



Gravity

Smart Campus

Gravity LDO Environmental Statement
Volume 2 – Appendices
Appendix 12.12 Shadow Habitat
Regulations Assessment

THIS IS GRAVITY



ECOLOGYSOLUTIONS

Part of the ES Group

**GRAVITY
LOCAL DEVELOPMENT ORDER**

**SHADOW
HABITATS REGULATIONS
ASSESSMENT**

**Pursuant to Regulation 63
of The Conservation of
Habitats and Species
Regulations 2017
(as amended)**

October 2021
7761.sHRA.vf

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1. INTRODUCTION

1.1. Background

- 1.1.1. This Shadow Habitats Regulations Assessment (sHRA) report has been prepared to provide sufficient information for the local planning authority in relation to the undertaking of an assessment of the effects of development proposals associated with the This is Gravity Ltd ("Gravity") enterprise zone site in Sedgemoor, Somerset (hereinafter, "the Gravity Site") on designated sites of nature conservation importance protected under The Conservation of Habitats and Species Regulations 2017 (as amended) (hereinafter, "the Habitats Regulations") and sites that are given the same protection in accordance with advice in the National Planning Policy Framework (NPPF¹).

Site Characteristics

- 1.1.2. The Gravity Site is located within an rural setting, between the villages of Puriton (to the west) and Woolavington (to the east). The main component of the Gravity Site is located to the north east of the village of Puriton, and north-west of the village of Woolavington. In addition, the Gravity Site includes a railway spur to the north-west, a road connection from Junction 23 of the M5 motorway to the south-west and a reedbed system that connects to the River Huntspill situated to the north.
- 1.1.3. Broadly, the Gravity Site is a former Royal Ordnance Facility, previously occupied by a single manufacturing use, and closed in 2008. The former use comprised multiple buildings and compounds and bunds across the majority of the site. Currently the site is fully remediated and is being prepared through materials reclamation and constitutes a largely brownfield site. Parts of the site comprise grasslands, woodland, scrub, hedgerows, tall ruderal and ephemeral vegetation along with standing water, reed bed, wet and dry ditches (Rhynes) as well as buildings and hardstanding. There are also areas of disturbed / bare ground.

1.2. Gravity Proposals

- 1.2.1. The Gravity proposals can be summarised as the development of a smart campus including commercial building or buildings (current Use Classes E (a)-(g), B2, B8) and sui generis floorspace uses together with a range of buildings within Use Classes C1, C2, E (a) – (g) and F, including restaurants / cafes, shops, leisure, education and sui generis uses. Additionally the development of up to 750 homes (Use Class C3, together with associated infrastructure including restoration of the railway line for passenger and freight services, rail infrastructure including terminals, sidings and operational infrastructure and change of use of land to operational rail land, multi-modal transport interchange, energy generation, energy distribution and management infrastructure, utilities and associated buildings and infrastructure,

¹ Paragraph 181 of the NPPF (2021)

digital infrastructure, car parking, a site wide sustainable water management system and associated green infrastructure, access roads and landscaping.

1.3. Purpose of this Report

- 1.3.1. This report specifically assesses the potential significant effects of the development proposals on international / European designated sites (now commonly referred to as Habitats Sites). Within this document specific regard is had to the tests under Regulation 63 of the Habitats Regulations. Regulation 63 is described and considered further in Section 2 of this document.
- 1.3.2. Assessment under Regulation 63 of the Habitats Regulations is required in this instance, since the Gravity Site lies in relatively close proximity to a number of European / internationally designated sites. The following relevant designated sites are located within a 20km radius of the Gravity site:
 - Somerset Levels and Moors SPA / Ramsar;
 - Severn Estuary SPA / SAC / Ramsar;
 - Mendip Limestone Grasslands SAC;
 - Hestercombe House SAC;
 - North Somerset & Mendip Bats SAC;
 - Exmoor & Quantock Oakwoods SAC; and
 - Mendip Woodlands SAC.
- 1.3.3. The proximity of the Gravity Site to these sites is described in detail at Section 3 of this report and is also shown (as applicable) on Plan ECO1 and at Annex 1.
- 1.3.4. As part of this assessment, professional judgement has necessarily been applied in some instances in order to interpret information.
- 1.3.5. In line with relevant jurisprudence, this report assesses the likely significant effects of the development proposals as a whole, both alone and in combination with other plans / projects. It then goes on to consider whether the development proposals will give rise to an adverse effect on the integrity of the relevant designated sites.
- 1.3.6. By way of headline summary, it is the opinion of Ecology Solutions, following detailed assessment, that the development proposals would not result in a likely significant adverse effect on the integrity of any international / European designated sites, either alone or in combination with any other plans or projects, and that as such the test contained at Regulation 63 of the Habitats Regulations would be passed.

2. LEGISLATIVE AND PLANNING POLICY BACKGROUND

2.1. This section of the document outlines further details regarding the legislation and planning policy of particular relevance to the development proposals.

2.2. Legislation and relevant case law

2.2.1. The Conservation of Habitats and Species Regulations 2017 (as amended) and preceding regulations (together "the Habitats Regulations") give effect to Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna ("Habitats Directive") and Council Directive 2009/147/EC on the conservation of wild birds in England and Wales ("Wild Birds Directive". In accordance with the EU-UK Withdrawal Agreement and the European Union (Withdrawal Agreement) Act 2020, the transitional provisions under which European law such as the Habitats Directive and the Wild Birds Directive had effect in Great Britain ended on 31 December 2020 (EU exit day).

2.2.2. To ensure that habitat and species protection and standards continue to be implemented in England and Wales in the same way or in an equivalent way after EU exit day, the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019/579 made necessary amendments to the Habitats Regulations. The changes are explained in the Policy paper "Changes to the Habitats Regulations 2017", published on 1 January 2021 ("Policy paper"). Most changes are concerned with the transfer of functions from the European Commission to appropriate authorities in England and Wales. There are no changes to the substance of the HRA process or that affect the conclusions reached in this HRA Report, which identifies amendments that are relevant in the process of determining the DCO.

2.2.3. On 24 February 2021 the Department for Environment, Food & Rural Affairs (Defra), NE, Welsh Government, and Natural Resources Wales published two guidance notes on Habitats Regulation Assessment and a derogation notice form:

- Guidance: Habitats regulations assessments: protecting a European site: How a competent authority must decide if a plan or project proposal that affects a European site can go ahead ("the HRA Guidance");
- Guidance: Duty to protect, conserve and restore European sites: Competent authorities must take action to help protect, conserve and restore the protected habitats and species of European sites ("Duty to conserve Guidance")
- Form: Habitats regulations assessment: derogation notice to be used by competent authorities when giving notice under regulation 64(5) of a decision to allow a plan or project that has an adverse effect on a European site to go ahead ("Derogation notice form").

- 2.2.4. Article 4 of the Habitats Directive required the United Kingdom to contribute to the creation of the Natura 2000 network, a coherent European ecological network of special areas of conservation that shall enable the natural habitat types and species' habitats concerned to be maintained or, where appropriate, restored at a favourable conservation status in their natural range. Article 1 (e) defines "conservation status" of a natural habitat as "the sum of the influences acting on a natural habitat and its typical species that may affect its long-term natural distribution, structure and functions as well as the long-term survival of its typical species" within the European Union ("EU"). Conservation status will be "favourable" when:

"- its natural range and areas it covers within that range are stable or increasing, and

- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and

- the conservation status of its typical species is favourable..."

- 2.2.5. For the purposes of the Habitats Regulations, all references to Natura 2000 are now to be construed as references to the national site network, which is defined in amended regulation 3 to mean *"the network of sites in the United Kingdom's territory consisting of such sites as—*

a) immediately before exit day formed part of Natura 2000; or

b) at any time on or after exit day are European sites, European marine sites and European offshore marine sites for the purposes of any of the retained transposing regulations"

- 2.2.6. The location of the Gravity Site in proximity to international / European designated sites means that the Habitats Regulations are relevant. The Gravity Site is not directly connected with or necessary to the management of a site forming part of the national site network. Therefore, it is necessary to consider whether it is likely to have a significant effect on any such site, either individually or in combination with other plans or projects.

- 2.2.7. The Gravity Site also lies in relatively close proximity to two Ramsar sites; specifically, the Severn Estuary and Somerset Levels and Moors Ramsar sites. The UK is a signatory to the Convention on Wetlands of International Importance Especially as Wildfowl Habitat 1971, commonly known as the Ramsar Convention after the town in which it was signed. Parties to the Ramsar Convention are obliged to designate particular sites as Wetlands of International Importance.

- 2.2.8. The obligations imposed by the Convention are in themselves not particularly strong, in that they require the promotion and encouragement of the stated aims, rather than any specific action. However, as a matter of policy², Ramsar sites receive the same

² As noted at paragraph 181 (b) of the National Planning Policy Framework (July 2021)

protection as designated SPAs and SACs. The procedures applicable to European sites are therefore to be applied to Ramsar sites, even though these are not protected by the Habitats Regulations as a matter of law.

2.2.9. The relevant legal and policy framework is discussed below.

Habitats and Birds Directives

2.2.10. Although neither the Habitats or Birds Directives now have the force of law in England, they will remain relevant in the interpretation and application of the Habitats Regulations 2017 unless and until Parliament otherwise modifies those Regulations. This is because the Habitats Regulations have the status of "retained EU law" for the purposes of the Withdrawal Agreement, which provides at Section 6(3) that, so far as retained EU law remains unmodified by UK legislation, it shall be interpreted in accordance with retained domestic case law, retained EU case law and retained general principles of EU law. This section therefore describes relevant aspects of the Habitats and Birds Directives and case law.

2.2.11. Under the EC Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna, commonly referred to as the Habitats Directive (Council Directive 92/43/EEC), Member States are required to take special measures to maintain the distribution and abundance of certain priority habitats and species (listed in Annexes I and II of the Directive).

2.2.12. Each Member State is required to designate the most suitable sites as Special Areas of Conservation (SACs). All such SACs will form part of the Natura 2000 network under Article 3(1) of the Habitats Directive.

2.2.13. Article 2(3) sets out that member states have a duty, in exercising their obligations under the Habitats Directive to:

".. take account of economic, social and cultural requirements and local characteristics."

2.2.14. Under the EC Directive on Wild Birds (the Birds Directive) (Council Directive 2009/147/EC, formerly 79/409/EEC), Member States are required to take special measures to conserve the habitats of certain rare species of birds (listed in Annex I of the Directive) and regularly occurring migratory birds.

2.2.15. Each Member State is required to classify the most suitable areas of such habitats as SPAs. This is designed to protect wild birds, and to provide sufficient diversity of habitats for all species so as to maintain populations at an ecologically sound level. All Bird Directive SPAs are part of the Natura 2000 network under article 3(1) of the Habitats Directive.

2.2.16. Thus, there is an obligation under the Habitats Directive and the Birds Directive for member states to designate sites before turning to measures for their protection.

- 2.2.17. The protection afforded to SPAs and SACs is delivered through Article 6 of the Habitats Directive.
- 2.2.18. Article 6(2) requires member states to take appropriate steps to avoid the deterioration of natural habitats and disturbance of species for which the sites have been designated, in so far as the disturbance could be significant in relation to the objectives of the Directive. Article 6(3) and Article 6(4) together set out a process known as Habitat Regulations Assessment (HRA) that comprises between one and five stages, depending on the outcome of assessments for each project. The five stages require the decision-maker to:
- assess whether there would be a Likely Significant Effect (“LSE”) on any European site (Stage 1); and, if such an effect cannot be excluded,
 - determine whether there would be an adverse effect on the integrity of any European site (Stage 2); and, if so,
 - consider whether there are any feasible alternative solutions that would be less damaging or avoid damage to the site (Stage 3); and, if not,
 - determine whether there are imperative reasons of overriding public interest (“IROPI”) why the development should proceed (Stage 4); and, if so,
 - consider whether all necessary compensatory measures have been secured to fully compensate for the negative effects of the proposal. The compensatory measures must not have a negative effect on the national network of European sites as a whole (Stage 5).
- 2.2.19. The HRA Guidance (February 2021) presents the HRA process as having up to three stages: 1. Screening; 2. Appropriate Assessment and 3. Derogation. Stage 3: Derogation comprises stages 3 – 5 above. If an appropriate assessment is undertaken and a proposed development fails to meet the integrity test then permission can only be granted for a development if it passes all three of the legal tests that are required to qualify for a derogation: i.e. no feasible alternative solutions, IROPI and necessary compensatory measures.

The Conservation of Habitats and Species Regulations 2017 (as amended)

- 2.2.20. The Conservation of Species and Habitats Regulations 2017, (Habitats Regulations), transposed the requirements of the Habitats Directive and Birds Directive into UK legislation.
- 2.2.21. As noted above, SACs and SPAs in the UK no longer form part of the European Union’s Natura ecological network. Instead, from 31 December 2020 these sites form part of the national site network (‘NSN’), which also includes any further SACs and SPAs designated under the Habitats Regulations.
- 2.2.22. The Habitats Regulations, regulation 16A sets out the management objectives for the NSN, places management obligations on appropriate

authorities and sets out the considerations to which such authorities must have regard in the discharge of their obligations.

- 2.2.23. The process to be followed where a competent authority proposes to undertake or to give any consent, permission or other authorisation for a plan or project that is likely to have a significant effect on a European site and is not directly connected with or necessary to the management of that site is set out in regulation 63 of the Habitats Regulations:

“63(1) A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for a plan or project, which:-

(a) is likely to have a significant effect on a European site or a European offshore marine site (either alone or in combination with other plans or projects) and

(b) is not directly connected with or necessary to the management of the site,

must make an appropriate assessment of the implications of the plan or project for that site in view of that site’s conservation objectives.

63(3) The competent authority must for the purposes of the assessment consult the appropriate nature conservation body and have regard to any representations made by that body within such reasonable time as the authority specifies.

63(5) In the light of the conclusions of the assessment, and subject to regulation 64, the authority may agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site or the European offshore marine site (as the case may be).

63(6) In considering whether a plan or project will adversely affect the integrity of the site, the authority must have regard to the manner in which it is proposed to be carried out or to any conditions or restrictions subject to which it proposes that the consent, permission or other authorisation should be given.”

- 2.2.24. Regulation 63 of the Habitats Regulations therefore sets out an assessment process that will comprise one or two stages, depending on the outcome of the first stage. The first stage is to determine whether the plan / project is likely to have a significant effect on the European site. If that possibility cannot be excluded then the second stage is to undertake an appropriate assessment of the implications of the plan or project for the European site in view of the site’s conservation objectives.

- 2.2.25. Some key concepts of the Habitats Directive and Habitats Regulations have been clarified through case law. The most pertinent cases in relation to the development proposals are: the *Waddenzee*

Judgement; the *Sweetman Case*; the *People over Wind* Judgement; and the *Holohan* Judgement. These are considered in chronological order below to illustrate recent changes to case law, and are discussed below.

Case Law

Waddenzee Judgement

- 2.2.26. In the *Waddenzee* case (C-127/02) [2004] the European Court of Justice decided that an appropriate assessment is required for a plan or project where there is a probability or a risk that it will have a significant effect on the SPA. The Judgement states (at paragraph 3(a)) that:

“...any plan or project not directly connected with or necessary to the management of the site is to be subject to an appropriate assessment of its implications for the site in view of the site’s conservation objectives if it cannot be excluded, on the basis of objective information, that it will have a significant effect on that site, either individually or in combination with other plans or projects.”

- 2.2.27. Hence, the need for an Appropriate Assessment should be determined on a precautionary basis.

- 2.2.28. The Judgement gives clarity that the test of ‘likely significant effect’ should also be undertaken in view of the European site’s Conservation Objectives. It is stated at paragraph 3(b) that:

“where a plan or project not directly connected with or necessary to the management of a site is likely to undermine the site’s conservation objectives, it must be considered likely to have a significant effect on that site.”

- 2.2.29. Paragraph 4 of the Judgement emphasises the requirement for the appropriate assessment to rely on objective scientific information:

“...an appropriate assessment...implies that, prior to its approval, all the aspects of the plan or project which can, by themselves or in combination with other plans or projects, affect the site’s conservation objectives must be identified in the light of the best scientific knowledge in the field. The competent national authorities, taking account of the appropriate assessment of the implications...for the site concerned in the light of the site’s conservation objectives, are to authorise such an activity only if they have made certain that it will not adversely affect the integrity of that site. That is the case where no reasonable scientific doubt remains as to the absence of such effects.”

Sweetman Case

- 2.2.30. Further guidance in relation to the consideration of impacts in the light of the Habitats Regulations is provided in the *Sweetman* case (*Sweetman v An Bord Pleanála* (C-258/11) [2014]). The case as set out by the Advocate General considered in detail the test for likely significant effect in paragraphs 50 and 51:

“50. The test which that expert assessment must determine is whether the plan or project in question has ‘an adverse effect on the integrity of the site’, since that is the basis on which the competent national authorities must reach their decision. The threshold at this (the second) stage is noticeably higher than that laid down at the first stage. That is because the question (to use more simple terminology) is not ‘should we bother to check’ (the question at the first stage) but rather ‘what will happen to the site if this plan or project goes ahead; and is that consistent with ‘maintaining or restoring the favourable conservation status’ of the habitat or species concerned’...

51. It is plain, however, that the threshold laid down at this stage of Article 6(3) may not be set too high, since the assessment must be undertaken having rigorous regard to the precautionary principle. That principle applies where there is uncertainty as to the existence or extent of risks. The competent national authorities may grant authorisation to a plan or project only if they are convinced that it will not adversely affect the integrity of the site concerned. If doubt remains as to the absence of adverse effects, they must refuse authorisation.”

- 2.2.31. The Court of Justice of the European Union (CJEU) agreed with the Advocate General’s conclusions, and held:

“40. Authorisation for a plan or project, as referred to in Article 6(3) of the Habitats Directive, may therefore be given only on condition that the competent authorities – once all aspects of the plan or project have been identified which can, by themselves or in combination with other plans or projects, affect the conservation objectives of the site concerned, and in the light of the best scientific knowledge in the field – are certain that the plan or project will not have lasting adverse effects on the integrity of that site. That is so where no reasonable scientific doubt remains as to the absence of such effects.”

- 2.2.32. Hence a plan or project may be authorised only if no reasonable scientific doubt remains as to the absence of effects. Reasonable scientific doubt will exist if the evidence is not sufficiently conclusive, or if there are gaps in the information.

Dilly Lane Case

- 2.2.33. Reference to this case is made on the basis that it aids in understanding the importance (in assessment terms) of the People Over Wind case discussed below.

- 2.2.34. The Secretary of State's decision to allow an appeal in relation to applications for a total of 170 new homes on a greenfield site off Dilly Lane, Hartley Wintney was challenged in High Court by Hart District Council. The legal challenge was made on the grounds that the Secretary of State had erred in departing from her Inspector's conclusions as to the effects on the Thames Basin Heaths SPA.
- 2.2.35. A key issue for the case was whether mitigation measures should be disregarded when assessing whether the project would have a likely significant effect on the SPA. Mr Justice Sullivan (now Lord Justice Sullivan) ruled in favour of the Secretary of State after concluding that there was no absolute legal rule that mitigation measures should be disregarded during the first stage – 'the likely significant test':

"55. The competent authority is not considering the likely effect of some hypothetical project in the abstract. The exercise is a practical one which requires the competent authority to consider the likely effect of the particular project for which permission is being sought. If certain features (to use a neutral term) have been incorporated into that project, there is no sensible reason why those features should be ignored at the initial, screening, stage merely because they have been incorporated into the project in order to avoid, or mitigate, any likely effect on the SPA."

People over Wind Case

- 2.2.36. The CJEU in *People over Wind and Sweetman v Coillte Teoranta* (C-323/17) [2018] has reversed the position adopted under the *Dilly Lane* Decision, with the CJEU ruling that:

"Article 6(3) of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora must be interpreted as meaning that, in order to determine whether it is necessary to carry out, subsequently, an appropriate assessment of the implications, for a site concerned, of a plan or project, it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site."

- 2.2.37. In accordance with this ruling, avoidance or mitigation measures cannot be considered at the first stage of the test (the 'Likely Significant Effect' stage) and can only be considered at the Appropriate Assessment stage. The *People over Wind* ruling therefore overrules previous domestic case law in this regard.

ESB Wind Developments (Sweetman III) [Case C-164/17]

- 2.2.38. In this case a request for a preliminary ruling was made to the CJEU concerning the interpretation of Articles 6(3) and 6(4) of Council Directive 92/43/EEC (the Habitats Directive). The request was made in relation to proceedings brought by Mr Peter Sweetman and Edel Grace against the decision of An Bord Pleanála (National Planning

Appeals Board, Ireland) concerning the latter's decision to grant ESB Wind Developments Ltd and Coillte permission for a wind farm project within an SPA. The ruling was handed down on 25th July 2018.

- 2.2.39. This ruling distinguishes between, for the purpose of the application of Articles 6(3) and 6(4) of the Directive, 'mitigation' that consists of measures intended to avoid or reduce harm to the protected site, and measures intended to compensate for any harm (Compensatory measures). It is stated:

"Article 6 of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora must be interpreted as meaning that, where it is intended to carry out a project on a site designated for the protection and conservation of certain species, of which the area suitable for providing for the needs of a protected species fluctuates over time, and the temporary or permanent effect of that project will be that some parts of the site will no longer be able to provide a suitable habitat for the species in question, the fact that the project includes measures to ensure that, after an appropriate assessment of the implications of the project has been carried out and throughout the lifetime of the project, the part of the site that is in fact likely to provide a suitable habitat will not be reduced and indeed may be enhanced may not be taken into account for the purpose of the assessment that must be carried out in accordance with Article 6(3) of the directive to ensure that the project in question will not adversely affect the integrity of the site concerned; that fact falls to be considered, if need be, under Article 6(4) of the directive."

Holohan Judgement

- 2.2.40. In the case of *Holohan v. An Board Pleanala* (C-461-17) [2018], the CJEU considered further the assessment process to be adopted when considering potential impacts on a European designated site.
- 2.2.41. In considering this case, the CJEU clarified the need for a thorough assessment and certainty in the conclusions reached. The judgement also identified that the scope of an Appropriate Assessment may have to extend beyond the designated habitats and the species for which the habitat has been listed.
- 2.2.42. The Advocate General's Opinion stated that *"the assessment must therefore unequivocally demonstrate why the protected habitat types and species are not adversely affected"*, and notes that *"mere silence in respect of certain habitat types or species... will not generally amount to complete, precise and definitive findings capable of removing all reasonable scientific doubt as to the effects of the work under assessment"*.
- 2.2.43. Drawing the case law together, as a result of the CJEU interpretations of Article 6(3) and (4) of the Habitats Directive, a distinction is now drawn between the following:

- Conservation measures for special areas of conservation that correspond to the ecological requirements of the natural habitats and species and maintain or restore natural habitats at a favourable conservation status. These should be distinguished from measures proposed as part of a proposed development.
- Measures that are integral parts of a proposed development that are not intended to avoid or reduce direct adverse effects. Provided these are not avoidance or mitigation measures they may be taken into account in Stage 1 (screening).
- Protective measures forming part of a proposed development that are intended to avoid or reduce any direct adverse effects to ensure that the LDO Scheme does not adversely affect the integrity of a European site. These may not be taken into account in Stage 1 but can be taken into account in Stage 2.
- Measures that are aimed at compensating for the negative effects of a proposed development on a European site and that cannot be taken into account in the assessment of the implications of the project (Habitats Directive Article 6(4); Habitats Regulations Regulation 64) but are relevant to an evaluation at Stage 5.

2.3. Guidance and other Relevant Documents

- 2.3.1. Guidance on the interpretation of key terms and concepts contained within the European and UK legislation of relevance to European designated sites is provided through several documents issued by the European Commission and national organisations such as the Joint Nature Conservation Committee (JNCC) and Natural England. This guidance is discussed below (taken in chronological order).

Managing Natura 2000 Sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC

- 2.3.2. The document entitled "Managing Natura 2000 Sites the provisions of article 6 of the 'Habitats' Directive 92/43/CEE", was published by the European Commission in 2000. Its purpose was to provide guidelines to the Member States on the interpretation of certain key concepts used in Article 6 of the Habitats Directive.
- 2.3.3. In January 2019 the European Commission published updated guidance in relation to managing Natura 2000 sites, following that initial guidance published in 2000.
- 2.3.4. The primary purpose of the revision was to incorporate relevant rulings of the Court of Justice of the European Union (EU) which have been issued since the initial guidance was published in 2000. It also integrates, into a single document, other relevant European Commission notes / guidance documents. Those key rulings (of the Court of Justice of the EU) and other relevant European Commission notes / guidance are discussed above in this report. The revised guidance provides clarifications of key concepts to Member State, authorities and stakeholders involved in the management of Natura 2000 sites (e.g. SPAs and SACs).

2.3.5. This document advises at Section 2.3.3 that conservation measures must correspond to the ecological requirements of the habitats and species present for which the site is designated and that these requirements “involve all the ecological needs which are deemed necessary to ensure the conservation of the habitat types and species, including their relations with the physical environment (air, water, soil, vegetation, etc.)”.

2.3.6. At section 3.5 the guidance states, in relation to deterioration and disturbance of habitats or species:

“Deterioration and disturbance should be assessed against the conservation objectives of the site and the conservation condition of the species and habitat types present in the site using the same criteria as for the Article 6(3) procedure. This notion should be interpreted in a dynamic way, according to the evolution of the conservation condition of the habitat or of the species in that site.”

2.3.7. Section 4.5.2 sets out that in determining what may constitute a likely ‘significant’ effect one should take into account the conservation objectives for the site and other relevant baseline information. In the second paragraph of this section of the document it is stated:

“In this regard, the conservation objectives of a site as well as prior or baseline information about it can be very important in more precisely identifying conservation sensitivities.”

2.3.8. With regard to an assessment of the effects of a plan / project on the integrity of a site, the ‘integrity of the site’ is defined at Section 4.6.4 as:

*“... the coherent sum of the site’s ecological structure, function and ecological processes, across its whole area, which enables it to sustain the *habitats*, complex of habitats and/or populations of species for which the site is designated.”*

2.3.9. The guidance is clear, within the text box on page 58, that an assessment as to the implications of the plan / project on the integrity of the site should be limited to an assessment against the site’s conservation objectives:

“The integrity of the site involves its constitutive characteristics and ecological functions. The decision as to whether it is adversely affected should focus on and be limited to the habitats and species for which the site has been designated and the site’s conservation objectives.”

2.3.10. Section 5 of the document deals with Article 6(4) of the Habitats Directive.

Assessment of Plans and Projects Significantly Affecting Natura 2000 sites
- Methodological guidance on the provisions of Article 6(3) and (4) of the
Habitats Directive 92/43/EEC (European Commission, 2001)

- 2.3.11. This document, published by the European Commission in 2001, gives guidance on carrying out and reviewing those assessments required under Article 6(3) and (4) of the Habitats Directive. It is provided as supplementary guidance and does not over-ride or replace any of that set out within '*Managing Natura 2000*' (European Commission, 2000) which as stated at page 6 of the document, "*is the starting point for the interpretation of the key terms and phrases contained in the Habitats Directive*". The guidance provided is not mandatory and it is clearly set out that its use is "*optional and flexible*" and that it is for "*Member States to determine the procedural requirements deriving from the directive*".
- 2.3.12. The guidance sets out the key stages in following the tests contained within the Habitats Directive. Pertinent to an assessment under Regulation 63, stages one and two are relevant. Stage one is the screening stage assessing the likelihood of a plan / project resulting in a significant effect upon the European site. The second comprises the Appropriate Assessment.
- 2.3.13. Section 3.2.4 is concerned with Appropriate Assessment and specifically, the assessment against the Conservation Objectives of the European site. Box 9 provides a list of five example Conservation Objectives for differing broad habitat types. One such example, that for a coastal site, taken from Box 9 is provided below:

"to maintain the status of the European features of this coastal site in favourable condition, allowing for natural change. Features include coastal shingle vegetation and lagoons (within a candidate special area of conservation (SAC), which is also an SPA)."

Internal Guidance to decisions on 'Site Integrity': A framework for provision of advice to competent authorities (English Nature, 2004)

- 2.3.14. Natural England (English Nature at the time) produced an internal guidance document on the provision of advice to competent authorities regarding the concept of 'site integrity' in undertaking an Appropriate Assessment.
- 2.3.15. This guidance sets out a definition for integrity. It states that integrity is considered at the site level and gives the following definition (taken from PPG9):
- "The coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and / or levels of populations of the species for which it was classified"*.
- 2.3.16. Integrity is further defined within section 3.0 where it is stated that:

“In a dynamic context ‘integrity’ can be considered as a site having a sense of resilience and ability to evolve in ways that are favourable to conservation.”

- 2.3.17. The need to maintain or restore the designated site to favourable conservation status is dealt with in the final paragraph of section 3.0. Natural England quotes guidance issued jointly by the Environment Agency, English Nature and Countryside Council for Wales.
- 2.3.18. The guidance provides a checklist within section 4.1, for assessing the likelihood of an adverse effect on integrity occurring as a result of the proposed plan / project. It is stated that if the answer to all of the questions posed within the checklist is “yes” then it is reasonable to conclude that there will be no adverse effect upon integrity. In the event that one or more of the answers is no, then the guidance suggests a series of further site-specific factors, listed at 4.2 – 4.7.

Common Standards Monitoring (JNCC, 2004)

- 2.3.19. Common Standards Monitoring (CSM) is a means by which condition objectives for habitats, species, or other features of designated sites (e.g. SSSIs and SPAs) are set based on key attributes of the features.
- 2.3.20. JNCC and the country Conservation Agencies (e.g. Natural England) developed guidance on the setting and assessing of condition objectives, as required under the Birds and Habitats Directives and set out a framework for this in 1999. This framework is provided in the form of CSM guidance which comprises a suite of documents including an ‘*Introduction to the Guidance Manual on Common Standards Monitoring*’ and several species / habitat specific documents. The Guidance Manual covers various relevant concepts and terms. It also provides a background to the setting of conservation objectives and sets out the desired approach to setting targets, monitoring, management and reporting on conservation measures in designated sites.
- 2.3.21. The Guidance Manual and CSM guidance for individual site attributes (e.g. its bird or reptile interest) set out specific criteria regarding the identification of interest features, targets and methods of assessment. There is in-built flexibility and allowances for ‘judgements to be made’ when assessing, for example, favourable condition.
- 2.3.22. It is understood that Natural England applies the CSM approach to European designated sites through an assessment of the SSSI unit condition. This is undertaken on a cycle of approximately six years. The assessment does not relate to the Conservation Objectives of the European site but provides a tool for tailoring future management of the SSSI such that favourable condition of the interest features can be maintained or restored as appropriate.

Guidance document on Article 6(4) of the 'Habitats Directive' (European Commission, 2007)

- 2.3.23. This document, published by the European Commission in 2007, is intended to provide clarification on key terms / concepts as referred to within '*Managing Natura 2000 Sites*' and replaces the section on Article 6(4) within that earlier document.
- 2.3.24. The document covers the concepts of 'Alternative Solutions', 'Imperative Reasons of Overriding Public Interest', 'Compensation Measures', 'Overall Coherence' and the 'Opinion of the Commission'.
- 2.3.25. With regard to ensuring the quality of an Appropriate Assessment, and to define exactly what needs to be compensated, it is stated at Section 1.3 that:
- "Assessment procedures of plans or projects likely to affect Natura 2000 sites should guarantee full consideration of all elements contributing to the site integrity and to the overall coherence of the network, both in the definition of the baseline conditions and in the stages leading to identification of potential impacts, mitigation measures and residual impacts. These determine what has to be compensated, both in quality and quantity."*
- 2.3.26. The need to use information contained within the Natura 2000 Standard Data Form, in tandem with the site's Conservation Objectives when undertaking an Appropriate Assessment is specifically referred to (under the second hyphenated point at Section 1.3 on page 5).
- 2.3.27. Section 1.3.2 gives guidance on the application of Article 6(4) in respect of reasons of overriding public importance and Section 1.4.1 gives guidance on the application of Article 6(4) in respect of compensatory measures.

Habitats regulations assessments: protecting a European site: How a competent authority must decide if a plan or project proposal that affects a European site can go ahead

- 2.3.28. The most up-to-date guidance on HRA (for England and Wales) is provided by the updated HRA guidance titled "*Habitats regulations assessments: protecting a European site: How a competent authority must decide if a plan or project proposal that affects a European site can go ahead*" (hereinafter "HRA Guidance 2021")³. This guidance is available on the GOV.UK website and was published in February 2021.
- 2.3.29. This HRA Guidance 2021 describes the following stages of the assessment process.

³ <https://www.gov.uk/guidance/habitats-regulations-assessments-protecting-a-european-site#follow-hra-principles>

- 1) *“Screening - to check if the proposal is likely to have a significant effect on the site’s conservation objectives. If not, you do not need to go through the appropriate assessment or derogation stages.*
- 2) *Appropriate assessment - to assess the likely significant effects of the proposal in more detail and identify ways to avoid or minimise any effects.*
- 3) *Derogation - to consider if proposals that would have an adverse effect on a European site qualify for an exemption.”*

2.3.30. In accordance with the HRA Guidance 2021, the Local Planning Authority (acting as Competent Authority under the Habitats Regulations) will need to:

- understand the conservation objectives for the relevant European site affected - these describe the ecological reasons for its protection (see Section 5 and Annex 6 of this sHRA).
- use these databases to find out about existing threats or pressures on the site - this can include the effects of any unregulated activities or the effects of permissions given in the past (see Section 6 and Annexes 6 and 7 of this sHRA).
- consider all possible effects of the proposal, at every phase, on the designated features of the site - include impacts that are direct and indirect, temporary and permanent (see Section 6 of this sHRA)
- consider possible combined effects on the site with other plans and projects (see Section 6 of this sHRA).
- make judgements based on the facts of the individual situation and the ecological condition of the site’s features (see Section 6 of this sHRA).
- use the best available objective and scientific information to make confident decisions.
- work with the proposer to find a way to allow projects or adopt plans while still protecting sites, if possible.
- ask for information from the proposer that’s proportionate, for example only ask for the information or evidence you need to meet the regulations.
- consider the advice of the relevant SNCB.
- keep a detailed written record of the HRA and give clear reasons and evidence for your decisions.
- make sure the assessment is thorough and complete with clear and precise conclusions.

2.3.31. The HRA Guidance 2021 confirms that a precautionary approach to decisions should be taken at each stage of the HRA process. It is stated that, for example:

- *“If the risk of a proposal having a significant effect on the conservation objectives of a European site at stage 1: screening cannot be ruled out then an appropriate assessment must be carried out;*
- *If all reasonable scientific doubt of an adverse effect on a site’s integrity at stage 2: appropriate assessment cannot be ruled out*

then the proposal must be refused unless an exemption (stage 3: derogation) is justified.”

2.4. Planning Policy

National Planning Policy Framework (NPPF) and ODPM / DEFRA Circular (ODPM / DEFRA, 2005)

- 2.4.1. Paragraphs 174 and 181 of the National Planning Policy Framework (July 2021) are of direct relevance. Paragraph 174 makes reference to protecting and enhancing sites of biodiversity value *“in a manner commensurate with their statutory status or identified quality in the development plan”*. Paragraph 181 asserts that potential SPAs, possible SACs, listed or proposed Ramsar sites and sites providing compensatory measures for adverse effects should be afforded the same level of protection as classified SPAs and designated SACs (referred to in the NPPF as ‘habitats sites’).
- 2.4.2. Guidance on the determination of whether an effect on a European designated site is likely to be significant, together with the scope of Appropriate Assessments and ascertaining the effect on the integrity, was previously provided within Circular 06/2005 *“Biodiversity and geographical conservation – statutory obligations and their impact within the planning system”* (DEFRA). The Circular originally accompanied Planning Policy Statement 9 (PPS9) and is referenced in the NPPF at footnote 61. Whilst Circular 06/2005 provides guidance in respect of statutory obligations for biodiversity and geological conservation and their impact within the planning system, the most up-to-date guidance on HRA (for England and Wales) is provided by the updated HRA Guidance of Feb 2021 (discussed above).
- 2.4.3. Paragraph 182 of the updated NPPF (July 2021) states that:
- “The presumption in favour of sustainable development does not apply where the plan or project is likely to have a significant effect on a habitats site (either alone or in combination with other plans or projects), unless an appropriate assessment has concluded that the plan or project will not adversely affect the integrity of the habitats site”.*

3. KEY TERMS AND CONCEPTS RELEVANT TO THE TESTS CONTAINED WITHIN THE HABITATS REGULATIONS

- 3.1. The application of the Habitats Regulations when deciding to grant a consent/permission for a plan or project has several individual steps but two main stages.
- 3.2. The first main stage of the process is, in accordance with Regulation 63(1), to ascertain whether, either alone or in combination, the plan/project is likely to give rise to any significant effects on the European site ("the likely significance test"). This is essentially a broad sieving stage, whereby if it can be shown that no significant effects are likely, then a consent can safely be granted without the need to move to the second main stage. If conversely the plan or project is likely to have a significant effect or it cannot be determined with the required level of certainty whether an effect would arise then the second main stage is triggered and an appropriate assessment should be undertaken. In line with the HRA Guidance 2021, the test at the sieving stage should be undertaken in view of the conservation objectives of the European site, on the basis that a plan or project which is likely to undermine a site's conservation objectives, must be likely to have a significant effect upon it.
- 3.3. The second main stage (Regulation 63(5), where necessary, is to assess the implications of the plan/project on the integrity of the European site, again in view of a site's conservation objectives. This second main stage of the process (appropriate assessment or "the integrity test") is a more detailed and thorough examination of the proposals and the impacts on the European site.
- 3.4. In the event that in undertaking the appropriate assessment the competent authority (in this instance the Local Planning Authority) cannot conclude that the plan/project will not have an adverse effect on the integrity of a European site, the plan/project may still be consented where the competent authority is satisfied that, there being no alternative solutions, the plan/project must be carried out for imperative reasons of over-riding public interest. This is set out at Regulation 64 of the Habitats Regulations.
- 3.5. Regulation 68 provides that where a project is agreed to, notwithstanding a negative assessment, the appropriate authority must secure that any necessary compensatory measures are taken to ensure that the overall coherence of the NSN is protected.

Defining "Integrity"

- 3.6. The HRA Guidance 2021 states that:

"The integrity of the site will be adversely affected if a proposal could, for example:

- *destroy, damage or significantly change all or part of a designated habitat*
- *significantly disturb the population of a designated species, for example, its breeding birds or hibernating bats*

- *harm the site's ecological connectivity with the wider landscape, for example, harm a woodland that helps to support the designated species from a nearby European site*
- *harm the site's ecological function, or its ability to survive damage, and reduce its ability to support a designated species*
- *change the site's physical environment, for example, by changing the chemical makeup of its soil, increasing the risk of pollution or changing the site's hydrology*
- *restrict access to resources outside the site that are important to a designated species, for example, food sources or breeding grounds*
- *prevent or disrupt restoration work, or the potential for future restoration, if it undermines the site's conservation objectives"*

- 3.7. Further useful guidance is provided within the "Managing Natura 2000 guidance document"⁴ which contains guidance as to the meaning of "integrity" for the purpose of addressing the provision of Article 6 of the Habitats Directive. It states at section 4.6.4 that:

"The 'integrity of the site' can be usefully defined as the coherent sum of the site's ecological structure, function and ecological processes, across its whole area, which enables it to sustain the habitats, complex of habitats and / or populations of the species for which the site is designated."

- 3.8. The text box at the foot of page 47 of the Managing Natura 2000 guidance document goes on to state:

"The integrity of the site involves its constitutive characteristics and ecological functions. The decision as to whether it is adversely affected should focus on and be limited to the habitats and species for which the site has been designated and the site's conservation objectives."

The term 'Conservation Objectives'

- 3.9. Amended regulation 3A of the Habitats Regulations states that in the Habitats Regulations, any reference to "the requirements of the Directives" is to be construed as if the objective of the Directives included the "management objectives" for the national site network. The management objectives for the national site network are set out in Amended Regulation 16A.

- 3.10. Amended Regulation 16A of the Habitats Regulations states:

1) *"The appropriate authority must, in co-operation with any other authority having a corresponding responsibility, manage, and where necessary adapt, the national site network, so far as it consists of European sites, with a view to contributing to the achievement of the management objectives of the national site network."*

2) *The management objectives of the national site network are—*

⁴ Managing Natura 2000 Sites – The provisions of Article 6 of the habitats Directive 92/43/EEC (2019)

- a) *to maintain at, or where appropriate restore to, a favourable conservation status in their natural range (so far as it lies in the United Kingdom's territory, and so far as is proportionate)—*
 - i. *the natural habitat types listed in Annex I to the Habitats Directive;*
 - ii. *the species listed in Annex II to that Directive whose natural range includes any part of the United Kingdom's territory;*
 - b) *to contribute, in their area of distribution, to ensuring the survival and reproduction of—*
 - i. *the species of birds listed in Annex I to the new Wild Birds Directive which naturally occur in the United Kingdom's territory;*
 - ii. *regularly occurring migratory species of birds not listed in that Annex which naturally occur in the United Kingdom's territory;*
 - c) *to contribute, to securing compliance with the requirements of Article 2 of the new Wild Birds Directive for the purposes of the duty in regulation 9(1) in relation to the species of birds in paragraph (b) within their area of distribution.*
- 3) *In complying with the obligation in paragraph (1), the appropriate authority must have regard—*
- a) *in relation to any European sites which are not of a kind mentioned in regulation 8(1)(d), to the considerations mentioned in paragraph (4);*
 - b) *in relation to European sites of a kind mentioned in regulation 8(1)(d), to the considerations mentioned in paragraph (5).*
- 4) *The considerations mentioned in paragraph (3)(a) are—*
- a) *the importance of the sites for meeting the objective in paragraph (2)(a);*
 - b) *the importance of the sites for the coherence of national site network;*
 - c) *the threats of degradation or destruction (including deterioration and disturbance of protected features) to which the sites are exposed.*
- 5) *The considerations mentioned in paragraph (3)(b) are—*
- a) *the importance of the sites for meeting the objectives in paragraph 2(b) and (c);*
 - b) *in the case of migratory species, the importance of their breeding, moulting and wintering areas and staging points along their migration routes;*
 - c) *the importance of the sites for the coherence of national site network;*
 - d) *the threats of degradation or destruction (including deterioration and disturbance of protected features) to which the sites are exposed."*
- 3.10.1. The formal European Site Conservation Objectives for SPAs and SACs in England are produced by Natural England. A copy of the

European Site Conservation Objectives (and where available, Supplementary Advice) for the relevant designated sites are included as annexes to this sHRA.

Assemblages

- 3.11. “Assemblage” is not a term or a concept used in the Directive. Section 14 of the Introduction to the CSM describes what may constitute an assemblage, with specific reference to SSSIs, SPAs and Ramsar sites. Under the title, “What is an assemblage?”, the following information is given:

“ASSIs/SSSIs, SPAs and Ramsar sites may each be notified because of the presence of important assemblages of species. This might seem straightforward, but in the context of species features two situations can be envisaged:

- 1. A colony of different species all occurring / living together, where the total number of individuals is the key aspect of the interest on the site (e.g. more than 20,000 seabirds on a SPA site).*
- 2. A number of characteristic species which together form the feature and usually share similar ecological or habitat requirements (e.g. the co-occurrence of woodland or upland bird species, or heathland invertebrates).*

The term ‘assemblage’ can also be used in a third, functional, way; when there are a number of features which co-exist, yet are individually notified (i.e. they are features in their own right). While it may be possible to assess them using the same or very similar attributes, these species must be assessed as individual features independently of any assemblage of which they may also form a part (e.g. under scenario 1).”

- 3.12. Thus the quality of the ‘assemblage’ can be defined by the mix of species (assemblage) or the total number of characteristic species (aggregation).

European Marine sites

- 3.13. European Marine Sites are not statutorily designated sites in their own right. They are composite sites, comprising the marine elements of SACs, SPAs and Ramsar sites. EMSs are commonly described as ‘management units’ for those (European / Ramsar) sites which extend beyond the underpinning SSSI / Area of Special Scientific Interest (ASSI – in Northern Ireland) designation boundaries, which typically extend only to the mean low water mark. In other words, an EMS designation confers no additional protection to a site nor does it change the legal tests to be applied in relation to areas which are separately protected.

Application of the “Precautionary Principle”

3.14. Relevant case law makes it clear that in applying the relevant tests of the Habitats Regulations, there is a need for certainty (or the absence of reasonable scientific doubt), both regarding the nature and extent of predicted effects on integrity and in relation to the effectiveness of any preventative measures relied upon. As discussed previously, The HRA Guidance 2021 confirms that a precautionary approach to decisions should be taken at each stage of the HRA process.

3.15. The document titled "Communication from the Commission on the Precautionary Principle" (2000) provides useful guidance in relation to the application of the Precautionary Principle in relation to European sites issues. A copy of this guidance is included at Annex 2. Paragraph 6, sets out the six key matters for consideration when applying the Precautionary Principle. Paragraph 6 states:

"Where action is deemed necessary, measures based on the precautionary principle should be, inter alia:

- proportional to the chosen level of protection,*
- non-discriminatory in their application,*
- consistent with similar measures already taken,*
- based on an examination of the potential benefits and costs of action or lack of action (including, where appropriate and feasible, an economic cost/benefit analysis),*
- subject to review, in the light of new scientific data, and*
- capable of assigning responsibility for producing the scientific evidence necessary for a more comprehensive risk assessment."*

3.16. Under these bulleted points, the guidance gives specific definitions in relation to each of the above at pages 4 and 5, with further detail provided within section 6.

3.17. In accordance with the Communication from the Commission it is clear that when they are deemed necessary, risk reduction measures should be proportionate and must not aim at zero risk. It is stated at section 6.3.1 of the Communication from the Commission that:

"The measures envisaged must make it possible to achieve the appropriate level of protection. Measures based on the precautionary principle must not be disproportionate to the desired level of protection and must not aim at zero risk, something which rarely exists. However, in certain cases, an incomplete assessment of the risk may considerably limit the number of options available to the risk managers."

3.18. With reference to not aiming "at zero risk" the judgement of the Appeal Court in the case of *Morge vs Hampshire County Council* [2010] EWCA Civ 608 is relevant. Lord Justice Ward considered what the level of disturbance was required in addressing Article 12(1)(b) and at paragraph 35 he described the level or risk of threatened habitat and species stating that:

"... It must be certain, that is to say, identifiable. It must be real, not fanciful."

- 3.19. This is understood to mean that for the level of risk to be real and identifiable, it must be based upon objective evidence to substantiate the risk.
- 3.20. The judgment in the case of *Boggis v Natural England*⁵ also assists in determining when it would be appropriate to invoke the precautionary principle and conclude that the objective information needed, is simply not available.
- 3.21. At paragraph 37 of the judgment, it is stated:

"...a claimant who alleges that there was a risk which should have been considered by the authorising authority so that it could decide whether that risk could be "excluded on the basis of objective information", must produce credible evidence that there was a real, rather than a hypothetical, risk which should have been considered."

- 3.22. Also of relevance is the case of *R (Champion) v. North Norfolk District Council*⁶, where at paragraph 41, Lord Carnwath makes it clear that Article 6(3) does not require absolute certainty of no adverse effect and it is ultimately an issue of judgment for the decision maker. It is stated:

"As the court itself indicated in Waddenzee the context implies a high standard of investigation. However, as Advocate General Kokott said in Waddenzee [2005] All ER (EC) 353, para 107:

"The necessary certainty cannot be construed as meaning absolute certainty since that is almost impossible to attain. Instead, it is clear from the second sentence of article 6(3) of the Habitats Directive that the competent authorities must take a decision having assessed all the relevant information which is set out in particular in the appropriate assessment. The conclusion of this assessment is, of necessity, subjective in nature. Therefore, the competent authorities can, from their point of view, be certain that there will be no adverse effects even though, from an objective point of view, there is no absolute certainty"

In short, no special procedure is prescribed, and, while a high standard of investigation is demanded, the issue ultimately rests on the judgment of the authority."

Summary conclusions

- 3.23. Having regard to the relevant legislation and supporting guidance it is clear that the assessment at Regulation 63 of the Habitats Regulations, is a two

⁵ [2009] EWCA Civ 1061

⁶ [2015] UKSC 52, [2015] 1 WLR 3710,

stage process, the first being the 'likely significance' test stage, the second being the 'integrity' test.

3.24. The Competent Authority should not grant a consent or other permission unless it can be ascertained that the plan / project will not adversely affect the integrity of relevant European Sites. The decision taker must be certain of this, i.e. reach a judgment beyond reasonable scientific doubt in line with the precautionary principle. This test must be applied in light of the Conservation Objectives which have formally been adopted for each of the European Sites.

3.25. It is also necessary to note the Holohan judgment. That judgment emphasises that it may be necessary to look wider than the listed interest features when assessing against integrity. In that case the ECJ stated:

"Article 6(3) of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora must be interpreted as meaning that an 'appropriate assessment' must, on the one hand, catalogue the entirety of habitat types and species for which a site is protected, and, on the other, identify and examine both the implications of the proposed project for the species present on that site, and for which that site has not been listed, and the implications for habitat types and species to be found outside the boundaries of that site, provided that those implications are liable to affect the conservation objectives of the site."

3.26. This judgment underlines the importance of the assessment and ultimate judgment being related to the conservation objectives of the site.

3.27. It is important to recognise that the species for which sites are protected (at any level) do not recognise arbitrary boundaries and for many species / groups they will be reliant on different habitats or areas, in parts of their natural range for different stages of their life cycle, or at different times of year (e.g. as a response to seasonal climatic changes). A protected site may serve a 'protective function' for only part, or all of a species life cycle.

3.28. Regarding European designated sites, Article 4.1 of the Habitats Directive is of direct relevance on this point. It states:

"For animal species ranging over wide areas these sites shall correspond to the places within the natural range of such species which present the physical or biological factors essential to their life and reproduction. For aquatic species which range over wide areas, such sites will be proposed only where there is a clearly identifiable area representing the physical and biological factors essential to their life and reproduction."

3.29. The presence of a species within a site and the population number at a point in time is an important consideration in determining the quality and importance of the site to the species in question. However, in real terms, value judgments on site quality are made in relation to the contribution the site (e.g. SPA) makes to the favourable conservation status of the species generally. A reduction in numbers of a qualifying or other (e.g. typical)

species within a designated site may not jeopardise the contribution the site makes to the sustainability of the species more generally and in this respect, site integrity continues to be maintained.

- 3.30. Similarly, when considering bird assemblage features, the total loss of a species from an assemblage would be considered as harm in assessment terms, however so long as the ongoing viability of that species (as a contributing facet of the assemblage) was maintained, then a level of loss would not have an adverse effect on integrity, since the coherence of the site's ecological structure, function and ecological processes would still be maintained.

4. LOCATION OF THE GRAVITY SITE IN RELATION TO RELEVANT DESIGNATED SITES

4.1. In undertaking this assessment, regard has first been had to all those European / International designated sites located within 20km of the Gravity Site (by straight line distance). These include:

- Severn Estuary SPA / SAC / Ramsar (approximately 2.2km west),
- Somerset Levels and Moors SPA / Ramsar (approximately 3.2km east);
- Mendip Limestone Grasslands SAC (approximately 13km northeast);
- Exmoor and Quantock Oakwoods SAC (approximately 14.3km west);
- Hestercombe House SAC (approximately 14.7 km southwest);
- Mendip Woodlands SAC (approximately 15.2km northeast);
- North Somerset and Mendip Bats SAC (approximately 16km northeast);

4.2. Additionally, The Severn Estuary SPA/SAC/Ramsar site is classified as a European Marine Site (EMS). EMSs are defined as any part of a European site covered (either continuously or intermittently) by tidal waters or any part of the sea. They include SPAs, SACs and Ramsar sites. In many instances these designations coincide.

4.3. The relationship between the Site and relevant designated sites is shown on Plan ECO1 and on the series of maps produced at Annex 1.

5. CONSERVATION STATUS OF RELEVANT DESIGNATED SITES

- 5.1. This section of the assessment describes the reasons for designation of the international / European designated sites, together with supporting information and the Conservation Objectives (noting that these are not produced for Ramsar sites).

Severn Estuary SPA

- 5.2. The Natura 2000 Data Form (dated 22nd December 2015 – see Annex 3) states that the Severn Estuary SPA qualifies under:

- Article 4.1 of the Birds Directive (79/409/EEC) for wintering populations of Bewick's Swan *Cygnus columbianus bewickii* (3,9% of the GB population);
- Article 4.2 of the Birds Directive (79/409/EEC) for regularly supporting in winter internationally important numbers of Gadwall *Anas strepera*, Greater White-fronted Goose *Anas albifrons*, Dunlin *Calidris apina*, Shelduck *Tadorna tadorna*, and Redshank *Tringa totanus*,
- Article 4.2 of the Birds Directive (79/409/EEC) for supporting an internationally important assemblage of birds in winter (84,317 waterfowl) including Bewick's Swan, Shelduck, Gadwall, Dunlin, and Redshank.

- 5.3. Regulation 33 Advice has been jointly published by Natural England, the Countryside Council for Wales and the Welsh Assembly Government (see Annex 4). This advice summarises information taken from the original citation (1993), the 2001 SPA review and the Natura 2000 data form dated 2006. It clearly states at section 2.2 (dealing with qualifying features of the SPA) that at present the legally protected species remain those in the original 1995 citation. Since publication of the Regulation 33 Advice, further information has been published including the revised Natura 2000 data form (2015) (see Annex 3) and information made available by the JNCC. The Natura 2000 data form of 2015 has been discussed above. Current information available on the JNCC website relating to qualifying features of the SPA (see Annex 5) lists Bewick's Swan, Gadwall, Greater White-fronted Goose, Dunlin Shelduck and Redshank as individual qualifying features along with a waterbird assemblage figure of 84,317 individuals (no species are specifically cited in relation to the assemblage).

Severn Estuary Ramsar

- 5.4. The Severn Estuary Ramsar site qualifies under:

- Criterion 1 of the Ramsar convention due to its immense tidal range (second largest in the world) which affects the physical environment and biological communities (including the Annex I communities' sandbanks, estuaries, mudflats and sandflats, and Atlantic salt meadows);
- Criterion 3 due to its unusual estuarine communities, reduced diversity and high productivity;
- Criterion 4 for its importance for the run of migratory fish between the sea and the river via the estuary, including for Salmon *Salmo*

salar, Sea Trout *Salmo trutta*, Sea Lamprey, River Lamprey *Lampetra fluviatilis*, Allis Shad *Alosa alosa*, Twaite Shad *Alosa fallax*, and Eel *Anguilla anguilla*. It is also of particular importance for migratory birds during spring and autumn;

- Criterion 5 as it supports an assemblage of international importance - 1998/99-2002/2003 5 year peak mean of 70,919 waterfowl;
- Criterion 6 as it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird. Species with peak counts in winter (at designation) are: Bewick's Swan, Greater White-fronted Goose, Shelduck, Gadwall, Dunlin and Redshank. Populations identified subsequent to designation are: Ringed Plover *Charadrius hiaticula* (spring/autumn), Eurasian Teal *Anas crecca* (winter), Northern Pintail *Anas acuta* (winter) and Lesser Black-backed Gull *Larus fuscus graellsii* (breeding); and
- Criterion 8 due to the fish of the whole estuarine and river system being one of the most diverse in Britain, with over 110 species recorded, including those listed under Criterion 4, and for its importance as a feeding and nursery ground for many fish species, particularly Allis Shad and Twaite Shad which feed on mysid shrimps in the salt wedge.

5.5. The relevant Ramsar Information Sheet is included at Annex 3.

Severn Estuary SAC

5.6. The Severn Estuary SAC is designated for the following features of interest:

- Mudflats and sandflats not covered by seawater at low tide;
- Estuarine and intertidal habitats;
- Anadromous fish (River Lamprey *Lampetra fluviatilis*, Twaite Shad *Alosa fallax*, Allis Shad *Alosa alosa* and Sea Lamprey *Petromyzon marinus*); and
- Reefs on the shore line as well as subtidal habitat.

5.7. The SAC Natura 2000 data sheet is included at Annex 3.

Somerset Levels and Moors SPA

5.8. The Natura 2000 Data Form (dated 22nd December 2015 – see Annex 3) states that the Severn Estuary SPA qualifies under:

- Article 4.1 of the Birds Directive (79/409/EEC) for wintering Bewick's Swan and breeding Golden Plover *Pluvialis apricaria*;
- Article 4.2 of the Birds Directive (79/409/EEC) for wintering Eurasian Teal *Anas crecca* and breeding Northern Lapwing *Vanellus vanellus*;
- Article 4.2 of the Birds Directive (79/409/EEC) for an Internationally Important Assemblage of birds, regularly supporting 73014 waterfowl (5 year peak mean 1991/92-1995/96).

Somerset Levels and Moors Ramsar

- 5.9. The Somerset Levels and Moors Ramsar site qualifies under:
- Criterion 2 of the Ramsar convention on account of it supporting 17 species of British Red Data Book invertebrates;
 - Criterion 5 as it supports an assemblage of international importance - 97155 waterfowl (5 year peak mean 1998/99-2002/2003) during the winter;
 - Criterion 6 as it regularly supports species or populations occurring at levels of international importance. Species listed with peak counts in winter (at designation) are, Bewick's Swan and Eurasian Teal *Anas crecca*. Northern Lapwing are listed as a breeding qualifying interest feature.
- 5.10. Mute Swan *Cygnus olor*, Eurasian Wigeon *Anas Penelope*, Northern Pintail *Anas acuta* and Northern Shoveler *Anas clypeata* are all listed as species identified subsequent to designation for possible future consideration under criterion 6.

- 5.11. A copy of the relevant Ramsar Information Sheet is included at Annex 3.

Mendip Limestone Grasslands SAC

- 5.12. This SAC is designated for the following features of interest:
- European dry heaths for which the area is considered to support a significant presence.
 - Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia) for which this is considered to be one of the best areas in the United Kingdom.
 - Caves not open to the public for which the area is considered to support a significant presence.
 - Tilio-Acerion forests of slopes, screes and ravines for which the area is considered to support a significant presence.
 - Greater Horseshoe Bat *Rhinolophus ferrumequinum* for which the area is considered to support a significant presence.

- 5.13. The SAC Natura 2000 data sheet is included at Annex 3.

Hestercombe House SAC

- 5.14. This SAC is designated for the following features of interest:
- Lesser Horseshoe Bat *Rhinolophus hipposideros* for which this is considered to be one of the best areas in the United Kingdom.

- 5.15. The SAC Natura 2000 data sheet is included at Annex 3.

Exmoor and Quantock Oakwoods SAC

- 5.16. This SAC is designated for the following features of interest:

- Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles for which this is considered to be one of the best areas in the United Kingdom.
- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) for which the area is considered to support a significant presence.
- Bechstein's bat *Myotis bechsteini* for which the area is considered to support a significant presence.
- Barbastelle bat *Barbastella barbastellus* for which this is considered to be one of the best areas in the United Kingdom.
- Otter *Lutra lutra* for which the area is considered to support a significant presence.

5.17. The SAC Natura 2000 data sheet is included at Annex 3.

Mendip Woodlands SAC

5.18. This SAC is designated for the following features of interest:

- Tilio-Acerion forests of slopes, screes and ravines for which this is considered to be one of the best areas in the United Kingdom.

5.19. The SAC Natura 2000 data sheet is included at Annex 3.

North Somerset and Mendip Bats SAC

5.20. This SAC is designated for the following features of interest:

- Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia) for which this is considered to be one of the best areas in the United Kingdom.
- Caves not open to the public for which the area is considered to support a significant presence.
- Tilio-Acerion forests of slopes, screes and ravines for which this is considered to be one of the best areas in the United Kingdom.
- Greater Horseshoe Bat for which this is considered to be one of the best areas in the United Kingdom.
- Lesser Horseshoe Bat for which this is considered to be one of the best areas in the United Kingdom.

5.21. The SAC Natura 2000 data sheet is included at Annex 3.

Conservation Objectives

5.22. Natural England produce Conservation Objectives for all SPAs and SACs in England.

5.23. Copies of the formal Conservation Objectives for all of the above SPAs and SACs are included at Annex 6.

5.24. Consideration has been afforded to all of the above cited information in producing this assessment.

6. ASSESSMENT OF THE IMPLICATIONS OF THE PROPOSALS FOR THE CONSERVATION OBJECTIVES OF THE INTERNATIONAL / EUROPEAN DESIGNATED SITES

- 6.1. Section 2 of this document sets out the legislation, guidance and case law of relevance to an assessment of the implications of a plan / project on a European site. Section 3 discusses key terms and themes associated with Habitats Regulations assessments. Having regard to this legislation and supporting guidance, it is clear that the assessment is a two-stage process, the first being the 'likely significant effect', and the second being the 'integrity test'.
- 6.2. It is clear that the Conservation Objectives of a European site are the most important consideration in determining whether the plan / project will have an adverse effect on the site, including any effects on its integrity.
- 6.3. It is evident that there is a clear hierarchical approach to assessing effects on European sites in line with the Habitats Regulations. The primary test is that against the Conservation Objectives with other considerations following these. Such other considerations would include:
- Other features of interest associated with the site; and
 - Other relevant baseline information for the site.
- 6.4. In line with the above, whilst the qualifying interest features of the site and other baseline information have informed this assessment, the greatest weight has been placed upon the formal Conservation Objectives for the European sites, as set out by Natural England. Consideration has also been afforded to the Supplementary Advice such as that produced by Natural England, where relevant.
- 6.5. With reference to the relevant designated sites, this section includes a description of the potentially significant effects arising from the plan / project. The potential effects are assessed within this section in order to address the test under Regulation 63 (1) in the first instance (the 'likely significant effect' stage).
- 6.6. In undertaking this assessment, consideration has been had to the best available scientific knowledge. Further consideration under the Habitats Regulations can therefore be undertaken consistent with the HRA Guidance 2021, which requires the use of the best scientific knowledge to inform a decision where no reasonable scientific doubt remains as to the presence and / or absence of effects that would adversely affect the integrity of the designated site (see Section 2 above).
- 6.7. Furthermore, consideration is given to the *People over Wind* Judgement (C-323/17), which confirmed the view of the CJEU that avoidance or mitigation measures can only be taken into consideration at the Appropriate Assessment stage.

Potential significant effects in the absence of mitigation

- 6.8. The qualifying interest features of the relevant designated sites are described in detail within Section 5 of this assessment and the Conservation Objectives are included at Annex 6. Section 4 describes the location of the Application Site in the context of the various designations.
- 6.9. In view of the nature of the Development Proposals and their location, the site specific Conservation Objectives, qualifying interest features and the distances involved, it has been concluded that no source / receptor pathway exists which could give rise to a likely significant effect for the following sites:
- Somerset Levels and Moors SPA / Ramsar (approximately 3.2km east);
 - Mendip Limestone Grasslands SAC (approximately 13km northeast);
 - Exmoor and Quantock Oakwoods SAC (approximately 14.3km west);
 - Hestercombe House SAC (approximately 14.7 km southwest);
 - Mendip Woodlands SAC (approximately 15.2km northeast);
 - North Somerset and Mendip Bats SAC (approximately 16km northeast).
- 6.10. By way of qualification, the following information is given in support of the above conclusion.

Somerset Levels and Moors SPA / Ramsar

- 6.11. Cited pressures relating to the conservation status of this designated site relate to nutrient enrichment through elevated phosphate levels. An advice letter relating to this issue is included at Annex 7.
- 6.12. Whilst the Application Site is located in relatively close proximity to the Somerset Levels and Moors SPA / Ramsar site and it is understood to be within the same surface water catchment, the site actually drains away from the SPA / Ramsar site. Any nutrient enrichment (or other water quality issue) associated with water discharges into the Huntspill could not therefore have an adverse effect on water quality at the designated site.
- 6.13. Notwithstanding the above, a treatment chain for discharged water is proposed and this includes attenuation, water treatment (sewerage and grey water) at a bespoke treatment works and additional filtration through a rehabilitated existing reedbed system with significant capacity. Discharged water would most likely be at or around nutrient neutral at the point of discharge.
- 6.14. It is possible that increased water abstraction could have an adverse effect on the SPA / Ramsar site through the lowering of the water table. However, abstraction licences already exist for the Application Site and it is envisaged that the existing volume limits would be adhered to, as already consented. In the event that abstraction limits need to be increased in the future, then new licences would be applied for and the Environment Agency (acting as

Competent Authority) would need to assess that application on its own merits, in view of any relevant advice sought from Natural England.

- 6.15. No other pathways for potential significant effects have been identified.

Mendip Limestone Grasslands SAC

- 6.16. This SAC is located at a significant distance (13km) from the Application Site. At such distances direct and indirect adverse effects are not likely and simple screening based on distance is considered appropriate.

Mendip Woodlands SAC

- 6.17. Again this SAC is located at a significant distance from the Application Site (15.2km) and at such distances direct and indirect adverse effects are not likely and simple screening based on distance is considered appropriate.

Exmoor and Quantock Oakwoods SAC, Hestercombe House SAC and North Somerset and Mendip Bats SAC

- 6.18. Each of these SACs are designated on account of their important bat populations.
- 6.19. Regarding Hestercombe House SAC and North Somerset and Mendip Bats SAC, these sites are designated on account of their importance for Horseshoe bat species. Guidance has been prepared specifically in relation to development control considerations in relation to plans / projects which may have an adverse effect on the relevant bat populations associated with these sites. This guidance was published by Somerset Ecology Services (Somerset County Council) in 2019 and was prepared in consultation with a range of experts, including Natural England. Copies of the guidance documents are included at Annex 8. Specific regard has been had to the above cited guidance in undertaking this assessment.
- 6.20. In each case, the guidance defines 'consultation zones' within which it is considered that an adverse effect could arise, and where screening of the plan / project is stated as being required. These zones include the areas of habitat considered to be important in maintaining the bat populations at a favourable conservation status. Advice is also given on survey requirements and measures which may form part of a suitable mitigation strategy.
- 6.21. The Application Site falls well outside all of these consultation zones and any of the habitat areas highlighted as being of conservation importance for the relevant bat populations.
- 6.22. In this light it is considered that likely significant effects can be screened out in relation to Hestercombe House SAC and North Somerset and Mendip Bats SAC.
- 6.23. Regarding Exmoor and Quantock Oakwoods SAC, this site is designated for its important populations of Bechstein's bat and Barbastelle bat, in addition to Otter and its woodlands (dominated by Sessile Oak, Holly, Ash and Alder).

- 6.24. Both Bechstein's bat and Barbastelle bat are closely associated with mature woodland habitats (although not solely reliant upon them), typically being tree roosting species. Neither species tends to range far from their roosts to forage, with Bechstein's bat generally foraging up to a maximum distance of 1k to 2.5km (usually closer to 1km). Barbastelle bats are known to typically forage up to 5km from maternity roosts, however where less favourable habitat exists around the roost site, they will travel further to reach more optimal feeding grounds.
- 6.25. As stated previously, the Application Site is located approximately 14.3km to the west of the SAC boundary (straight line distance).
- 6.26. As with the other SACs discussed above, guidance has been prepared specifically in relation to development control considerations in relation to plans / projects which may have an adverse effect on the relevant bat populations associated with this site. Again the guidance (April 2018) was published by Somerset Ecology Services (Somerset County Council) and was prepared in consultation with a range of experts, including Natural England. Copies of the guidance document is included at Annex 8. Specific regard has been had to the above cited guidance in undertaking this assessment.
- 6.27. The guidance defines 'consultation zones' within which it is considered that an adverse effect could arise, and where screening of the plan / project is stated as being required. These zones include the areas of habitat considered to be important in maintaining the bat populations at a favourable conservation status. Two consultation zones are defined and discussed, one relating to the Quantocks roosts and one relating to the Exmoor roosts, with each having regard to defined zones relating to behaviour, including foraging ("sustenance zones").
- 6.28. The Quantocks roosts consultation zone is the closest to the Application site, however the Application Site still falls outside of the zone, which does not extend east of the M5 corridor. It should be noted that whilst the consultation zones include land out to 15.5km, this zone relates to the known roost areas and not the boundary of the SAC. The SAC boundary includes significant areas of habitat overall, but the known roosting areas are very localised and well removed from the Application Site.
- 6.29. In the light of the above, and in consideration of there being no other identified pathways for significant effect to arise, it is concluded that likely significant effects can be screened out in relation to Exmoor and Quantock Oakwoods SAC.

Consideration of the Severn Estuary SPA / SAC / Ramsar site

- 6.30. This designated site is located approximately 2.2km west of the Application Site at its closest point (straight line distance). Hydrological connectivity exists between the Application Site and the SPA / SAC / Ramsar site, via the Huntspill River (National Nature Reserve NNR) which discharges into the Bridgwater Bay SSSI / NNR, further designated as part of the Severn Estuary SPA / SAC / Ramsar site.

- 6.31. Regarding water quality issues, it is noted that surface water flows would be towards Bridgwater Bay. Whilst the proposed water treatment chain (including the rehabilitated reedbed system and water treatment plant), together with construction stage environmental mitigation, are considered integral to the project proposals, this sHRA has proceeded on the basis of considering such measures only as part of the appropriate assessment stage (see further below)
- 6.32. Insofar as abstraction effects are concerned, given the tidal nature of the Severn Estuary and the reasons for designation, any effects would be nugatory. It is however also relevant to consider that, as already discussed, abstraction licences already exist for the Application Site and it is envisaged that the existing volume limits would continue to be adhered to. In the event that abstraction limits do need to be increased in the future, then new licences would be applied for and the Environment Agency (acting as Competent Authority) would need to assess that application on its own merits, in view of any relevant advice sought from Natural England.
- 6.33. It is concluded that no likely significant effect arises in relation to water abstraction.
- 6.34. With the exception of water quality issues and increased recreational pressure, a matter discussed further below, it is concluded that in view of the Development Proposals, the distances involved and the qualifying interest features associated with the SPA / SAC Ramsar site (and the formal Conservation Objectives), that no pathways exist by which likely significant effects could arise.
- 6.35. Insofar as increased recreational pressure is concerned, this is an issue which has been cited as requiring consideration for some years in relation to the Severn Estuary SPA and Ramsar designations, principally focussed on implications for bird interest features from disturbance (breeding and wintering). The available evidence base relating to this issue is far more developed for the upper reaches of the Severn Estuary. By way of example, Stroud District Council having adopted a strategic approach to mitigation / avoidance measures on the basis of an evidence base and assessment work specifically focussed on disturbance effects on qualifying interest features. Such an evidence base is not available for those parts of the SPA / SAC and Ramsar of direct relevance to this sHRA. A precautionary approach to assessment has therefore been undertaken.
- 6.36. Insofar as this screening assessment is concerned, given the distances involved (straight line) and the fact that new residents and workers / visitors could potentially access parts of the SPA / SAC / Ramsar site for recreation, it is considered that a likely significant effect cannot be ruled out with sufficient certainty. In this light it is considered necessary to consider the issue in greater detail and assess whether, in view of any required mitigation / avoidance measures a firm conclusion as to the absence of an adverse effect on integrity can be reached.

Consideration of the Integrity test at Regulation 63(5)

- 6.37. As discussed previously, surface water flows would be towards Bridgwater Bay SSSI (a constituent part of the Severn Estuary SPA / SAC / Ramsar site). Given the hydrological connectivity, it is possible that construction phase run-off, including silts or pollutants could reach the SPA / SAC / Ramsar site. It is also possible that nutrient enrichment (e.g. increased phosphate or nitrate levels), derived from water discharged from the Application Site could occur at the SPA / SAC / Ramsar site. These impact pathways could give rise to direct adverse effects on qualifying habitat interest features of the SAC and Ramsar site and, that they could also give rise to indirect adverse effects on faunal qualifying interest features associated with the SPA / SAC / Ramsar site.
- 6.38. It is considered that some comfort can be taken from the dilution effects that would occur in the Huntspill River. However, in the absence of any specific mitigation relating to potential water quality impacts, it is considered that it is not possible to conclude with the required level of certainty that no adverse effect on the integrity of the SPA / SAC / Ramsar site would arise. The proposed mitigation / avoidance measures which will negate any such potential adverse effects are discussed in the following section of this sHRA.

Disturbance effects

- 6.39. On a precautionary basis, it is considered that disturbance effects could arise from increased recreational pressure. Such effects are considered to be focussed upon visual/physical disturbance arising from walkers and cyclists. Dog walking is an often cited contributing factor to disturbance effects on birds, mainly because dogs will often initiate a predator / prey flight response especially when ran off the lead. When off the lead they will often stray from paths (which otherwise act to manage visitor movements especially in a coastal or wetland environment), and they may actively chase birds.
- 6.40. During winter, birds are particularly susceptible to adverse effects through disturbance due to food sources being generally scarcer and efficient use of energy being of heightened importance to survival. As such, increased disturbance could give rise to an adverse effect on the birds during these harsher periods. The SPA bird qualifying interest features relate to wintering populations of birds, which are also a qualifying interest feature of the Ramsar designation.
- 6.41. During the breeding season, disturbance can give rise to avoidance of otherwise suitable nesting or foraging habitat. Dogs in particular can also flush birds from nests resulting in nest / egg abandonment and chick predation. Breeding populations are not relevant to the SPA. Insofar as the Ramsar site is concerned, breeding Lesser Black Backed Gull are listed as a qualifying feature under criterion 6.

Quantifying the potential effect of the proposals

- 6.42. In terms of the number of potential additional visitors to the SPA / SAC / Ramsar site, the following information is considered relevant.

- 6.43. The Development Proposals will deliver up to 750 new homes. Using information available from the 2011 census, for Sedgemoor district the average house occupancy rate is 2.3 persons per house. On this basis the proposals could result in an additional 1725 new residents. In addition, the proposals would give rise to visitors and workers at the site.
- 6.44. It is to be expected that these new residents will seek recreational spaces and a proportion will require areas to walk dogs. Information available from the Pet Food Manufacturers Association⁷ shows that for 2021 it is estimated that in the UK 33% of households own a dog/s.
- 6.45. In relation to dog walking therefore, it would be expected that 248 new households would own at least one dog⁸. On the basis that dogs are often walked twice a day, taking a precautionary approach it can be assumed that the proposals associated with the residential element of the scheme would generate up to an additional 496 dog walks a day. This can be viewed as a precautionary estimate on the basis that the detailed proposals may not deliver the full 750 units, some of these units may be flats which are less suited to dog ownership and not all dogs will be walked more than once a day.
- 6.46. The most direct route on foot from the Application Site to the SPA / SAC / Ramsar site (should this be made available) would entail a walk well in excess of 5km starting from the southern end of the reedbed, with the route following the permissive footpath along the southern bank of the Huntspill River to the west. Access from the southern part of the Site, where housing is more likely to be delivered, would add approximately 1 kilometre to the route.
- 6.47. An alternative walking route would be available via a combination of footpaths and roads, heading west through Puriton, crossing the M5 (bridge) and picking up the England Coast Path at the banks of the River Parrett then heading north to meet the SPA / SAC / Ramsar boundary at Brickyard Farm. Again, this would entail a walk of around 5km to reach the SPA / SAC / Ramsar boundary from the development zone, within which housing could be delivered.
- 6.48. It follows that any walk, where sections footpath within adjacent to the SPA / SAC / Ramsar are walked (having arrived on foot), would be well over 10km. This is far longer than would be expected for daily dog walks and indeed longer than most people would walk as part of regular exercise or other form of recreation. It is considered highly unlikely that either of these routes would be walked (or otherwise used) to their full extent, on anything other than a very irregular basis.
- 6.49. It is of course possible that residents and to an extent workers or visitors would travel by car to access coastal locations associated with the SPA / SAC / Ramsar site, for recreation including dog walking.

⁷ <https://www.pfma.org.uk/pet-population-2021>

⁸ $33/100 \times 750 = 247.5$

- 6.50. Public car parking is available in locations adjacent to, or close to, the SPA / SAC / Ramsar site, in many locations with some relatively close (in context) to the Application Site. Such parking is for example available at Burnham on Sea (circa 10km by road) and at Combswich (northwest of Bridgwater), a journey of around 16km. Beyond Combswich is parking at Stockland Bristol (circa 18.km journey) and Steart (circa 22km journey). Other incidental parking areas, including at the side of lanes or residential streets will exist in various locations, from where access to the SPA / SAC / Ramsar site will be possible along public rights of way.
- 6.51. Given the above, it is not possible to rule out new residents or workers / visitors accessing the SPA / SAC / Ramsar site or immediately adjacent footpaths for recreational purposes, however it is considered highly unlikely that any such access would be on anything other than an infrequent basis.
- 6.52. It is however also necessary to consider matters concerning functional linkage and implications for qualifying interest features of the SPA / SAC / Ramsar site which utilise other habitat outside of the designated site boundary, where that other habitat is important to the maintenance of the qualifying population. In this regard, the Application Site itself is not important (does not support populations of the relevant species). Given that new occupiers of the Application Site may access the footpath associated with the Huntspill River NNR, consideration has also been given to the NNR in relation to this pathway for a potential effect, and the likely significance of any such effect.
- 6.53. The habitats associated with the Huntspill River NNR can be broadly described as comprising linear open water, grassland and scrub. Agricultural grasslands surround it. Given these habitats, the NNR is not likely to be used as an important foraging, shelter or loafing resource for any of the wintering bird interest features.
- 6.54. It is however noted that Bewick's Swan (Severn Estuary SPA / Ramsar qualifying feature and also an interest feature of the Somerset Levels and Moors SPA) are known to use agricultural land surrounding the SPA / Ramsar for foraging purposes during daylight. With regard to walkers accessing the footpath along the Huntspill River and potentially disturbing foraging / loafing Bewick's Swan, the following points are relevant:
- 1) The very open nature of the landscape would mean that walkers (including dog walkers) would be very unlikely to startle the birds, causing them to expend energy in moving away;
 - 2) The linear nature of the footpath will act to manage / control visitors such that any effect would be highly localised and birds would not avoid using large areas of otherwise suitable and potentially important habitat; and
 - 3) The fact that the NNR is actively marketed for recreational use (including walking, canoeing and angling) would imply that disturbance effects are not considered to be a significant issue and certainly not one which could undermine a designated site's conservation objectives;
 - 4) Noting the above, a level of habituation by the birds to walkers and other users would be expected, such that they no longer perceive walkers as a threat at anything but very close range.

- 6.55. It is considered that indirect effects relating to functional linkage would not be significant and that no adverse effect on integrity would arise in relation to this pathway.
- 6.56. In view of the above, it is considered that it is possible to conclude that it would be very unlikely that the Development Proposals would lead to an adverse effect on the integrity of the SPA / SAC / Ramsar site through increased recreational pressure. However, Ecology Solutions is mindful that it remains possible that new residents and workers / visitors could (albeit infrequently) visit the SPA / SAC / Ramsar site and that it is necessary to view any effects in combination with effects arising from other sources of increased recreational pressure (e.g. other new housing).
- 6.57. Regarding in combination effects of new housing provision, Ecology Solutions is mindful that the HRA of the Sedgemoor Core Strategy required proposals for large (20+ units) housing developments within 5km of a Natura 2000 site to meet the Accessible Natural Greenspace (ANG) Standard ANG standard in order to reduce recreational pressure. Policy D30 of the Sedgemoor Local Plan states that in the interest of reducing recreational pressure on sensitive Natura 2000 sites all residential development should be ANG compliant or otherwise appropriately contribute to improving access to natural greenspace. In this light, further consideration of measures to mitigate / avoid increased recreational pressure at relevant designated sites is considered in the following section.

7. MITIGATION / AVOIDANCE MEASURES AND OVERALL CONCLUSION

- 7.1. Following from the conclusions reached in the above assessment section, those mitigation and avoidance measures which are to be brought forward are described below.

Water Quality

- 7.2. The proposed water treatment chain associated with the proposals includes a water treatment plant which will in turn discharge into a large, rehabilitated reedbed system which will deliver additional 'polishing' before final discharge into the Huntspill River. It is anticipated that nutrient neutrality would be achieved at the point of discharge into the Huntspill River and in these terms no in combination effects could occur.
- 7.3. In the event that nutrient neutrality was not in fact reached by the point of discharge into the Huntspill River, given the treatment chain it can be expected that nutrient levels would be only marginally elevated (above neutral) and could be considered nugatory in assessment terms. It then falls to consider the dilution effects of the Huntspill River which gives additional comfort.
- 7.4. A Framework Demolition and Construction Environmental Management Plan (FDCEMP) has been produced and is included at Appendix 4.1 of the ES. The aim of the FDCEMP is to avoid adverse environmental effects during the demolition and construction phase, including pollution prevention associated with aquatic habitats.
- 7.5. In view of the reedbed system, the securing of construction stage environmental mitigation (through the FDCEMP) and the aforementioned dilution effects of the Huntspill River, it can also be concluded that construction and demolition phase effects relating to water quality can be considered nugatory.
- 7.6. The mitigation avoidance measures described above, allow for the conclusion that when considered both alone and in combination with other plan and projects, no adverse effect will arise on any relevant designated site in relation to water quality issues.

Increased Recreation

- 7.7. A key principle guiding mitigation / avoidance strategies associated with avoiding recreational impacts at European (and other) designated sites is the delivery of good quality recreational resources on the door-step of new residents. Such resources are of particular value in facilitating easy access to areas for regular (daily) dog walking. Indeed, this approach is reflected in the relevant development plan, as previously discussed.
- 7.8. A copy of the document titled "An analysis of Accessible Natural Greenspace provision in Sedgemoor" (2017) published by Sedgemoor District Council is included at Annex 9. ANG standards are defined at page two of that document as follows:

“To meet the standard there should be a qualifying ANG site:

- of at least 2 hectares in size, no more than 300 metres (5 minute walk) from home;*
- of at least 20 hectares in size within two kilometres of home;*
- of at least 100 hectares in size within five kilometres of home; and*
- of at least 500 hectares in size within ten kilometres of home; plus*
- a minimum of one hectare of statutory Local Nature Reserve per thousand population.”*

- 7.9. The Development Proposals include significant provision of landscaping, which will include areas of accessible open space available to new residents.
- 7.10. New housing provision would in any event trigger requirements to deliver accessible open space for recreation purposes and this would provide immediately accessible recreation space close to new homes.
- 7.11. In addition, “Gravity Park” in the southeast of the Proposed Development will be approximately 8ha in size and this would be accessible to new residents and other members of the public. This large open space area would be mixed use delivering ecological as well as amenity benefits, with a range of habitat features including grassland, orchard, hedgerows and scrub.
- 7.12. There is also the potential for further public access to additional open space areas for recreation created within the “Wellbeing and Arrival Zone” in the south-east of the development and potentially other landscape features at the periphery of the site.
- 7.13. In addition, the Design Guide has a strong focus on delivering well designed, integrated, inclusive and attractive public settings with both pedestrian and cycle routes. These measures will encourage walking and ‘green’ transport choices in the local vicinity, which ultimately will assist in ensuring a quality recreation experience locally, limiting visitor pressures elsewhere.
- 7.14. Further, the Development Proposals will deliver benefits to the Avalon Marshes regeneration project through the locality investment plan. Funding can be facilitated towards land acquisition, habitat restoration and ecological and visitor management. Several areas of the Avalon Marshes are designated as an NNR where public recreational use is encouraged. A key aim of the Avalon Marshes project is to buffer some of the more sensitive habitats (such as those designated as part of the Somerset Levels and Moors SPA/Ramsar), significantly increasing the ecological value of the landscape unit, whilst also increasing the quality of the experience for visitors.
- 7.15. Turning back to the ANG standards, the Development Proposals would more than meet the requirements to deliver at least 2ha of ANG within 300m of new dwellings. Further, the local NNR site network, including Huntspill River NNR (which would remain accessible to new residents, even where direct access beside the reedbed was not provided), Somerset Levels NNR and those associated with the Avalon Marshes including

Shapwick Heath NNR, Streat Heath NNR, Ham Wall NNR all deliver large accessible natural open space in relatively close proximity.

- 7.16. Whilst there may be deficiencies identified in the application of the ANG standards, the ability of the Development Proposals to contribute significantly to the level of accessible greenspace available (at the Application Site) not just to new residents but to existing residents of Puriton and Woolavington is important. This is because in addressing matters concerning increased recreational pressure at designated sites, it is the net effect on the site which is important. You would not expect all of the new residents to only ever use open space delivered on site as part of the scheme. They may, visit the SPA / SAC / Ramsar site for example. The open space may however, equally act to draw other pre-existing residents of the local area who would otherwise have visited the SPA / SAC / Ramsar site.
- 7.17. The locality investment plan also lists the Parrett Barrier scheme as a potential scheme to assist with funding and delivery. This scheme also has strategic environmental benefits and is a key asset in terms of locality investment and economic transformation.
- 7.18. In these terms, it can be concluded that, in line with Policy D30 of the Sedgemoor Local Plan, the Development Proposals appropriately contribute to improving access to natural greenspace. The mitigation avoidance measures allow for the conclusion that when considered both alone and in combination with other plan and projects, no adverse effect will arise on any relevant designated site through increased recreational pressure.

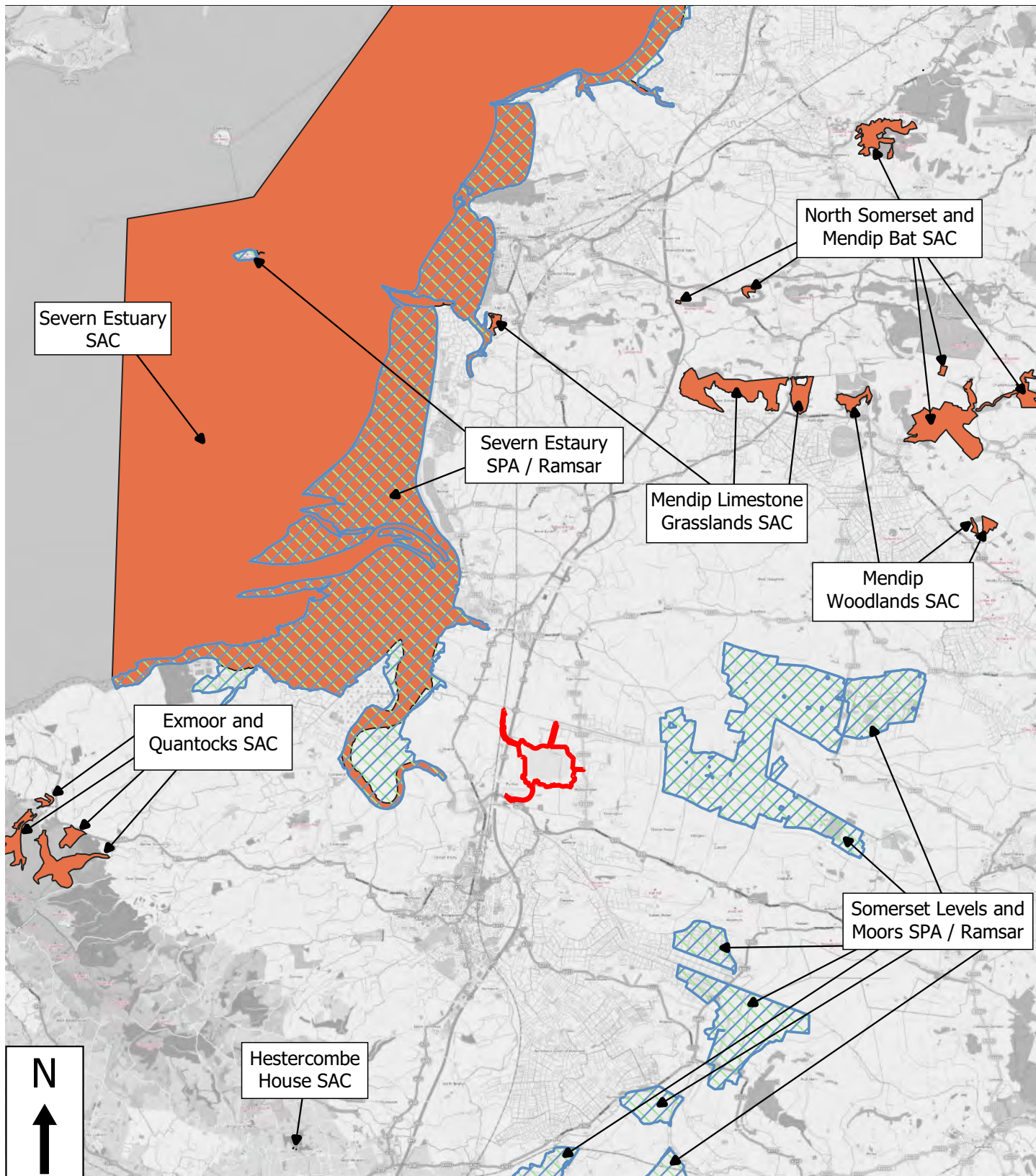
Overall Assessment Conclusion

- 7.19. No adverse effect on the Integrity of any relevant designated site has been identified when the plan project is considered both alone and in combination with other plans or projects.





PLANS

PLAN ECO1

Designated Site Locations



Key:

-  Red Line Boundary
-  Ramsar Site
-  Special Protection Area (SPA)
-  Special Area of Conservation (SAC)



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7761: THIS IS GRAVITY

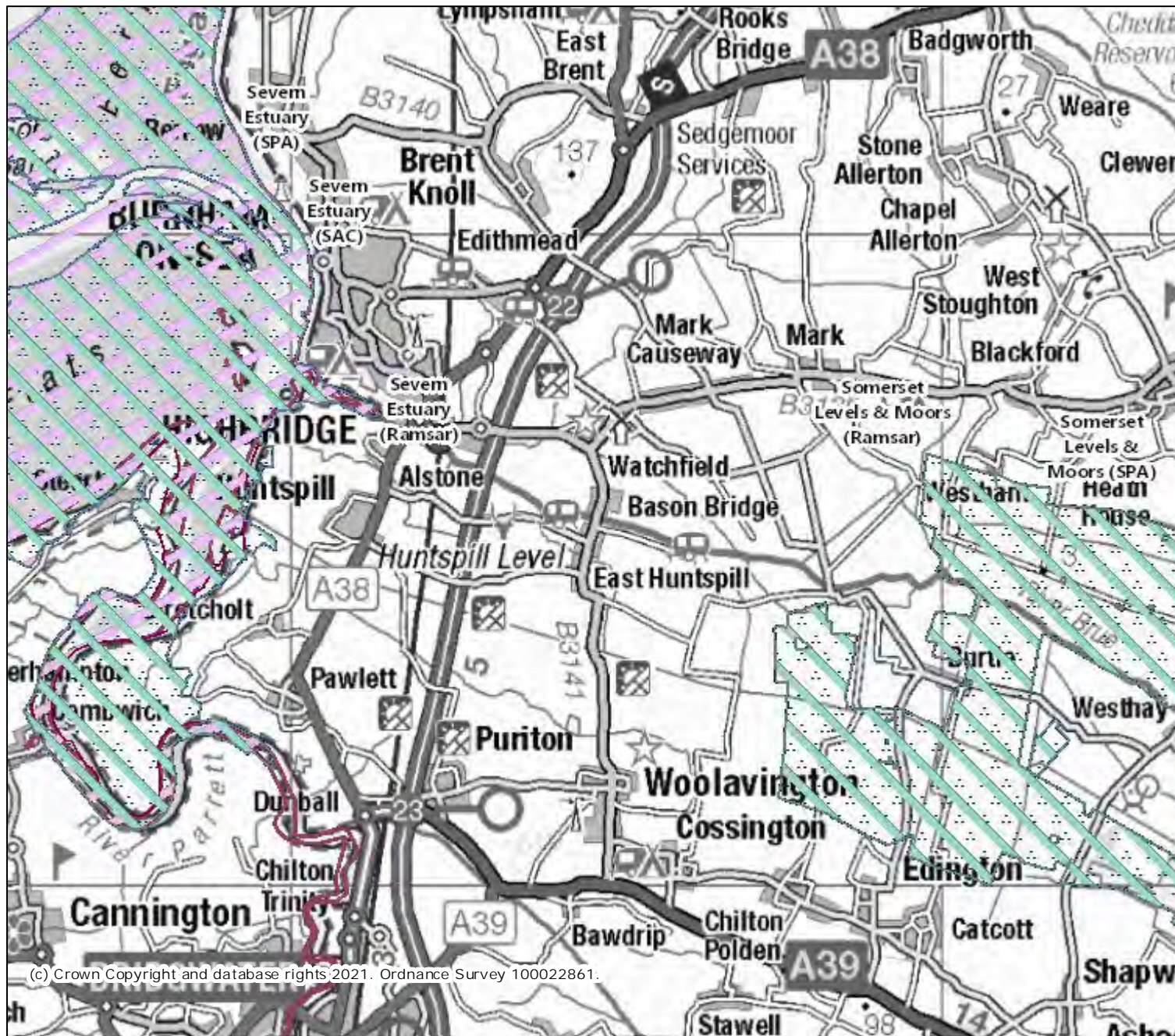
PLAN ECO1: DESIGNATED SITE
LOCATIONS

Rev: A
Sep 2021

ANNEXES

ANNEX 1

Information downloaded from MAGIC



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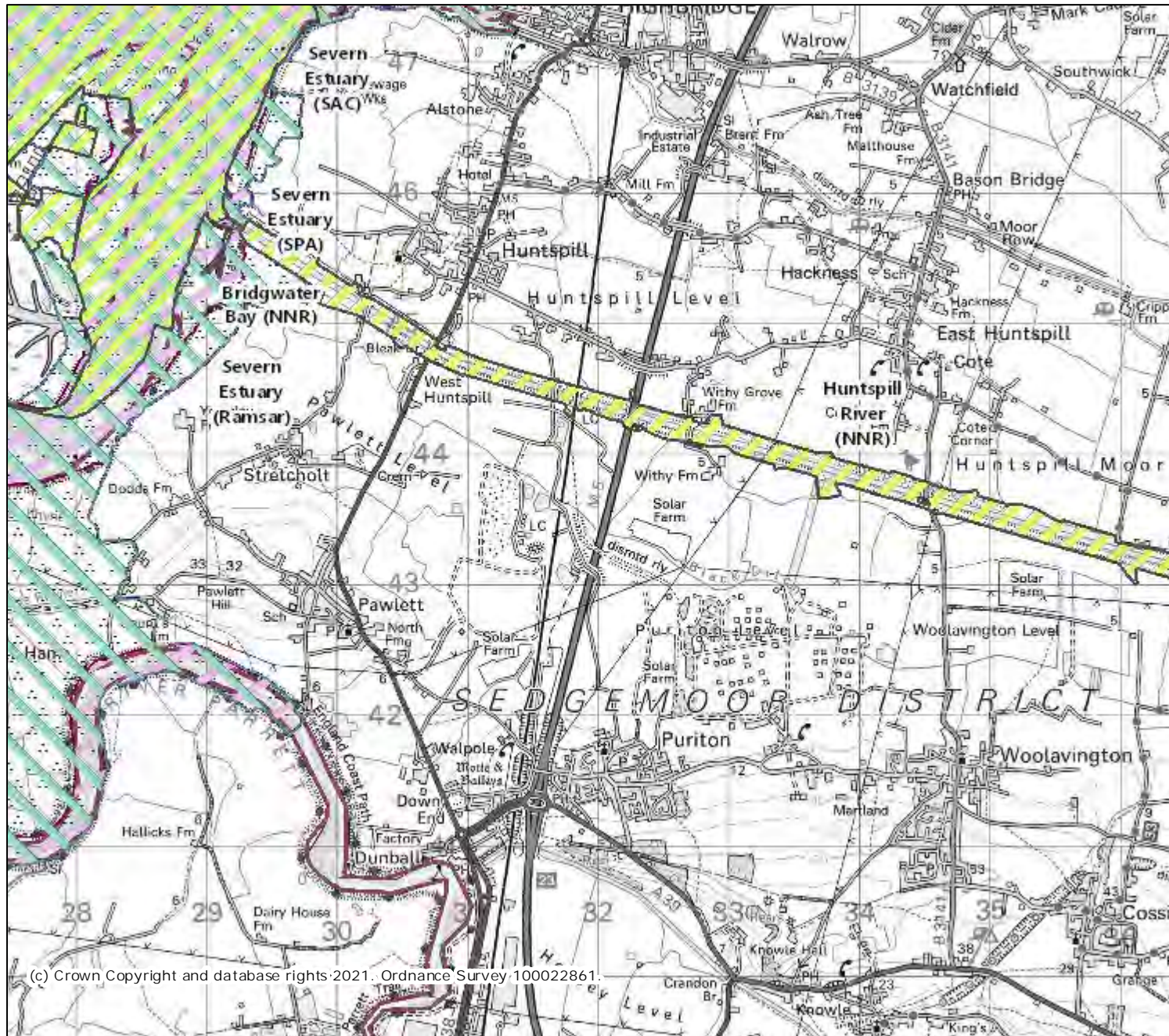
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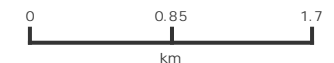
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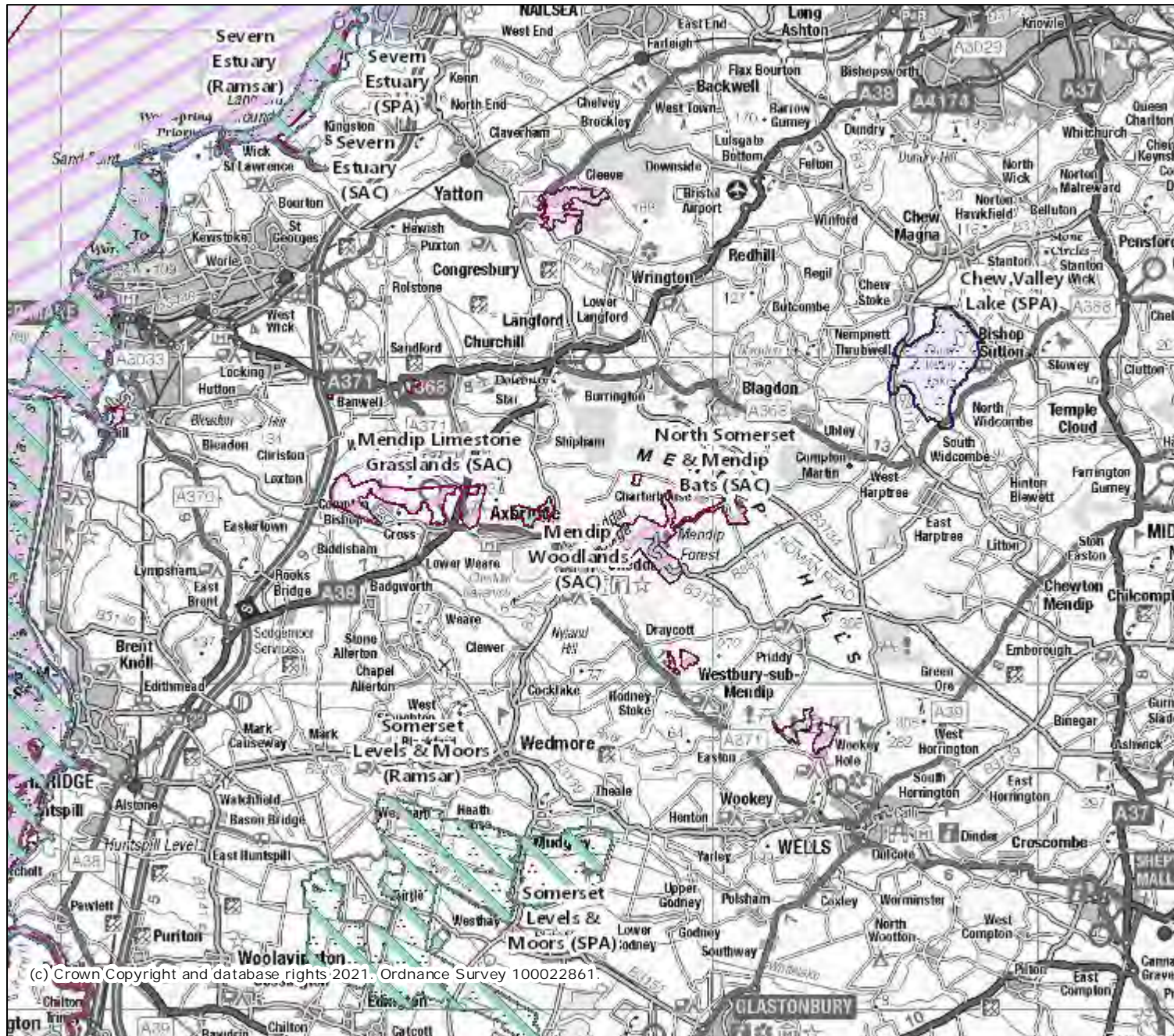
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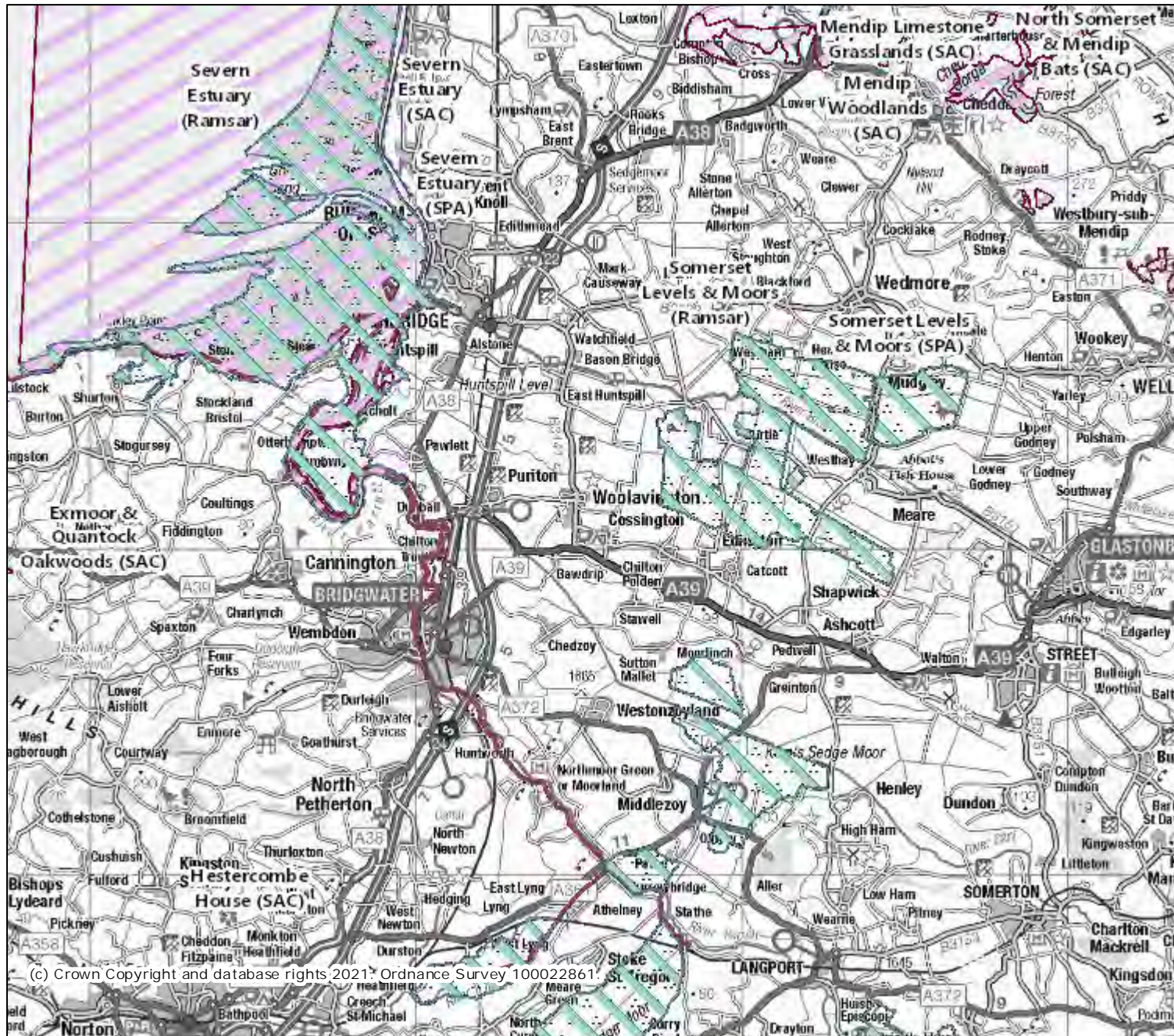
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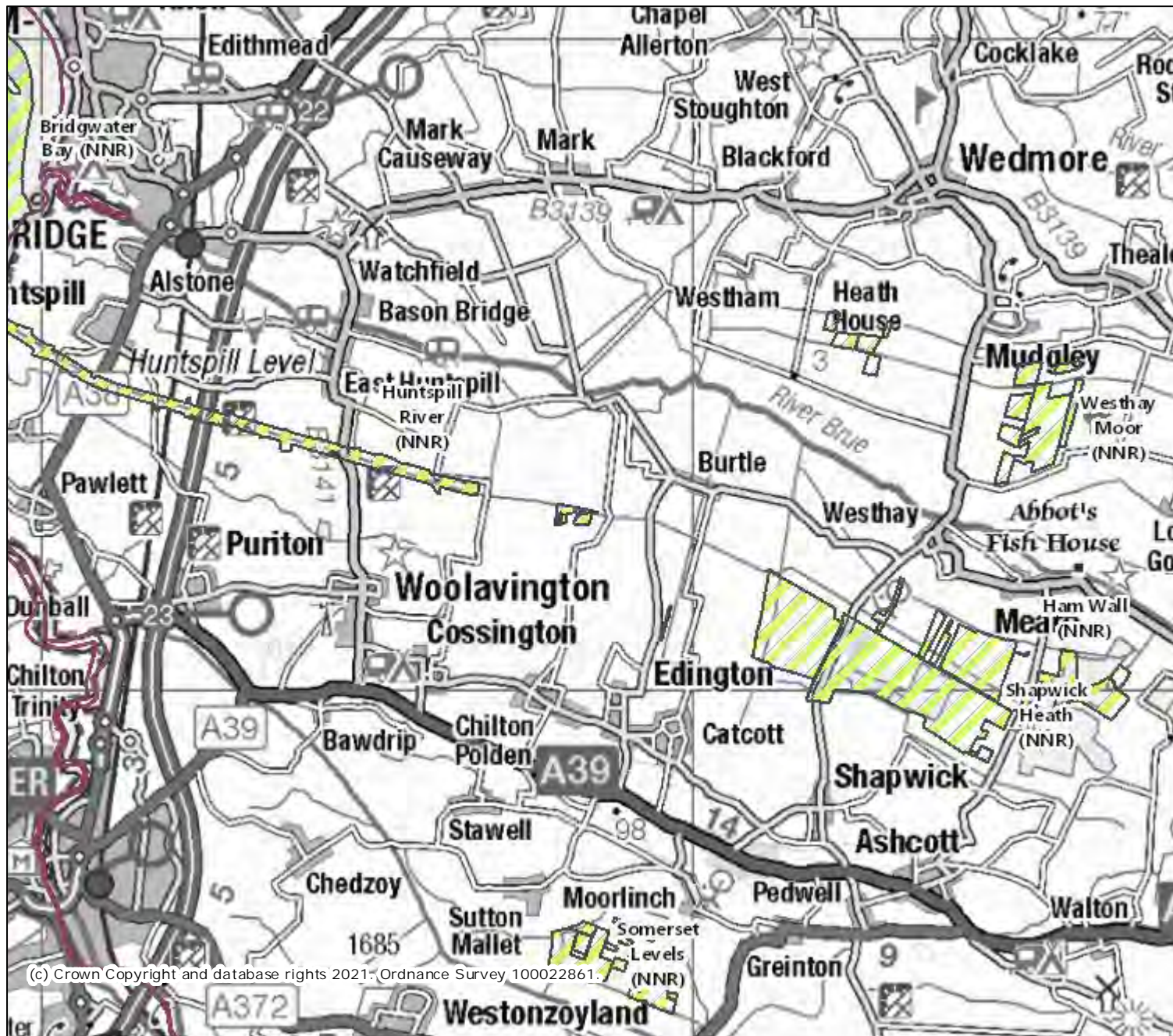


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Legend

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-  Special Areas of Conservation (England)
-  Special Protection Areas (England)



Legend

- 
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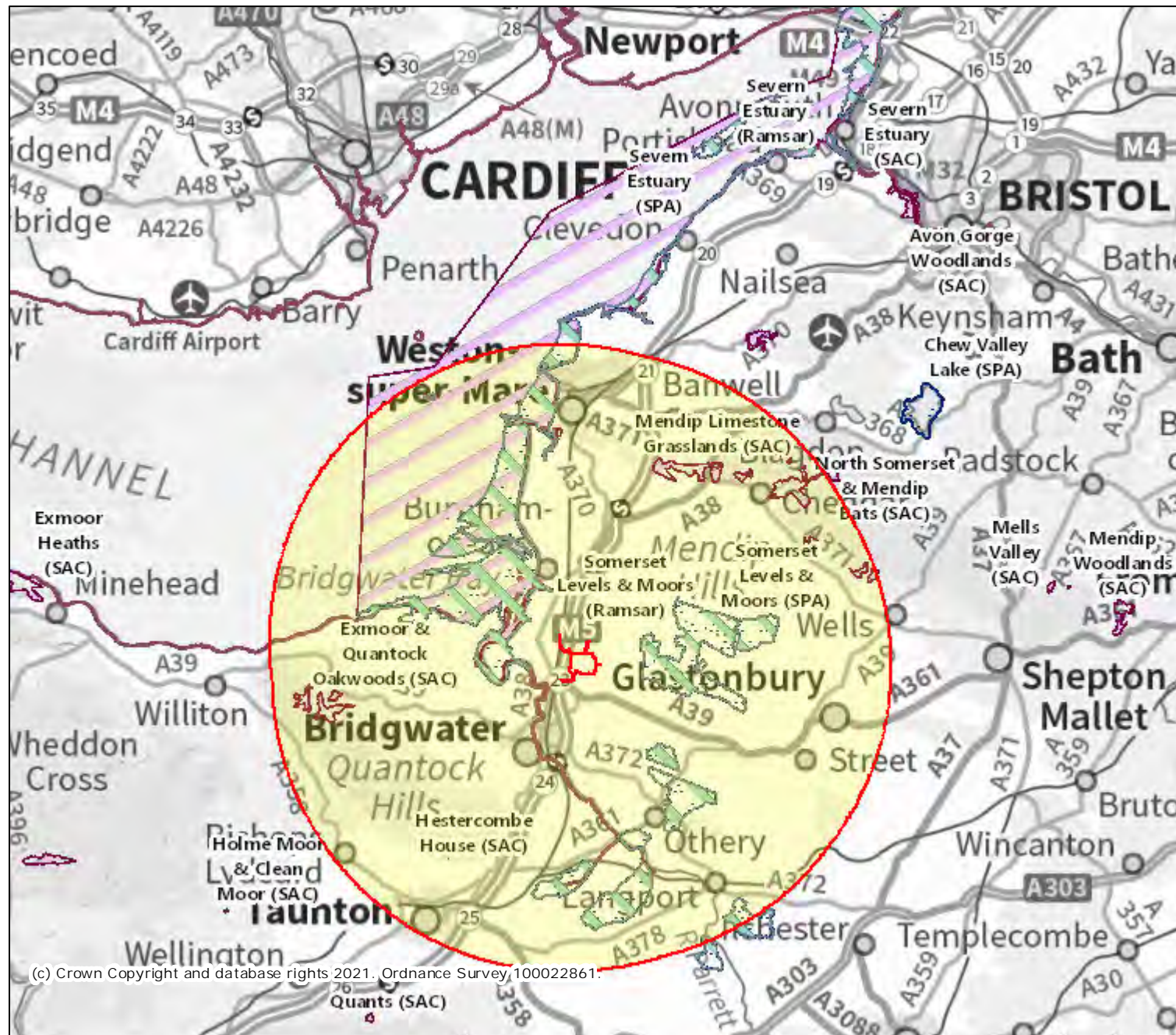
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Legend

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ANNEX 2

Copy of Communication from the Commission on the
Application of the Precautionary Principle (2000)



COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 2.2.2000
COM(2000) 1 final

COMMUNICATION FROM THE COMMISSION

on the precautionary principle

SUMMARY

1. The issue of when and how to use the precautionary principle, both within the European Union and internationally, is giving rise to much debate, and to mixed, and sometimes contradictory views. Thus, decision-makers are constantly faced with the dilemma of balancing the freedom and rights of individuals, industry and organisations with the need to reduce the risk of adverse effects to the environment, human, animal or plant health. Therefore, finding the correct balance so that the proportionate, non-discriminatory, transparent and coherent actions can be taken, requires a structured decision-making process with detailed scientific and other objective information.
2. The Communication's fourfold aim is to:
 - outline the Commission's approach to using the precautionary principle,
 - establish Commission guidelines for applying it,
 - build a common understanding of how to assess, appraise, manage and communicate risks that science is not yet able to evaluate fully, and
 - avoid unwarranted recourse to the precautionary principle, as a disguised form of protectionism.

It also seeks to provide an input to the ongoing debate on this issue, both within the Community and internationally.

3. The precautionary principle is not defined in the Treaty, which prescribes it only once - to protect the environment. But *in practice*, its scope is much wider, and specifically where preliminary objective scientific evaluation, indicates that there are reasonable grounds for concern that the potentially dangerous effects on the *environment, human, animal or plant health* may be inconsistent with the high level of protection chosen for the Community.

The Commission considers that the Community, like other WTO members, has the right to establish the level of protection - particularly of the environment, human, animal and plant health, - that it deems appropriate. Applying the precautionary principle is a key tenet of its policy, and the choices it makes to this end will continue to affect the views it defends internationally, on how this principle should be applied.

4. The precautionary principle should be considered within a structured approach to the analysis of risk which comprises three elements: risk assessment, risk management, risk communication. The precautionary principle is particularly relevant to the management of risk.

The precautionary principle, which is essentially used by decision-makers in the management of risk, should not be confused with the element of caution that scientists apply in their assessment of scientific data.

Recourse to the precautionary principle presupposes that potentially dangerous effects deriving from a phenomenon, product or process have been identified, and that scientific evaluation does not allow the risk to be determined with sufficient certainty.

The implementation of an approach based on the precautionary principle should start with a scientific evaluation, as complete as possible, and where possible, identifying at each stage the degree of scientific uncertainty.

5. Decision-makers need to be aware of the degree of uncertainty attached to the results of the evaluation of the available scientific information. Judging what is an "acceptable" level of risk for society is an eminently *political* responsibility. Decision-makers faced with an unacceptable risk, scientific uncertainty and public concerns have a duty to find answers. Therefore, all these factors have to be taken into consideration.

In some cases, the right answer may be not to act or at least not to introduce a binding legal measure. A wide range of initiatives is available in the case of action, going from a legally binding measure to a research project or a recommendation.

The decision-making procedure should be transparent and should involve as early as possible and to the extent reasonably possible all interested parties.

6. Where action is deemed necessary, measures based on the precautionary principle should be, *inter alia*:
 - *proportional* to the chosen level of protection,
 - *non-discriminatory* in their application,
 - *consistent* with similar measures already taken,
 - *based on an examination of the potential benefits and costs* of action or lack of action (including, where appropriate and feasible, an economic cost/benefit analysis),
 - *subject to review*, in the light of new scientific data, and
 - *capable of assigning responsibility for producing the scientific evidence* necessary for a more comprehensive risk assessment.

Proportionality means tailoring measures to the chosen level of protection. Risk can rarely be reduced to zero, but incomplete risk assessments may greatly reduce the range of options open to risk managers. A total ban may not be a proportional response to a potential risk in all cases. However, in certain cases, it is the sole possible response to a given risk.

Non-discrimination means that comparable situations should not be treated differently, and that different situations should not be treated in the same way, unless there are objective grounds for doing so.

Consistency means that measures should be of comparable scope and nature to those already taken in equivalent areas in which all scientific data are available.

Examining costs and benefits entails comparing the overall cost to the Community of action and lack of action, in both the short and long term. This is not simply an economic cost-benefit analysis: its scope is much broader, and includes non-economic considerations, such as the efficacy of possible options and their acceptability to the public. In the conduct of such an examination, account should be taken of the general principle and the case law of the Court that the protection of health takes precedence over economic considerations.

Subject to review in the light of new scientific data, means measures based on the precautionary principle should be maintained so long as scientific information is incomplete or inconclusive, and the risk is still considered too high to be imposed on society, in view of chosen level of protection. Measures should be periodically reviewed in the light of scientific progress, and amended as necessary.

Assigning responsibility for producing scientific evidence is already a common consequence of these measures. Countries that impose a prior approval (marketing authorisation) requirement on products that they deem dangerous *a priori* reverse the burden of proving injury, by treating them as dangerous unless and until businesses do the scientific work necessary to demonstrate that they are safe.

Where there is no prior authorisation procedure, it may be up to the user or to public authorities to demonstrate the nature of a danger and the level of risk of a product or process. In such cases, a specific precautionary measure might be taken to place the burden of proof upon the producer, manufacturer or importer, but this cannot be made a general rule.

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1. INTRODUCTION

A number of recent events has shown that public opinion is becoming increasingly aware of the potential risks to which the population or their environment are potentially exposed.

Enormous advances in communications technology have fostered this growing sensitivity to the emergence of new risks, before scientific research has been able to fully illuminate the problems. Decision-makers have to take account of the fears generated by these perceptions and to put in place preventive measures to eliminate the risk or at least reduce it to the minimum acceptable level. On 13 April 1999 the Council adopted a resolution urging the Commission *inter alia* "to be in the future even more determined to be guided by the precautionary principle in preparing proposals for legislation and in its other consumer-related activities and develop as priority clear and effective guidelines for the application of this principle". This Communication is part of the Commission's response.

The dimension of the precautionary principle goes beyond the problems associated with a short or medium-term approach to risks. It also concerns the longer run and the well-being of future generations.

A decision to take measures without waiting until all the necessary scientific knowledge is available is clearly a precaution-based approach.

Decision-makers are constantly faced with the dilemma of balancing the freedoms and rights of individuals, industry and organisations with the need to reduce or eliminate the risk of adverse effects to the environment or to health.

Finding the correct balance so that proportionate, non-discriminatory, transparent and coherent decisions can be arrived at, which at the same time provide the chosen level of protection, requires a structured decision making process with detailed scientific and other objective information. This structure is provided by the three elements of risk analysis: the assessment of risk, the choice of risk management strategy and the communication of the risk.

Any assessment of risk that is made should be based on the existing body of scientific and statistical data. Most decisions are taken where there is sufficient information available for appropriate preventive measures to be taken but in other circumstances, these data may be wanting in some respects.

Whether or not to invoke the Precautionary Principle is a decision exercised where scientific information is insufficient, inconclusive, or uncertain and where there are indications that the possible effects on the environment, or human, animal or plant health may be potentially dangerous and inconsistent with the chosen level of protection.

2. THE GOALS OF THIS COMMUNICATION

The aim of this Communication is to inform all interested parties, in particular the European Parliament the Council and Member States of the manner in which the Commission applies or intends to apply the precautionary principle when faced with taking decisions relating to the containment of risk. However, this general Communication does not claim to be the final word - rather, the idea is to provide input to the ongoing debate both at Community and international level.

This Communication seeks to establish a common understanding of the factors leading to recourse to the precautionary principle and its place in decision making, and to establish guidelines for its application based on reasoned and coherent principles.

The guidelines outlined in this Communication are only intended to serve as general guidance and in no way to modify or affect the provisions of the Treaty or secondary Community legislation.

Another objective is to avoid unwarranted recourse to the precautionary principle, which in certain cases could serve as a justification for disguised protectionism. Accordingly the development of international guidelines could facilitate the achievement of this end. The Commission also wishes to stress in this Communication that, far from being a way of evading obligations arising from the WTO Agreements, the envisaged use of the precautionary principle complies with these obligations.

It is also necessary to clarify a misunderstanding as regards the distinction between reliance on the precautionary principle and the search for zero risk, which in reality is rarely to be found. The search for a high level of health and safety and environmental and consumer protection belongs in the framework of the single market, which is a cornerstone of the Community.

The Community has already relied on the precautionary principle. Abundant experience has been gained over many years in the environmental field, where many measures have been inspired by the precautionary principle, such as measures to protect the ozone layer or concerning climate change.

3. THE PRECAUTIONARY PRINCIPLE IN THE EUROPEAN UNION

The Community has consistently endeavoured to achieve a high level of protection, among others in environment and human, animal or plant health. In most cases, measures making it possible to achieve this high level of protection can be determined on a satisfactory scientific basis. However, when there are reasonable grounds for concern that potential hazards may affect the environment or human, animal or plant health, and when at the same time the available data preclude a detailed risk evaluation, the precautionary principle has been politically accepted as a risk management strategy in several fields.

To understand fully the use of the precautionary principle in the European Union, it is necessary to examine the legislative texts, the case law of the Court

of Justice and the Court of First Instance, and the policy approaches that have emerged.

Legal Texts

The analysis starts with the legal texts which explicitly or implicitly refer to the precautionary principle (Annex I, Ref. 1).

At Community level the only explicit reference to the precautionary principle is to be found in the environment title of the EC Treaty, and more specifically Article 174. However, one cannot conclude from this that the principle applies only to the environment (Annex I, Refs. 2 and 3). Although the principle is adumbrated in the Treaty, it is not defined there.

Like other general notions contained in the legislation, such as subsidiarity or proportionality, it is for the decision-makers and ultimately the courts to flesh out the principle. In other words, the scope of the precautionary principle also depends on trends in case law, which to some degree are influenced by prevailing social and political values.

However, it would be wrong to conclude that the absence of a definition has to lead to legal uncertainty. The Community authorities' practical experience with the precautionary principle and its judicial review make it possible to get an ever-better handle on the precautionary principle.

Case law

The Court of Justice of the European Communities and the Court of First Instance have already had occasion to review the application of the precautionary principle in cases they have adjudicated and hence to develop case law in this area. (see Annex I, Refs. 5, 6 and 7)

Policy orientations

Policy orientations were set out by the Commission in the Green Paper on the General Principles of Food Safety and the Communication of 30 April 1997 on Consumer Health and Food Safety, by Parliament in its Resolution of 10 March 1998 concerning the Green Paper, by the Council in its Resolution of 13 April 1999 and by the Joint Parliamentary Committee of the EEA (European Economic Area) in its Resolution of 16 March 1999 (Annex I, Refs. 8-12).

Hence the Commission considers that the precautionary principle is a general one which should in particular be taken into consideration in the fields of environmental protection and human, animal and plant health.

Although the precautionary principle is not explicitly mentioned in the Treaty except in the environmental field, its scope is far wider and covers those specific circumstances where scientific evidence is insufficient, inconclusive or uncertain and there are indications through preliminary objective scientific evaluation that there are reasonable grounds for concern that the potentially dangerous effects on the environment, human, animal or

4. THE PRECAUTIONARY PRINCIPLE IN INTERNATIONAL LAW

At international level, the precautionary principle was first recognised in the World Charter for Nature, adopted by the UN General Assembly in 1982. It was subsequently incorporated into various international conventions on the protection of the environment. (cf. Annex II).

This principle was enshrined at the 1992 Rio Conference on the Environment and Development, during which the Rio Declaration was adopted, whose principle 15 states that: *"in order to protect the environment, the precautionary approach shall be widely applied by States according to their capability. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation"*. Besides, the United Nations' Framework Convention on Climate Change and the Convention of Biological Diversity both refer to the precautionary principle. Recently, on 28 January 2000, at the Conference of the Parties to the Convention on Biological Diversity, the Protocol on Biosafety concerning the safe transfer, handling and use of living modified organisms resulting from modern biotechnology confirmed the key function of the Precautionary Principle (see Annex II).

Hence this principle has been progressively consolidated in international environmental law, and so it has since become a full-fledged and general principle of international law.

The WTO agreements confirm this observation. The preamble to the WTO Agreement highlights the ever closer links between international trade and environmental protection¹. A consistent approach means that the precautionary principle must be taken into account in these agreements, notably in the Agreement on Sanitary and Phytosanitary Measures (SPS) and in the Agreement on Technical Barriers to Trade (TBT), to ensure that this general principle is duly enforced in this legal order.

Hence, each Member of the WTO has the independent right to determine the level of environmental or health protection they consider appropriate. Consequently a member may apply measures, including measures based on the precautionary principle, which lead to a higher level of protection than that provided for in the relevant international standards or recommendations.

¹ *"The parties to this agreement ... recognising that their relations in the field of trade and economic endeavour should be conducted with a view to raising standards of living, ensuring full employment and a large and steadily growing volume of real income and effective demand, and expanding the production of and trade in goods and services, while allowing for the optimal use of the world's resources in accordance with the objective of sustainable development, seeking both to protect and preserve the environment and to enhance the means for doing to in a manner consistent with their respective needs and concerns at different levels of economic development ..."*

The Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) clearly sanctions the use of the precautionary principle, although the term itself is not explicitly used. Although the general rule is that all sanitary and phytosanitary measures must be based on scientific principles and that they should not be maintained without adequate scientific evidence, a derogation from these principles is provided for in Article 5 (7) which stipulates that: *“in cases where relevant scientific evidence is insufficient, a Member may provisionally adopt sanitary or phytosanitary measures on the basis of available pertinent information, including that from the relevant international organizations as well as from sanitary or phytosanitary measures applied by other Members. In such circumstances, Members shall seek to obtain the additional information necessary for a more objective assessment of risk and review the sanitary or phytosanitary measure accordingly within a reasonable period of time.”*

Hence, according to the SPS Agreement, measures adopted in application of a precautionary principle when the scientific data are inadequate, are provisional and imply that efforts be undertaken to elicit or generate the necessary scientific data. It is important to stress that the provisional nature is not bound up with a time limit but with the development of scientific knowledge.

The use of the term “more objective assessment of risk” in Article 5.7 infers that a precautionary measure may be based on a less objective appraisal but must nevertheless include an evaluation of risk.

The concept of risk assessment in the SPS leaves leeway for interpretation of what could be used as a basis for a precautionary approach. The risk assessment on which a measure is based may include non-quantifiable data of a factual or qualitative nature and is not uniquely confined to purely quantitative scientific data. This interpretation has been confirmed by the WTO’s Appellate body in the case of growth hormones, which rejected the panel’s initial interpretation that the risk assessment had to be quantitative and had to establish a minimum degree of risk.

The principles enshrined in Article 5.7 of the SPS must be respected in the field of sanitary and phytosanitary measures; however, because of the specific nature of other areas, such as the environment, it may be that somewhat different principles will have to be applied.

International guidelines are being considered in relation to the application of the Precautionary Principle in Codex Alimentarius. Such guidance in this, and other sectors, could pave the way to a harmonised approach by the WTO Members, to drawing up health or environment protection measures, while avoiding the misuse of the precautionary principle which could otherwise lead to unjustifiable barriers to trade.

In the light of these observations, the Commission considers that, following the example set by other Members of the WTO, the Community is entitled to prescribe the level of protection, notably as regards the environment and human, animal and plant health, which it considers appropriate. In this context, the Community must respect Articles 6, 95, 152 and 174 of the Treaty. To this end,

reliance on the precautionary principle constitutes an essential plank of its policy. It is clear that the choices made will affect its positions at international and notably multilateral level, as regards recourse to the precautionary principle.

Bearing in mind the very origins of the precautionary principle and its growing role in international law, and notably in the agreements of the World Trade Organisation, this principle must be duly addressed at international level in the various areas in which it is likely to be of relevance.

Following the example set by the other members of the WTO, the Commission considers that the Community is entitled to prescribe the level of protection, notably as regards environmental protection and human, animal and plant health, that it considers appropriate. Recourse to the precautionary principle is a central plank of Community policy. The choices made to this end will continue to influence its positions at international level, and notably at multinational level, as regards the precautionary principle.

5. THE CONSTITUENT PARTS OF THE PRECAUTIONARY PRINCIPLE

An analysis of the precautionary principle reveals two quite distinct aspects: (i) **the political decision to act or not to act as such**, which is linked to the **factors triggering** recourse to the precautionary principle; (ii) in the affirmative, **how to act, i.e. the measures** resulting from application of the precautionary principle.

There is a controversy as to the role of scientific uncertainty in risk analysis, and notably as to whether it belongs under risk assessment or risk management. This controversy springs from a confusion between a prudential approach and application of the precautionary principle. These two aspects are complementary but should not be confounded.

The prudential approach is part of risk assessment policy which is determined before any risk assessment takes place and which is based on the elements described in 5.1.3; it is therefore an integral part of the scientific opinion delivered by the risk evaluators.

On the other hand, application of the precautionary principle is part of risk management, when scientific uncertainty precludes a full assessment of the risk and when decision-makers consider that the chosen level of environmental protection or of human, animal and plant health may be in jeopardy.

The Commission considers that measures applying the precautionary principle belong in the general framework of risk analysis, and in particular risk management.

5.1. Factors triggering recourse to the precautionary principle

The precautionary principle is relevant only in the event of a potential risk, even if this risk cannot be fully demonstrated or quantified or its effects determined because of the insufficiency or inclusive nature of the scientific data.

It should however be noted that the precautionary principle can under no circumstances be used to justify the adoption of arbitrary decisions.

5.1.1. *Identification of potentially negative effects*

Before the precautionary principle is invoked, the scientific data relevant to the risks must first be evaluated. However, one factor logically and chronologically precedes the decision to act, namely identification of the potentially negative effects of a phenomenon. To understand these effects more thoroughly it is necessary to conduct a scientific examination. The decision to conduct this examination without awaiting additional information is bound up with a less theoretical and more concrete perception of the risk.

5.1.2. *Scientific evaluation*

A scientific evaluation of the potential adverse effects should be undertaken based on the available data when considering whether measures are necessary to protect the environment, the human, animal or plant health. An assessment of risk should be considered where feasible when deciding whether or not to invoke the precautionary principle. This requires reliable scientific data and logical reasoning, leading to a conclusion which expresses the possibility of occurrence and the severity of a hazard's impact on the environment, or health of a given population including the extent of possible damage, persistency, reversibility and delayed effect. However it is not possible in all cases to complete a comprehensive assessment of risk, but all effort should be made to evaluate the available scientific information.

Where possible, a report should be made which indicates the assessment of the existing knowledge and the available information, providing the views of the scientists on the reliability of the assessment as well as on the remaining uncertainties. If necessary, it should also contain the identification of topics for further scientific research.

Risk assessment consists of four components - namely hazard identification, hazard characterisation, appraisal of exposure and risk characterisation (Annex III). The limits of scientific knowledge may affect each of these components, influencing the overall level of attendant uncertainty and ultimately affecting the foundation for protective or preventive action. An attempt to complete these four steps should be performed before decision to act is taken.

5.1.3. *Scientific uncertainty*

Scientific uncertainty results usually from five characteristics of the scientific method : the variable chosen, the measurements made, the samples drawn, the models used and the causal relationship employed. Scientific uncertainty may

also arise from a controversy on existing data or lack of some relevant data . Uncertainty may relate to qualitative or quantitative elements of the analysis.

A more abstract and generalised approach preferred by some scientists is to separate all uncertainties into three categories of – Bias, Randomness and True Variability. Some other experts categorise uncertainty in terms of estimation of confidence interval of the probability of occurrence and of the severity of the hazard's impact.

This issue is very complex and the Commission launched a project “Technological Risk and the Management of Uncertainty” conducted under the auspices of the European Scientific Technology Observatory. The four ESTO reports will be published shortly and will give a comprehensive description of scientific uncertainty.

Risk evaluators accommodate these uncertainty factors by incorporating prudential aspects such as :

- relying on animal models to establish potential effects in man;
- using body weight ranges to make inter-species comparisons;
- adopting a safety factor in evaluating an acceptable daily intake to account for intra- and inter-species variability; the magnitude of this factor depends on the degree of uncertainty of the available data;
- not adopting an acceptable daily intake for substances recognised as genotoxic or carcinogenic;
- adopting the "ALARA" (as low as reasonably achievable) level as a basis for certain toxic contaminants.

Risk managers should be fully aware of these uncertainty factors when they adopt measures based on the scientific opinion delivered by the evaluators.

However, in some situations the scientific data are not sufficient to allow one to apply these prudential aspects in practice, i.e. in cases in which extrapolations cannot be made because of the absence of parameter modelling and where cause-effect relationships are suspected but have not been demonstrated. It is in situations like these that decision-makers face the dilemma of having to act or not to act.

Recourse to the precautionary principle presupposes:

- *identification of potentially negative effects resulting from a phenomenon, product or procedure;*
- *a scientific evaluation of the risk which because of the insufficiency of the data, their inconclusive or imprecise nature, makes it impossible to determine with sufficient certainty the risk in question.*

5.2. Measures resulting from reliance on the precautionary principle

5.2.1. The decision whether or not to act

In the kind of situation described above - sometimes under varying degrees of pressure from public opinion - decision-makers have to respond. However, responding does not necessarily mean that measures always have to be adopted. The decision to do nothing may be a response in its own right.

The appropriate response in a given situation is thus the result of an eminently political decision, a function of the risk level that is "acceptable" to the society on which the risk is imposed.

5.2.2. Nature of the action ultimately taken

The nature of the decision influences the type of control that can be carried out. Recourse to the precautionary principle does not necessarily mean adopting final instruments designed to produce legal effects that are open to judicial review. There is a whole range of actions available to decision-makers under the head of the precautionary principle. The decision to fund a research programme or even the decision to inform the public about the possible adverse effects of a product or procedure may themselves be inspired by the precautionary principle.

It is for the Court of Justice to pronounce on the legality of any measures taken by the Community institutions. The Court has consistently held that when the Commission or any other Community institution has broad discretionary powers, notably as regards the nature and scope of the measures it adopts, review by the Court must be limited to examining whether the institution committed a manifest error or misuse of power or manifestly exceed the limits of its powers of appraisal.

Hence the measures may not be of an arbitrary nature.

Recourse to the precautionary principle does not necessarily mean adopting final instruments designed to produce legal effects, which are subject to judicial review.

6. GUIDELINES FOR APPLYING THE PRECAUTIONARY PRINCIPLE.

6.1. Implementation

When decision-makers become aware of a risk to the environment or human, animal or plant health that in the event of non-action may have serious consequences, the question of appropriate protective measures arise. Decision-makers have to obtain, through a structured approach, a scientific evaluation, as complete as possible, of the risk to the environment, or health, in order to select the most appropriate course of action

The determination of appropriate action including measures based on the precautionary principle should start with a scientific evaluation and, if necessary, the decision to commission scientists to perform an as objective and complete as possible scientific evaluation. It will cast light on the existing objective evidence, the gaps in knowledge and the scientific uncertainties.

The implementation of an approach based on the precautionary principle should start with a scientific evaluation, as complete as possible, and where possible, identifying at each stage the degree of scientific uncertainty.

6.2. The triggering factor

Once the scientific evaluation has been performed as best as possible, it may provide a basis for triggering a decision to invoke the precautionary principle. The conclusions of this evaluation should show that the desired level of protection for the environment or a population group could be jeopardised. The conclusions should also include an assessment of the scientific uncertainties and a description of the hypotheses used to compensate for the lack of the scientific or statistical data. An assessment of the potential consequences of inaction should be considered and may be used as a trigger by the decision-makers. The decision to wait or not to wait for new scientific data before considering possible measures should be taken by the decision-makers with a maximum of transparency. The absence of scientific proof of the existence of a cause-effect relationship, a quantifiable dose/response relationship or a quantitative evaluation of the probability of the emergence of adverse effects following exposure should not be used to justify inaction. Even if scientific advice is supported only by a minority fraction of the scientific community, due account should be taken of their views, provided the credibility and reputation of this fraction are recognised.²

The Commission has confirmed its wish to rely on procedures as transparent as possible and to involve all interested parties at the earliest possible stage³. This will assist decision makers in taking legitimate measures which are likely to achieve the society's chosen level of health or environmental protection

An assessment of the potential consequences of inaction and of the uncertainties of the scientific evaluation should be considered by decision-makers when determining whether to trigger action based on the precautionary principle.

All interested parties should be involved to the fullest extent possible in the

² cf The WTO Appellate Body report on hormones, paragraph 124 : « In some cases, the very existence of divergent views presented by qualified scientists who have investigated the particular issue at hand, may indicate a state of scientific uncertainty »

³ A considerable effort has already been made notably as regards public health and the environment. As regards the latter, the Community and the Member States have demonstrated the importance they attach to access to information and justice by signing the Aarhus Convention of June 1998.

study of various risk management options that may be envisaged once the results of the scientific evaluation and/or risk assessment are available and the procedure be as transparent as possible.

6.3. The general principles of application

The general principles are not limited to application of the precautionary principle. They apply to all risk management measures. An approach inspired by the precautionary principle does not exempt one from applying wherever possible these criteria, which are generally used when a complete risk assessment is at hand.

Thus reliance on the precautionary principle is no excuse for derogating from the general principles of risk management.

These general principles include:

- proportionality,
- non-discrimination,
- consistency,
- examination of the benefits and costs of action or lack of action
- examination of scientific developments.

6.3.1. Proportionality

The measures envisaged must make it possible to achieve the appropriate level of protection. Measures based on the precautionary principle must not be disproportionate to the desired level of protection and must not aim at zero risk, something which rarely exists. However, in certain cases, an incomplete assessment of the risk may considerably limit the number of options available to the risk managers.

In some cases a total ban may not be a proportional response to a potential risk. In other cases, it may be the sole possible response to a potential risk.

Risk reduction measures should include less restrictive alternatives which make it possible to achieve an equivalent level of protection, such as appropriate treatment, reduction of exposure, tightening of controls, adoption of provisional limits, recommendations for populations at risk, etc. One should also consider replacing the products or procedures concerned by safer products or procedures.

The risk reduction measure should not be limited to immediate risks where the proportionality of the action is easier to assess. It is in situations in which the adverse effects do not emerge until long after exposure that the cause-effect relationships are more difficult to prove scientifically and that – for this reason – the precautionary principle often has to be invoked. In this case the potential long-term effects must be taken into account in evaluating the proportionality of measures in the form of rapid action to limit or eliminate a risk whose effects

will not surface until ten or twenty years later or will affect future generations. This applies in particular to effects on the eco-system. Risks that are carried forward into the future cannot be eliminated or reduced except at the time of exposure, that is to say immediately.

Measures should be proportional to the desired level of protection.

6.3.2. *Non-discrimination*

The principle of non-discrimination means that comparable situations should not be treated differently and that different situations should not be treated in the same way, unless there are objective grounds for doing so.

Measures taken under the precautionary principle should be designed to achieve an equivalent level of protection without invoking the geographical origin or the nature of the production process to apply different treatments in an arbitrary manner.

Measures should not be discriminatory in their application.

6.3.3. *Consistency*

Measures should be consistent with the measures already adopted in similar circumstances or using similar approaches. Risk evaluations include a series of factors to be taken into account to ensure that they are as thorough as possible. The goal here is to identify and characterise the hazards, notably by establishing a relationship between the dose and the effect and assessing the exposure of the target population or the environment. If the absence of certain scientific data makes it impossible to characterise the risk, taking into account the uncertainties inherent to the evaluation, the measures taken under the precautionary principle should be comparable in nature and scope with measures already taken in equivalent areas in which all the scientific data are available.

Measures should be consistent with the measures already adopted in similar circumstances or using similar approaches.

6.3.4. *Examination of the benefits and costs of action and lack of action*

A comparison must be made between the most likely positive or negative consequences of the envisaged action and those of inaction in terms of the overall cost to the Community, both in the long- and short-term. The measures envisaged must produce an overall advantage as regards reducing risks to an acceptable level.

Examination of the pros and cons cannot be reduced to an economic cost-benefit analysis. It is wider in scope and includes non-economic considerations.

However, examination of the pros and cons should include an economic cost-benefit analysis where this is appropriate and possible.

Besides, other analysis methods, such as those concerning the efficacy of possible options and their acceptability to the public may also have to be taken into account. A society may be willing to pay a higher cost to protect an interest, such as the environment or health, to which it attaches priority.

The Commission affirms, in accordance with the case law of the Court that requirements linked to the protection of public health should undoubtedly be given greater weight than economic considerations.

The measures adopted presuppose examination of the benefits and costs of action and lack of action. This examination should include an economic cost/benefit analysis when this is appropriate and feasible. However, other analysis methods, such as those concerning efficacy and the socio-economic impact of the various options, may also be relevant. Besides the decision-maker may, in certain circumstances, be guided by non-economic considerations such as the protection of health.

6.3.5. Examination of scientific developments

The measures should be maintained as long as the scientific data are inadequate, imprecise or inconclusive and as long as the risk is considered too high to be imposed on society. The measures may have to be modified or abolished by a particular deadline, in the light of new scientific findings. However, this is not always linked to the time factor, but to the development of scientific knowledge.

Besides, scientific research should be carried out with a view to obtaining a more advanced or more complete scientific assessment. In this context, the measures should be subjected to regular scientific monitoring, so that they can be reevaluated in the light of new scientific information.

The Agreement on Sanitary and Phytosanitary Measures (SPS) provides that measures adopted in the context of inadequate scientific evidence must respect certain conditions. Hence these conditions concern only the scope of the SPS Agreement, but the specific nature of certain sectors, such as the environment, may mean that somewhat different principles have to be applied.

Article 5(7) of the SPS agreement includes certain specific rules:

- The measures must be of a provisional nature pending the availability of more reliable scientific data. However this provisional nature is linked to the development of scientific knowledge rather than to a time factor.
- Research must be carried out to elicit the additional scientific data required for a more objective assessment of the risk.

- The measures must be periodically reviewed to take account of new scientific data. The results of scientific research should make it possible to complete the risk evaluation and if necessary to review the measures on the basis of the conclusions.
- Hence the reasonable period envisaged in the SPS Agreement includes the time needed for completion of the necessary scientific work and, besides, the time needed for performance of a risk evaluation based on the conclusions of this scientific work. It should not be possible to invoke budgetary constraints or political priorities to justify excessive delays in obtaining results, re-evaluating the risk or amending the provisional measures.

Research could also be conducted for the improvement of the methodologies and instruments for assessing risk, including greater integration of all pertinent factors (e.g. socio-economic information, technological perspectives).

The measures, although provisional, shall be maintained as long as the scientific data remain incomplete, imprecise or inconclusive and as long as the risk is considered too high to be imposed on society.

Maintenance of the measures depends on the development of scientific knowledge, in the light of which they should be reevaluated. This means that scientific research shall be continued with a view to obtaining more complete data.

Measures based on the precautionary principle shall be reexamined and if necessary modified depending on the results of the scientific research and the follow up of their impact.

6.4. The burden of proof

- Community rules and those of many third countries enshrine the principle of prior approval (positive list) before the placing on the market of certain products, such as drugs, pesticides or food additives. This is one way of applying the precautionary principle, by shifting responsibility for producing scientific evidence. This applies in particular to substances deemed "a priori" hazardous or which are potentially hazardous at a certain level of absorption. In this case the legislator, by way of precaution, has clearly reversed the burden of proof by requiring that the substances be deemed hazardous until proven otherwise. Hence it is up to the business community to carry out the scientific work needed to evaluate the risk. As long as the human health risk cannot be evaluated with sufficient certainty, the legislator is not legally entitled to authorise use of the substance, unless exceptionally for test purposes.
- In other cases, where such a prior approval procedure does not exist, it may be for the user, a private individual, a consumer association, citizens or the public authorities to demonstrate the nature of a danger and the level of risk posed by a product or process. Action taken under the head of the

precautionary principle must in certain cases include a clause reversing the burden of proof and placing it on the producer, manufacturer or importer, but such an obligation cannot be systematically entertained as a general principle. This possibility should be examined on a case-by-case basis when a measure is adopted under the precautionary principle, pending supplementary scientific data, so as to give professionals who have an economic interest in the production and/or marketing of the procedure or product in question the opportunity to finance the necessary research on a voluntary basis.

Measures based on the precautionary principle may assign responsibility for producing the scientific evidence necessary for a comprehensive risk evaluation.

7. CONCLUSION

This Communication of a general scope sets out the Commission's position as regards recourse to the precautionary principle. The Communication reflects the Commission's desire for transparency and dialogue with all stakeholders. At the same it provides concrete guidance for applying the precautionary principle.

The Commission wishes to reaffirm the crucial importance it attaches to the distinction between the decision to act or not to act, which is of an eminently political nature, and the measures resulting from recourse to the precautionary principle, which must comply with the general principles applicable to all risk management measures. The Commission also considers that every decision must be preceded by an examination of all the available scientific data and, if possible, a risk evaluation that is as objective and comprehensive as possible. A decision to invoke the precautionary principle does not mean that the measures will be adopted on an arbitrary or discriminatory basis.

This Communication should also contribute to reaffirming the Community's position at international level, where the precautionary principle is receiving increasing attention. However the Commission wishes to stress that this Communication is not meant to be the last word; rather, it should be seen as the point of departure for a broader study of the conditions in which risks should be assessed, appraised, managed and communicated.

ANNEX I

LEGAL AND OTHER BASES FOR EC DECISIONS ON PRECAUTIONARY MEASURES

The legislative texts

Ref. 1

The EC Treaty, incorporating provisions already introduced by the Maastricht Treaty of 1992, and more specifically Article 174 thereof, states:

- "2. Community policy on the environment shall aim at a high level of protection taking into account the diversity of situations in the various regions of the Community. It shall be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay ...
- 3. In preparing its policy on the environment, the Community shall take account of:
 - available scientific and technical data, ...
 - the potential benefits and costs of action or lack of action ..."

Ref. 2

Article 6 of the EC Treaty provides that "environmental protection requirements must be integrated into the definition and implementation of the Community policies and activities referred to in Article 3, in particular with a view to promoting sustainable development".

Ref. 3

Hence, Article 95(3) of the EC Treaty provides that: "The Commission, in its proposals envisaged in paragraph 1 concerning health, safety, environmental protection and consumer protection, will take as a base a high level of protection, taking account in particular of any new development based on scientific facts. Within their respective powers, the European Parliament and the Council will also seek to achieve this objective".

Ref. 4

The first paragraph of Article 152 of the EC Treaty provides that: "A high level of human health protection shall be ensured in the definition and implementation of all Community policies and activities".

Case law

Ref. 5

In its judgement on the validity of the Commission's decision banning the exportation of beef from the United Kingdom to reduce the risk of BSE transmission (Judgements of 5 May 1998, cases C-157/96 and C-180/96), the Court held:

"Where there is uncertainty as to the existence or extent of risks to human health, the institutions may take protective measures without having to wait until the reality and seriousness of those risks become fully apparent." (Grounds 63). The next section fleshes out the Court's reasoning: "That approach is borne out by Article 130r(1) of the EC Treaty, according to which Community policy on the environment is to pursue the objective inter alia of protecting human health. Article 130r(2) provides that that policy is to aim at a high level of protection and is to be based in particular on the principles that preventive action should be taken and that environmental protection requirements must be integrated into the definition and implementation of other Community policies." (Grounds 64).

Ref. 6

In another judgement concerning protection of consumer health (Judgement of 16 July 1998, case T-199/96), the Court of First Instance cites the above passage from the BSE judgement (see Grounds 66 and 67).

Ref. 7

Recently, in the Order of 30 June 1999 (Case T-70/99), the President of the Court of First Instance confirmed the positions expressed in the abovementioned judgements. Note that this judgement contains an explicit reference to the precautionary principle and affirms that "requirements linked to the protection of public health should undoubtedly be given greater weight than economic considerations."

Policy orientations

Ref. 8

In its Communication of 30 April 1997 on consumer health and food safety (COM(97) 183 final), the Commission states: "the Commission will be guided in its risk analysis by the precautionary principle, in cases where the scientific basis is insufficient or some uncertainty exists".

Ref. 9

In its Green Paper on the General Principles of Food Law in the European Union of 30 April 1997 (COM(97) 176 final), the Commission reiterates this point:

"The Treaty requires the Community to contribute to the maintenance of a high level of protection of public health, the environment and consumers. In order to ensure a high level of protection and coherence, protective measures should be based on risk assessment, taking into account all relevant risk factors, including technological aspects, the best available scientific evidence and the availability of inspection sampling and

testing methods. Where a full risk assessment is not possible, measures should be based on the precautionary principle."

Ref. 10

In its Resolution of 10 March 1998 on the Green Paper, the European Parliament states:

"European food law is based on the principle of preventive protection of consumer health;

stresses that policy in this area must be founded on a scientifically-based risk analysis supplemented, where necessary, by appropriate risk management based on the precautionary principle;

invites the Commission to anticipate possible challenges to Community food law by WTO bodies by requesting the scientific committees to present a full set of arguments based on the precautionary principle."

Ref. 11

The Joint Parliamentary Committee of the EEA (European Economic Area), adopted a Resolution on Food Safety in the EEA on 16 March 1999. In this connection, on the one hand, it "emphasises the importance of application of the precautionary principle" (point 5) and, on the other, "reaffirms the over-riding need for a precautionary approach within the EEA to the assessment and evaluation of applications for the marketing of GMOs intended to enter the food chain..." (point 13).

Ref. 12

On 13 April 1999, the Council adopted a Resolution urging the Commission, inter alia, "to be in the future even more determined to be guided by the precautionary principle in preparing proposals for legislation and in its other consumer-related activities and develop as a priority clear and effective guidelines for the application of this principle".

ANNEX II

THE PRECAUTIONARY PRINCIPLE IN INTERNATIONAL LAW

The environment

Although applied more broadly, the Precautionary Principle has been developed primarily in the context of environmental policy.

Hence, the Ministerial Declaration of the Second International Conference on the Protection of the North Sea (1987) states that *"in order to protect the North Sea from possibly damaging effects of the most dangerous substances, a precautionary approach is necessary which may require action to control inputs of such substances even before a causal link has been established by absolutely clear scientific evidence"*. A new Ministerial Declaration was delivered at the Third International Conference on the Protection of the North Sea (1990). It fleshes out the earlier declaration, stating that *"the participants ... will continue to apply the precautionary principle, that is to take action to avoid potentially damaging impacts of substances that are persistent, toxic and liable to bioaccumulate even where there is no scientific evidence to prove a causal link between emissions and effects"*

The Precautionary Principle was explicitly recognised during the UN Conference on Environment and Development (UNCED) in Rio de Janeiro 1992 and included in the so-called Rio Declaration. Since then the Precautionary Principle has been implemented in various environmental instruments, and in particular in global climate change, ozone depleting substances and biodiversity conservation.

The precautionary Principle is listed as Principle 15 of the Rio Declaration among the principles of general rights and obligations of national authorities:

"In order to protect the environment, the precautionary approach should be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation".

Principle 15 is reproduced in similar wording in:

1. The preamble of the Convention of Biological Diversity (1992):

(...) Noting also that where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimise such a threat (...)

2. In article 3 (Principles) of the Convention of Climate Change (1992):

(..)The Parties should take precautionary measures to anticipate, prevent or minimise the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost. To achieve this, such policies and measures should take into account different socio-

economic contexts, be comprehensive, cover all relevant sources, sinks and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors. Efforts to address climate change may be carried out cooperatively by interested Parties.

In the Paris Convention for the protection of the marine environment of the north-east Atlantic (September 1992), the precautionary principle is defined as the principle "*by virtue of which preventive measures are to be taken when there are reasonable grounds for concern that substances or energy introduced, directly or indirectly, into the marine environment may bring about hazards to human health, harm living resources and marine ecosystems, damage amenities or interfere with other legitimate uses of the sea, even when there is no conclusive evidence of a causal relationship between the inputs and the effects.*"

Recently, on 28 January 2000, at the Conference of the Parties to the Convention on Biological diversity, the Protocol on Biosafety concerning the safe transfer, handling and use of living modified organisms resulting from modern biotechnology confirmed the key function of the Precautionary Principle. In fact, article 10, paragraph 6 states: "*Lack of scientific certainty due to insufficient relevant scientific information and knowledge regarding the extent of the potential adverse effects of a living modified organism on the conservation and sustainable use of biological diversity in the Party of import, taking also into account risks to human health, shall not prevent that Party from taking a decision, as appropriate, with regard to the import of living modified organism in question as referred to in paragraph 3 above, in order to avoid or minimize such potential adverse effects*".

Besides, the preamble to the WTO Agreement highlights the ever closer links between international trade and environmental protection.

The WTO SPS Agreement

Although the term „Precautionary Principle“ is not explicitly used in the WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS), the Appellate Body on EC measures concerning meat and meat products (Hormones) (AB-1997-4, paragraph 124) states that it finds reflection in Article 5.7 of this Agreement. Art 5.7 reads: „*In cases where relevant scientific evidence is insufficient, a Member may provisionally adopt sanitary or phytosanitary measures on the basis of available scientific information, including that from the relevant international organizations as well as from sanitary and phytosanitary measures applied by other Members. In such circumstances, Members shall seek to obtain the additional information necessary for a more objective assessment of risk and review the sanitary or phytosanitary measure accordingly within a reasonable period of time.*“

The Appellate Body on Hormones (Paragraph 124) recognises....” that there is no need to assume that Article 5.7 exhausts the relevance of a precautionary principle”. Moreover, Members have the “right to establish their own level of sanitary protection, which level may be higher (i.e. more cautious) than that implied in existing international standards, guidelines and recommendations”. Furthermore, it accepts that “responsible, representative governments commonly act from perspectives of prudence and precaution where risks of irreversible, e.g. life-terminating, damage to human health are concerned.” The Appellate Body on Japan-Measures affecting agricultural products (AB-1998-8, paragraph 89) clarifies the four requirements which must be met in order to adopt and

maintain provisional SPS measures. A Member may provisionally adopt an SPS measure if this measure is:

- 1) imposed in respect of a situation where „relevant scientific information is insufficient“; and
- 2) adopted “on the basis of available pertinent information“.

Such a provisional measure may not be maintained unless the Member which adopted the measure:

- 1) „seek(s) to obtain the additional information necessary for a more objective risk assessment“; and
- 2) „review(s) the ... measure accordingly within a reasonable period of time“

These four requirements are clearly cumulative and are equally important for the purpose of determining consistency with the provision of Art 5.7. Whenever one of these four requirements is not met, the measure at issue is inconsistent with Art 5.7. As to what constitutes a „reasonable period of time“ to review the measure, the Appellate Body points out (Paragraph 93), that this has to be established on a case-by-case basis and depends on the specific circumstances of each case, including the difficulty of obtaining the additional information necessary for the review *and* the characteristics of the provisional SPS measure.

ANNEX III

THE FOUR COMPONENTS OF RISK ASSESSMENT

An attempt to complete as far as possible these four components should be performed before action is taken.

Hazard identification means identifying the biological, chemical or physical agents that may have adverse effects. A new substance or biological agent may reveal itself through its effects on the population (illness or death), or on the environment and it may be possible to describe the actual or potential effects on the population or environment before the cause is identified beyond doubt.

Hazard characterisation consists of determining, in quantitative and/or qualitative terms, the nature and severity of the adverse effects associated with the causal agents or activity. It is at this stage that a relationship between the amount of the hazardous substance and the effect has to be established. However, the relationship is sometimes difficult or impossible to prove, for instance because the causal link has not been established beyond doubt.

Appraisal of exposure consists of quantitatively or qualitatively evaluating the probability of exposure to the agent under study. Apart from information on the agents themselves (source, distribution, concentrations, characteristics, etc.), there is a need for data on the probability of contamination or exposure of the population or environment to the hazard.

Risk characterisation corresponds to the qualitative and/or quantitative estimation, taking account of inherent uncertainties, of the probability, of the frequency and severity of the known or potential adverse environmental or health effects liable to occur. It is established on the basis of the three preceding and closely depends on the uncertainties, variations, working hypotheses and conjectures made at each stage of the process. When the available data are inadequate or non-conclusive, a prudent and cautious approach to environmental protection, health or safety could be to opt for the worst-case hypothesis. When such hypotheses are accumulated, this will lead to an exaggeration of the real risk but gives a certain assurance that it will not be underestimated.

ANNEX 3

Relevant Natura Data Forms and Ramsar Information Sheets

STANDARD DATA FORM for sites within the 'UK national site network of European sites'

Special Protection Areas (SPAs) are classified and Special Areas of Conservation (SACs) are designated under:

- the Conservation of Habitats and Species Regulations 2017 (as amended) in England and Wales (including the adjacent territorial sea) and to a limited extent in Scotland (reserved matters) and Northern Ireland (excepted matters);
- the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) in Scotland;
- the Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 (as amended) in Northern Ireland; and
- the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) in the UK offshore area.

Each SAC or SPA (forming part of the UK national site network of European sites) has its own Standard Data Form containing site-specific information. The information provided here generally follows the same documenting format for SACs and SPAs, as set out in the [Official Journal of the European Union recording the Commission Implementing Decision of 11 July 2011 \(2011/484/EU\)](#).

Please note that these forms contain a number of codes, all of which are explained either within the data forms themselves or in the end notes.

More general information on SPAs and SACs in the UK is available from the [SPA homepage](#) and [SAC homepage](#) on the JNCC website. These webpages also provide links to Standard Data Forms for all SAC and SPA sites in the UK.

<https://jncc.gov.uk/>



NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),
Proposed Sites for Community Importance (pSCI),
Sites of Community Importance (SCI) and
for Special Areas of Conservation (SAC)

SITE UK0030148
SITENAME Exmoor and Quantock Oakwoods

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1. SITE IDENTIFICATION

1.1 Type B	1.2 Site code UK0030148	Back to top
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1.3 Site name

Exmoor and Quantock Oakwoods

1.4 First Compilation date 2001-01	1.5 Update date 2015-12
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1.6 Respondent:

Name/Organisation: Joint Nature Conservation Committee
Address: Joint Nature Conservation Committee Monkstone House City Road Peterborough PE1 1JY
Email:

Date site proposed as SCI:	2001-01
Date site confirmed as SCI:	2004-12
Date site designated as SAC:	2005-04
National legal reference of SAC designation:	Regulations 11 and 13-15 of the Conservation of Habitats and Species Regulations 2010 (http://www.legislation.gov.uk/uksi/2010/490/contents/made).

2. SITE LOCATION

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2.1 Site-centre location [decimal degrees]:

Longitude

-3.5825

Latitude

51.18388889

2.2 Area [ha]:

1894.05

2.3 Marine area [%]

0.0

2.4 Sitelength [km]:

0.0

2.5 Administrative region code and name

NUTS level 2 code

Region Name

UKK2	Dorset and Somerset
UKK4	Devon





2.6 Biogeographical Region(s)

Atlantic (100.0
%)

3. ECOLOGICAL INFORMATION

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3.1 Habitat types present on the site and assessment for them

Annex I Habitat types						Site assessment			
Code	PF	NP	Cover [ha]	Cave [number]	Data quality	A B C D	A B C		
						Representativity	Relative Surface	Conservation	Global
4030 			0.57	0	G	D			
9120 			70.08	0	G	D			
91A0 			1414.86	0	G	A	C	B	B
91E0 	X		45.46	0	G	C	C	A	C

- **PF:** for the habitat types that can have a non-priority as well as a priority form (6210, 7130, 9430) enter "X" in the column PF to indicate the priority form.
- **NP:** in case that a habitat type no longer exists in the site enter: x (optional)
- **Cover:** decimal values can be entered
- **Caves:** for habitat types 8310, 8330 (caves) enter the number of caves if estimated surface is not available.
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation)

3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them

Species					Population in the site						Site assessment			
G	Code	Scientific Name	S	NP	T	Size		Unit	Cat.	D.qual.	A B C D	A B C		
						Min	Max				Pop.	Con.	Iso.	Glo.
M	1308	Barbastella barbastellus			p	51	100	i		M	B	A	C	A
F	1163	Cottus gobio			p				C	DD	D			
F	1096	Lampetra planeri			p				R	DD	D			
I	1083	Lucanus cervus			p				P	DD	D			
M	1355	Lutra lutra			p				P	DD	C	B	C	C
M	1323	Myotis bechsteinii			p				P	DD	C	B	C	C
M	1303	Rhinolophus hipposideros			p				P	DD	D			
F	1106	Salmo salar			p				C	DD	D			

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see [reference portal](#))
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

4. SITE DESCRIPTION

4.1 General site character

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Habitat class	% Cover
N16	87.0
N07	0.5
N09	3.0
N06	0.5
N23	0.5
N19	1.0
N10	0.5
N08	6.0

N17	1.0
Total Habitat Cover	100

Other Site Characteristics

1 Terrestrial: Soil & Geology: sedimentary,acidic,sandstone,neutral,nutrient-poor 2 Terrestrial: Geomorphology and landscape: upland,hilly,valley,slope,floodplain

4.2 Quality and importance

Old sessile oak woods with Ilex and Blechnum in the British Isles for which this is considered to be one of the best areas in the United Kingdom. Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) for which the area is considered to support a significant presence. Myotis bechsteini for which the area is considered to support a significant presence. Barbastella barbastellus for which this is considered to be one of the best areas in the United Kingdom. Lutra lutra for which the area is considered to support a significant presence.

4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]
H	A04		I
H	K04		I
H	H04		B
H	B02		I
H	I01		B

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]
H	B02		I
H	B06		I
H	A02		I
H	A04		I

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

4.5 Documentation

Conservation Objectives - the Natural England links below provide access to the Conservation Objectives (and other site-related information) for its terrestrial and inshore Natura 2000 sites, including conservation advice packages and supporting documents for European Marine Sites within English waters and for cross-border sites. See also the 'UK Approach' document for more information (link via the JNCC website).

Link(s): <http://publications.naturalengland.org.uk/category/6490068894089216>

<http://publications.naturalengland.org.uk/category/3212324>

http://jncc.defra.gov.uk/pdf/Natura2000_StandardDataForm_UKApproach_Dec2015.pdf

5. SITE PROTECTION STATUS (optional)

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5.1 Designation types at national and regional level:

Code	Cover [%]	Code	Cover [%]	Code	Cover [%]
UK04	100.0	UK01	22.4		

6. SITE MANAGEMENT

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6.1 Body(ies) responsible for the site management:

Organisation:	Natural England
Address:	
Email:	

6.2 Management Plan(s):

An actual management plan does exist:

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No, but in preparation
<input checked="" type="checkbox"/>	No

6.3 Conservation measures (optional)

For available information, including on Conservation Objectives, see Section 4.5.

EXPLANATION OF CODES USED IN THE SPECIAL AREA OF CONSERVATION (SAC) AND SPECIAL PROTECTION AREA (SPA) STANDARD DATA FORMS

The codes in the table below generally follow those explained in the [official European Union guidelines for the Standard Data Form](#) (also referencing the relevant page number).

1.1 Site type

CODE	DESCRIPTION	PAGE NO
A	SPA (classified Special Protection Area)	53
B	cSAC, SCI or SAC (candidate Special Area of Conservation, Site of Community Importance, designated Special Area of Conservation)	53
C	SPA area/boundary is the same as the cSAC/SCI/SAC i.e. a co-classified/designated site (Note: this situation only occurs in Gibraltar)	53

3.1 Habitat code

CODE	DESCRIPTION	PAGE NO
1110	Sandbanks which are slightly covered by sea water all the time	57
1130	Estuaries	57
1140	Mudflats and sandflats not covered by seawater at low tide	57
1150	Coastal lagoons	57
1160	Large shallow inlets and bays	57
1170	Reefs	57
1180	Submarine structures made by leaking gases	57
1210	Annual vegetation of drift lines	57
1220	Perennial vegetation of stony banks	57
1230	Vegetated sea cliffs of the Atlantic and Baltic Coasts	57
1310	Salicornia and other annuals colonizing mud and sand	57
1320	Spartina swards (Spartinion maritimae)	57
1330	Atlantic salt meadows (Glaucio-Puccinellietalia maritimae)	57
1340	Inland salt meadows	57
1420	Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi)	57
2110	Embryonic shifting dunes	57
2120	Shifting dunes along the shoreline with Ammophila arenaria ("white dunes")	57
2130	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	57
2140	Decalcified fixed dunes with Empetrum nigrum	57
2150	Atlantic decalcified fixed dunes (Calluno-Ulicetea)	57
2160	Dunes with Hippophya• rhamnoides	57
2170	Dunes with Salix repens ssp. argentea (Salicion arenariae)	57
2190	Humid dune slacks	57
21A0	Machairs (* in Ireland)	57
2250	Coastal dunes with Juniperus spp.	57
2330	Inland dunes with open Corynephorus and Agrostis grasslands	57
3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)	57
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea	57
3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	57
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation	57

CODE	DESCRIPTION	PAGE NO
3160	Natural dystrophic lakes and ponds	57
3170	Mediterranean temporary ponds	57
3180	Turloughs	57
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation	57
4010	Northern Atlantic wet heaths with Erica tetralix	57
4020	Temperate Atlantic wet heaths with Erica ciliaris and Erica tetralix	57
4030	European dry heaths	57
4040	Dry Atlantic coastal heaths with Erica vagans	57
4060	Alpine and Boreal heaths	57
4080	Sub-Arctic Salix spp. scrub	57
5110	Stable xerothermophilous formations with Buxus sempervirens on rock slopes (Berberidion p.p.)	57
5130	Juniperus communis formations on heaths or calcareous grasslands	57
6130	Calaminarian grasslands of the Violetalia calaminariae	57
6150	Siliceous alpine and boreal grasslands	57
6170	Alpine and subalpine calcareous grasslands	57
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)	57
6230	Species-rich Nardus grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe)	57
6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	57
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	57
6510	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	57
6520	Mountain hay meadows	57
7110	Active raised bogs	57
7120	Degraded raised bogs still capable of natural regeneration	57
7130	Blanket bogs (* if active bog)	57
7140	Transition mires and quaking bogs	57
7150	Depressions on peat substrates of the Rhynchosporion	57
7210	Calcareous fens with Cladium mariscus and species of the Caricion davallianae	57
7220	Petrifying springs with tufa formation (Cratoneurion)	57
7230	Alkaline fens	57
7240	Alpine pioneer formations of the Caricion bicoloris-atrofuscae	57
8110	Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani)	57
8120	Calcareous and calcshist scree of the montane to alpine levels (Thlaspietalia rotundifoliae)	57
8210	Calcareous rocky slopes with chasmophytic vegetation	57
8220	Siliceous rocky slopes with chasmophytic vegetation	57
8240	Limestone pavements	57
8310	Caves not open to the public	57
8330	Submerged or partially submerged sea caves	57
9120	Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robur-petraeae or Ilici-Fagenion)	57
9130	Asperulo-Fagetum beech forests	57
9160	Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli	57
9180	Tilio-Acerion forests of slopes, scree and ravines	57
9190	Old acidophilous oak woods with Quercus robur on sandy plains	57
91A0	Old sessile oak woods with Ilex and Blechnum in the British Isles	57
91C0	Caledonian forest	57
91D0	Bog woodland	57
91E0	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	57
91J0	Taxus baccata woods of the British Isles	57

3.1 Habitat representativity (abbreviated to 'Representativity' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent representativity	57
B	Good representativity	57
C	Significant representativity	57
D	Non-significant presence representativity	57

3.1 Relative surface

CODE	DESCRIPTION	PAGE NO
A	> 15%-100%	58
B	> 2%-15%	58
C	≤ 2%	58

3.1 Degree of conservation (abbreviated to 'Conservation' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	59
B	Good conservation	59
C	Average or reduced conservation	59

3.1 Global assessment (abbreviated to 'Global' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	59
B	Good value	59
C	Significant value	59

3.2 Population (abbreviated to 'Pop.' in data form)

CODE	DESCRIPTION	PAGE NO
A	> 15%-100%	62
B	> 2%-15%	62
C	≤ 2%	62
D	Non-significant population	62

3.2 Degree of conservation (abbreviated to 'Con.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	63
B	Good conservation	63
C	Average or reduced conservation	63

3.2 Isolation (abbreviated to 'Iso.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Population (almost) Isolated	63
B	Population not-isolated, but on margins of area of distribution	63
C	Population not-isolated within extended distribution range	63

3.2 Global Grade (abbreviated to 'Glo.' or 'G.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	63
B	Good value	63
C	Significant value	63

3.3 Other species – essentially covers bird assemblage types

CODE	DESCRIPTION	PAGE NO
WATR	Non-breeding waterbird assemblage	UK specific code
SBA	Breeding seabird assemblage	UK specific code

BBA	Breeding bird assemblage (applies only to sites classified pre 2000)	UK specific code
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4.1 Habitat class code

CODE	DESCRIPTION	PAGE NO
N01	Marine areas, Sea inlets	65
N02	Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins)	65
N03	Salt marshes, Salt pastures, Salt steppes	65
N04	Coastal sand dunes, Sand beaches, Machair	65
N05	Shingle, Sea cliffs, Islets	65
N06	Inland water bodies (Standing water, Running water)	65
N07	Bogs, Marshes, Water fringed vegetation, Fens	65
N08	Heath, Scrub, Maquis and Garrigue, Phygrana	65
N09	Dry grassland, Steppes	65
N10	Humid grassland, Mesophile grassland	65
N11	Alpine and sub-Alpine grassland	65
N14	Improved grassland	65
N15	Other arable land	65
N16	Broad-leaved deciduous woodland	65
N17	Coniferous woodland	65
N19	Mixed woodland	65
N21	Non-forest areas cultivated with woody plants (including Orchards, groves, Vineyards, Dehesas)	65
N22	Inland rocks, Screes, Sands, Permanent Snow and ice	65
N23	Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites)	65
N25	Grassland and scrub habitats (general)	65
N26	Woodland habitats (general)	65

4.3 Threats code

CODE	DESCRIPTION	PAGE NO
A01	Cultivation	65
A02	Modification of cultivation practices	65
A03	Mowing / cutting of grassland	65
A04	Grazing	65
A05	Livestock farming and animal breeding (without grazing)	65
A06	Annual and perennial non-timber crops	65
A07	Use of biocides, hormones and chemicals	65
A08	Fertilisation	65
A10	Restructuring agricultural land holding	65
A11	Agriculture activities not referred to above	65
B01	Forest planting on open ground	65
B02	Forest and Plantation management & use	65
B03	Forest exploitation without replanting or natural regrowth	65
B04	Use of biocides, hormones and chemicals (forestry)	65
B06	Grazing in forests/ woodland	65
B07	Forestry activities not referred to above	65
C01	Mining and quarrying	65
C02	Exploration and extraction of oil or gas	65
C03	Renewable abiotic energy use	65
D01	Roads, paths and railroads	65
D02	Utility and service lines	65
D03	Shipping lanes, ports, marine constructions	65
D04	Airports, flightpaths	65
D05	Improved access to site	65
E01	Urbanised areas, human habitation	65
E02	Industrial or commercial areas	65

CODE	DESCRIPTION	PAGE NO
E03	Discharges	65
E04	Structures, buildings in the landscape	65
E06	Other urbanisation, industrial and similar activities	65
F01	Marine and Freshwater Aquaculture	65
F02	Fishing and harvesting aquatic resources	65
F03	Hunting and collection of wild animals (terrestrial), including damage caused by game (excessive density), and taking/removal of terrestrial animals (including collection of insects, reptiles, amphibians, birds of prey, etc., trapping, poisoning, poaching, predator control, accidental capture (e.g. due to fishing gear), etc.)	65
F04	Taking / Removal of terrestrial plants, general	65
F05	Illegal taking/ removal of marine fauna	65
F06	Hunting, fishing or collecting activities not referred to above	65
G01	Outdoor sports and leisure activities, recreational activities	65
G02	Sport and leisure structures	65
G03	Interpretative centres	65
G04	Military use and civil unrest	65
G05	Other human intrusions and disturbances	65
H01	Pollution to surface waters (limnic & terrestrial, marine & brackish)	65
H02	Pollution to groundwater (point sources and diffuse sources)	65
H03	Marine water pollution	65
H04	Air pollution, air-borne pollutants	65
H05	Soil pollution and solid waste (excluding discharges)	65
H06	Excess energy	65
H07	Other forms of pollution	65
I01	Invasive non-native species	65
I02	Problematic native species	65
I03	Introduced genetic material, GMO	65
J01	Fire and fire suppression	65
J02	Human induced changes in hydraulic conditions	65
J03	Other ecosystem modifications	65
K01	Abiotic (slow) natural processes	65
K02	Biocenotic evolution, succession	65
K03	Interspecific faunal relations	65
K04	Interspecific floral relations	65
K05	Reduced fecundity/ genetic depression	65
L05	Collapse of terrain, landslide	65
L07	Storm, cyclone	65
L08	Inundation (natural processes)	65
L10	Other natural catastrophes	65
M01	Changes in abiotic conditions	65
M02	Changes in biotic conditions	65
U	Unknown threat or pressure	65
XO	Threats and pressures from outside the Member State	65

5.1 Designation type codes

CODE	DESCRIPTION	PAGE NO
UK00	No Protection Status	67
UK01	National Nature Reserve	67
UK04	Site of Special Scientific Interest (GB)	67
UK05	Marine Conservation Zone	67
UK06	Nature Conservation Marine Protected Area	67
UK86	Special Area (Channel Islands)	67
UK98	Area of Special Scientific Interest (NI)	67
IN00	Ramsar Convention site	67
IN08	Special Protection Area	67
IN09	Special Area of Conservation	67

STANDARD DATA FORM for sites within the 'UK national site network of European sites'

Special Protection Areas (SPAs) are classified and Special Areas of Conservation (SACs) are designated under:

- the Conservation of Habitats and Species Regulations 2017 (as amended) in England and Wales (including the adjacent territorial sea) and to a limited extent in Scotland (reserved matters) and Northern Ireland (excepted matters);
- the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) in Scotland;
- the Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 (as amended) in Northern Ireland; and
- the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) in the UK offshore area.

Each SAC or SPA (forming part of the UK national site network of European sites) has its own Standard Data Form containing site-specific information. The information provided here generally follows the same documenting format for SACs and SPAs, as set out in the [Official Journal of the European Union recording the Commission Implementing Decision of 11 July 2011 \(2011/484/EU\)](#).

Please note that these forms contain a number of codes, all of which are explained either within the data forms themselves or in the end notes.

More general information on SPAs and SACs in the UK is available from the [SPA homepage](#) and [SAC homepage](#) on the JNCC website. These webpages also provide links to Standard Data Forms for all SAC and SPA sites in the UK.

<https://jncc.gov.uk/>



NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),
Proposed Sites for Community Importance (pSCI),
Sites of Community Importance (SCI) and
for Special Areas of Conservation (SAC)

SITE UK0030168
SITENAME Hestercombe House

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- [1. SITE IDENTIFICATION](#)
- [2. SITE LOCATION](#)
- [3. ECOLOGICAL INFORMATION](#)
- [4. SITE DESCRIPTION](#)
- [5. SITE PROTECTION STATUS AND RELATION WITH CORINE BIOTOPES](#)
- [6. SITE MANAGEMENT](#)

1. SITE IDENTIFICATION

1.1 Type B	1.2 Site code UK0030168	Back to top
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1.3 Site name

Hestercombe House

1.4 First Compilation date 2001-03	1.5 Update date 2015-12
--	-----------------------------------

1.6 Respondent:

Name/Organisation: Joint Nature Conservation Committee	
Address:	Joint Nature Conservation Committee Monkstone House City Road Peterborough PE1 1JY
Email:	

Date site proposed as SCI:	2001-03
Date site confirmed as SCI:	2004-12
Date site designated as SAC:	2005-04
National legal reference of SAC designation:	Regulations 11 and 13-15 of the Conservation of Habitats and Species Regulations 2010 (http://www.legislation.gov.uk/uksi/2010/490/contents/made).

2. SITE LOCATION

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2.1 Site-centre location [decimal degrees]:

Longitude

-3.084166667

Latitude

51.05194444

2.2 Area [ha]:

0.06

2.3 Marine area [%]

0.0

2.4 Sitelength [km]:

0.0

2.5 Administrative region code and name

NUTS level 2 code

Region Name

UKK2	Dorset and Somerset
------	---------------------

2.6 Biogeographical Region(s)

Atlantic (100.0
%)

3. ECOLOGICAL INFORMATION

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3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them

Species					Population in the site						Site assessment			
G	Code	Scientific Name	S	NP	T	Size		Unit	Cat.	D.qual.	A B C D	A B C		
						Min	Max				Pop.	Con.	Iso.	Glo.
M	1303	Rhinolophus hipposideros			p	250	250	i		G	C	B	C	B

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see [reference portal](#))
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

4. SITE DESCRIPTION

4.1 General site character

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Habitat class	% Cover
N23	100.0
Total Habitat Cover	100

Other Site Characteristics

2 Terrestrial: Geomorphology and landscape: lowland

4.2 Quality and importance

Rhinolophus hipposideros for which this is considered to be one of the best areas in the United Kingdom.

4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]
H	G01		I
H	J02		B
H	E06		B
H	M02		B
H	K02		I

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

4.5 Documentation

Conservation Objectives - the Natural England links below provide access to the Conservation Objectives (and other site-related information) for its terrestrial and inshore Natura 2000 sites, including conservation advice packages and supporting documents for European Marine Sites within English waters and for cross-border sites. See also the 'UK Approach' document for more information (link via the JNCC website).

Link(s): <http://publications.naturalengland.org.uk/category/6490068894089216>

<http://publications.naturalengland.org.uk/category/3212324>

http://jncc.defra.gov.uk/pdf/Natura2000_StandardDataForm_UKApproach_Dec2015.pdf

5. SITE PROTECTION STATUS (optional)

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5.1 Designation types at national and regional level:

Code	Cover [%]	Code	Cover [%]	Code	Cover [%]
UK04	100.0				

6. SITE MANAGEMENT

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6.1 Body(ies) responsible for the site management:

Organisation:	Natural England
Address:	
Email:	

6.2 Management Plan(s):

An actual management plan does exist:

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No, but in preparation
<input checked="" type="checkbox"/>	No

6.3 Conservation measures (optional)

For available information, including on Conservation Objectives, see Section 4.5.

EXPLANATION OF CODES USED IN THE SPECIAL AREA OF CONSERVATION (SAC) AND SPECIAL PROTECTION AREA (SPA) STANDARD DATA FORMS

The codes in the table below generally follow those explained in the [official European Union guidelines for the Standard Data Form](#) (also referencing the relevant page number).

1.1 Site type

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C	SPA area/boundary is the same as the cSAC/SCI/SAC i.e. a co-classified/designated site (Note: this situation only occurs in Gibraltar)	53

3.1 Habitat code

CODE	DESCRIPTION	PAGE NO
1110	Sandbanks which are slightly covered by sea water all the time	57
1130	Estuaries	57
1140	Mudflats and sandflats not covered by seawater at low tide	57
1150	Coastal lagoons	57
1160	Large shallow inlets and bays	57
1170	Reefs	57
1180	Submarine structures made by leaking gases	57
1210	Annual vegetation of drift lines	57
1220	Perennial vegetation of stony banks	57
1230	Vegetated sea cliffs of the Atlantic and Baltic Coasts	57
1310	Salicornia and other annuals colonizing mud and sand	57
1320	Spartina swards (Spartinion maritimae)	57
1330	Atlantic salt meadows (Glaucio-Puccinellietalia maritimae)	57
1340	Inland salt meadows	57
1420	Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi)	57
2110	Embryonic shifting dunes	57
2120	Shifting dunes along the shoreline with Ammophila arenaria ("white dunes")	57
2130	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	57
2140	Decalcified fixed dunes with Empetrum nigrum	57
2150	Atlantic decalcified fixed dunes (Calluno-Ulicetea)	57
2160	Dunes with Hippophya• rhamnoides	57
2170	Dunes with Salix repens ssp. argentea (Salicion arenariae)	57
2190	Humid dune slacks	57
21A0	Machairs (* in Ireland)	57
2250	Coastal dunes with Juniperus spp.	57
2330	Inland dunes with open Corynephorus and Agrostis grasslands	57
3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)	57
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea	57
3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	57
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation	57

CODE	DESCRIPTION	PAGE NO
3160	Natural dystrophic lakes and ponds	57
3170	Mediterranean temporary ponds	57
3180	Turloughs	57
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation	57
4010	Northern Atlantic wet heaths with Erica tetralix	57
4020	Temperate Atlantic wet heaths with Erica ciliaris and Erica tetralix	57
4030	European dry heaths	57
4040	Dry Atlantic coastal heaths with Erica vagans	57
4060	Alpine and Boreal heaths	57
4080	Sub-Arctic Salix spp. scrub	57
5110	Stable xerothermophilous formations with Buxus sempervirens on rock slopes (Berberidion p.p.)	57
5130	Juniperus communis formations on heaths or calcareous grasslands	57
6130	Calaminarian grasslands of the Violetalia calaminariae	57
6150	Siliceous alpine and boreal grasslands	57
6170	Alpine and subalpine calcareous grasslands	57
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)	57
6230	Species-rich Nardus grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe)	57
6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	57
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	57
6510	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	57
6520	Mountain hay meadows	57
7110	Active raised bogs	57
7120	Degraded raised bogs still capable of natural regeneration	57
7130	Blanket bogs (* if active bog)	57
7140	Transition mires and quaking bogs	57
7150	Depressions on peat substrates of the Rhynchosporion	57
7210	Calcareous fens with Cladium mariscus and species of the Caricion davallianae	57
7220	Petrifying springs with tufa formation (Cratoneurion)	57
7230	Alkaline fens	57
7240	Alpine pioneer formations of the Caricion bicoloris-atrofuscae	57
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8120	Calcareous and calcshist scree of the montane to alpine levels (Thlaspietalia rotundifoliae)	57
8210	Calcareous rocky slopes with chasmophytic vegetation	57
8220	Siliceous rocky slopes with chasmophytic vegetation	57
8240	Limestone pavements	57
8310	Caves not open to the public	57
8330	Submerged or partially submerged sea caves	57
9120	Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robur-petraeae or Ilici-Fagenion)	57
9130	Asperulo-Fagetum beech forests	57
9160	Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli	57
9180	Tilio-Acerion forests of slopes, scree and ravines	57
9190	Old acidophilous oak woods with Quercus robur on sandy plains	57
91A0	Old sessile oak woods with Ilex and Blechnum in the British Isles	57
91C0	Caledonian forest	57
91D0	Bog woodland	57
91E0	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	57
91J0	Taxus baccata woods of the British Isles	57

3.1 Habitat representativity (abbreviated to 'Representativity' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent representativity	57
B	Good representativity	57
C	Significant representativity	57
D	Non-significant presence representativity	57

3.1 Relative surface

CODE	DESCRIPTION	PAGE NO
A	> 15%-100%	58
B	> 2%-15%	58
C	≤ 2%	58

3.1 Degree of conservation (abbreviated to 'Conservation' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	59
B	Good conservation	59
C	Average or reduced conservation	59

3.1 Global assessment (abbreviated to 'Global' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	59
B	Good value	59
C	Significant value	59

3.2 Population (abbreviated to 'Pop.' in data form)

CODE	DESCRIPTION	PAGE NO
A	> 15%-100%	62
B	> 2%-15%	62
C	≤ 2%	62
D	Non-significant population	62

3.2 Degree of conservation (abbreviated to 'Con.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	63
B	Good conservation	63
C	Average or reduced conservation	63

3.2 Isolation (abbreviated to 'Iso.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Population (almost) Isolated	63
B	Population not-isolated, but on margins of area of distribution	63
C	Population not-isolated within extended distribution range	63

3.2 Global Grade (abbreviated to 'Glo.' or 'G.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	63
B	Good value	63
C	Significant value	63

3.3 Other species – essentially covers bird assemblage types

CODE	DESCRIPTION	PAGE NO
WATR	Non-breeding waterbird assemblage	UK specific code
SBA	Breeding seabird assemblage	UK specific code

BBA	Breeding bird assemblage (applies only to sites classified pre 2000)	UK specific code
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4.1 Habitat class code

CODE	DESCRIPTION	PAGE NO
N01	Marine areas, Sea inlets	65
N02	Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins)	65
N03	Salt marshes, Salt pastures, Salt steppes	65
N04	Coastal sand dunes, Sand beaches, Machair	65
N05	Shingle, Sea cliffs, Islets	65
N06	Inland water bodies (Standing water, Running water)	65
N07	Bogs, Marshes, Water fringed vegetation, Fens	65
N08	Heath, Scrub, Maquis and Garrigue, Phygrana	65
N09	Dry grassland, Steppes	65
N10	Humid grassland, Mesophile grassland	65
N11	Alpine and sub-Alpine grassland	65
N14	Improved grassland	65
N15	Other arable land	65
N16	Broad-leaved deciduous woodland	65
N17	Coniferous woodland	65
N19	Mixed woodland	65
N21	Non-forest areas cultivated with woody plants (including Orchards, groves, Vineyards, Dehesas)	65
N22	Inland rocks, Screes, Sands, Permanent Snow and ice	65
N23	Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites)	65
N25	Grassland and scrub habitats (general)	65
N26	Woodland habitats (general)	65

4.3 Threats code

CODE	DESCRIPTION	PAGE NO
A01	Cultivation	65
A02	Modification of cultivation practices	65
A03	Mowing / cutting of grassland	65
A04	Grazing	65
A05	Livestock farming and animal breeding (without grazing)	65
A06	Annual and perennial non-timber crops	65
A07	Use of biocides, hormones and chemicals	65
A08	Fertilisation	65
A10	Restructuring agricultural land holding	65
A11	Agriculture activities not referred to above	65
B01	Forest planting on open ground	65
B02	Forest and Plantation management & use	65
B03	Forest exploitation without replanting or natural regrowth	65
B04	Use of biocides, hormones and chemicals (forestry)	65
B06	Grazing in forests/ woodland	65
B07	Forestry activities not referred to above	65
C01	Mining and quarrying	65
C02	Exploration and extraction of oil or gas	65
C03	Renewable abiotic energy use	65
D01	Roads, paths and railroads	65
D02	Utility and service lines	65
D03	Shipping lanes, ports, marine constructions	65
D04	Airports, flightpaths	65
D05	Improved access to site	65
E01	Urbanised areas, human habitation	65
E02	Industrial or commercial areas	65

CODE	DESCRIPTION	PAGE NO
E03	Discharges	65
E04	Structures, buildings in the landscape	65
E06	Other urbanisation, industrial and similar activities	65
F01	Marine and Freshwater Aquaculture	65
F02	Fishing and harvesting aquatic resources	65
F03	Hunting and collection of wild animals (terrestrial), including damage caused by game (excessive density), and taking/removal of terrestrial animals (including collection of insects, reptiles, amphibians, birds of prey, etc., trapping, poisoning, poaching, predator control, accidental capture (e.g. due to fishing gear), etc.)	65
F04	Taking / Removal of terrestrial plants, general	65
F05	Illegal taking/ removal of marine fauna	65
F06	Hunting, fishing or collecting activities not referred to above	65
G01	Outdoor sports and leisure activities, recreational activities	65
G02	Sport and leisure structures	65
G03	Interpretative centres	65
G04	Military use and civil unrest	65
G05	Other human intrusions and disturbances	65
H01	Pollution to surface waters (limnic & terrestrial, marine & brackish)	65
H02	Pollution to groundwater (point sources and diffuse sources)	65
H03	Marine water pollution	65
H04	Air pollution, air-borne pollutants	65
H05	Soil pollution and solid waste (excluding discharges)	65
H06	Excess energy	65
H07	Other forms of pollution	65
I01	Invasive non-native species	65
I02	Problematic native species	65
I03	Introduced genetic material, GMO	65
J01	Fire and fire suppression	65
J02	Human induced changes in hydraulic conditions	65
J03	Other ecosystem modifications	65
K01	Abiotic (slow) natural processes	65
K02	Biocenotic evolution, succession	65
K03	Interspecific faunal relations	65
K04	Interspecific floral relations	65
K05	Reduced fecundity/ genetic depression	65
L05	Collapse of terrain, landslide	65
L07	Storm, cyclone	65
L08	Inundation (natural processes)	65
L10	Other natural catastrophes	65
M01	Changes in abiotic conditions	65
M02	Changes in biotic conditions	65
U	Unknown threat or pressure	65
XO	Threats and pressures from outside the Member State	65

5.1 Designation type codes

CODE	DESCRIPTION	PAGE NO
UK00	No Protection Status	67
UK01	National Nature Reserve	67
UK04	Site of Special Scientific Interest (GB)	67
UK05	Marine Conservation Zone	67
UK06	Nature Conservation Marine Protected Area	67
UK86	Special Area (Channel Islands)	67
UK98	Area of Special Scientific Interest (NI)	67
IN00	Ramsar Convention site	67
IN08	Special Protection Area	67
IN09	Special Area of Conservation	67

STANDARD DATA FORM for sites within the 'UK national site network of European sites'

Special Protection Areas (SPAs) are classified and Special Areas of Conservation (SACs) are designated under:

- the Conservation of Habitats and Species Regulations 2017 (as amended) in England and Wales (including the adjacent territorial sea) and to a limited extent in Scotland (reserved matters) and Northern Ireland (excepted matters);
- the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) in Scotland;
- the Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 (as amended) in Northern Ireland; and
- the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) in the UK offshore area.

Each SAC or SPA (forming part of the UK national site network of European sites) has its own Standard Data Form containing site-specific information. The information provided here generally follows the same documenting format for SACs and SPAs, as set out in the [Official Journal of the European Union recording the Commission Implementing Decision of 11 July 2011 \(2011/484/EU\)](#).

Please note that these forms contain a number of codes, all of which are explained either within the data forms themselves or in the end notes.

More general information on SPAs and SACs in the UK is available from the [SPA homepage](#) and [SAC homepage](#) on the JNCC website. These webpages also provide links to Standard Data Forms for all SAC and SPA sites in the UK.

<https://jncc.gov.uk/>



NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),
Proposed Sites for Community Importance (pSCI),
Sites of Community Importance (SCI) and
for Special Areas of Conservation (SAC)

SITE UK0030203
SITENAME Mendip Limestone Grasslands

TABLE OF CONTENTS

- [1. SITE IDENTIFICATION](#)
- [2. SITE LOCATION](#)
- [3. ECOLOGICAL INFORMATION](#)
- [4. SITE DESCRIPTION](#)
- [5. SITE PROTECTION STATUS AND RELATION WITH CORINE BIOTOPES](#)
- [6. SITE MANAGEMENT](#)

1. SITE IDENTIFICATION

1.1 Type B	1.2 Site code UK0030203	Back to top
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1.3 Site name

Mendip Limestone Grasslands

1.4 First Compilation date 2001-01	1.5 Update date 2015-12
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1.6 Respondent:

Name/Organisation: Joint Nature Conservation Committee
Address: Joint Nature Conservation Committee Monkstone House City Road Peterborough PE1 1JY
Email:

Date site proposed as SCI:	2001-01
Date site confirmed as SCI:	2004-12
Date site designated as SAC:	2005-04
National legal reference of SAC designation:	Regulations 11 and 13-15 of the Conservation of Habitats and Species Regulations 2010 (http://www.legislation.gov.uk/uksi/2010/490/contents/made).

2. SITE LOCATION

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2.1 Site-centre location [decimal degrees]:

Longitude

-2.859166667

Latitude

51.29666667

2.2 Area [ha]:

415.24

2.3 Marine area [%]

0.0

2.4 Sitelength [km]:

0.0

2.5 Administrative region code and name

NUTS level 2 code

Region Name

UKK1	Gloucestershire, Wiltshire and Bristol/Bath area
UKK2	Dorset and Somerset





2.6 Biogeographical Region(s)

Atlantic (100.0
%)

3. ECOLOGICAL INFORMATION

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3.1 Habitat types present on the site and assessment for them

Annex I Habitat types						Site assessment			
Code	PF	NP	Cover [ha]	Cave [number]	Data quality	A B C D	A B C		
						Representativity	Relative Surface	Conservation	Global
4030 			84.71	0	G	B	C	C	C
6210 			158.21	0	G	A	C	A	B
8310 			2.91	0	G	B	C	C	C
9180 	X		19.93	0	G	B	C	C	C

- PF:** for the habitat types that can have a non-priority as well as a priority form (6210, 7130, 9430) enter "X" in the column PF to indicate the priority form.
- NP:** in case that a habitat type no longer exists in the site enter: x (optional)
- Cover:** decimal values can be entered
- Caves:** for habitat types 8310, 8330 (caves) enter the number of caves if estimated surface is not available.
- Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation)

3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them

Species					Population in the site						Site assessment			
G	Code	Scientific Name	S	NP	T	Size		Unit	Cat.	D.qual.	A B C D	A B C		
						Min	Max				Pop.	Con.	Iso.	Glo.
M	1304	Rhinolophus ferrumequinum			p	11	50	i		M	C	B	C	C
M	1303	Rhinolophus hipposideros			p	11	50	i		M	D			

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see [reference portal](#))
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

4. SITE DESCRIPTION

4.1 General site character

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Habitat class	% Cover
N22	7.0
N08	45.0
N16	10.0
N09	38.0
Total Habitat Cover	100

Other Site Characteristics

1 Terrestrial: Soil & Geology: basic, sedimentary, limestone, nutrient-poor 2 Terrestrial: Geomorphology and landscape: hilly, escarpment, caves

4.2 Quality and importance

European dry heaths for which the area is considered to support a significant presence. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia) for which this is considered to be one of the best areas in the United Kingdom. Caves not open to the public for which the area is considered to support a significant presence. Tilio-Acerion forests of slopes, screes and ravines for which the area is considered to support a significant presence. Rhinolophus ferrumequinum for which the area is considered to support a significant presence.

4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]
H	K04		I
H	H04		B
H	A02		I
H	K02		I

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]
H	A02		I
H	A04		I
H	B02		I

4.5 Documentation

Conservation Objectives - the Natural England links below provide access to the Conservation Objectives (and other site-related information) for its terrestrial and inshore Natura 2000 sites, including conservation advice packages and supporting documents for European Marine Sites within English waters and for cross-border sites. See also the 'UK Approach' document for more information (link via the JNCC website).

Link(s): <http://publications.naturalengland.org.uk/category/6490068894089216>

<http://publications.naturalengland.org.uk/category/3212324>

http://jncc.defra.gov.uk/pdf/Natura2000_StandardDataForm_UKApproach_Dec2015.pdf

5. SITE PROTECTION STATUS (optional)

5.1 Designation types at national and regional level:

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Code	Cover [%]	Code	Cover [%]	Code	Cover [%]
UK04	100.0				

6. SITE MANAGEMENT

6.1 Body(ies) responsible for the site management:

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Organisation:	Natural England
Address:	
Email:	

6.2 Management Plan(s):

An actual management plan does exist:

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No, but in preparation
<input checked="" type="checkbox"/>	No

6.3 Conservation measures (optional)

For available information, including on Conservation Objectives, see Section 4.5.

EXPLANATION OF CODES USED IN THE SPECIAL AREA OF CONSERVATION (SAC) AND SPECIAL PROTECTION AREA (SPA) STANDARD DATA FORMS

The codes in the table below generally follow those explained in the [official European Union guidelines for the Standard Data Form](#) (also referencing the relevant page number).

1.1 Site type

CODE	DESCRIPTION	PAGE NO
A	SPA (classified Special Protection Area)	53
B	cSAC, SCI or SAC (candidate Special Area of Conservation, Site of Community Importance, designated Special Area of Conservation)	53
C	SPA area/boundary is the same as the cSAC/SCI/SAC i.e. a co-classified/designated site (Note: this situation only occurs in Gibraltar)	53

3.1 Habitat code

CODE	DESCRIPTION	PAGE NO
1110	Sandbanks which are slightly covered by sea water all the time	57
1130	Estuaries	57
1140	Mudflats and sandflats not covered by seawater at low tide	57
1150	Coastal lagoons	57
1160	Large shallow inlets and bays	57
1170	Reefs	57
1180	Submarine structures made by leaking gases	57
1210	Annual vegetation of drift lines	57
1220	Perennial vegetation of stony banks	57
1230	Vegetated sea cliffs of the Atlantic and Baltic Coasts	57
1310	Salicornia and other annuals colonizing mud and sand	57
1320	Spartina swards (Spartinion maritimae)	57
1330	Atlantic salt meadows (Glaucio-Puccinellietalia maritimae)	57
1340	Inland salt meadows	57
1420	Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi)	57
2110	Embryonic shifting dunes	57
2120	Shifting dunes along the shoreline with Ammophila arenaria ("white dunes")	57
2130	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	57
2140	Decalcified fixed dunes with Empetrum nigrum	57
2150	Atlantic decalcified fixed dunes (Calluno-Ulicetea)	57
2160	Dunes with Hippophya• rhamnoides	57
2170	Dunes with Salix repens ssp. argentea (Salicion arenariae)	57
2190	Humid dune slacks	57
21A0	Machairs (* in Ireland)	57
2250	Coastal dunes with Juniperus spp.	57
2330	Inland dunes with open Corynephorus and Agrostis grasslands	57
3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)	57
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea	57
3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	57
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation	57

CODE	DESCRIPTION	PAGE NO
3160	Natural dystrophic lakes and ponds	57
3170	Mediterranean temporary ponds	57
3180	Turloughs	57
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation	57
4010	Northern Atlantic wet heaths with Erica tetralix	57
4020	Temperate Atlantic wet heaths with Erica ciliaris and Erica tetralix	57
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4040	Dry Atlantic coastal heaths with Erica vagans	57
4060	Alpine and Boreal heaths	57
4080	Sub-Arctic Salix spp. scrub	57
5110	Stable xerothermophilous formations with Buxus sempervirens on rock slopes (Berberidion p.p.)	57
5130	Juniperus communis formations on heaths or calcareous grasslands	57
6130	Calaminarian grasslands of the Violetalia calaminariae	57
6150	Siliceous alpine and boreal grasslands	57
6170	Alpine and subalpine calcareous grasslands	57
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6230	Species-rich Nardus grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe)	57
6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	57
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	57
6510	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	57
6520	Mountain hay meadows	57
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7120	Degraded raised bogs still capable of natural regeneration	57
7130	Blanket bogs (* if active bog)	57
7140	Transition mires and quaking bogs	57
7150	Depressions on peat substrates of the Rhynchosporion	57
7210	Calcareous fens with Cladium mariscus and species of the Caricion davallianae	57
7220	Petrifying springs with tufa formation (Cratoneurion)	57
7230	Alkaline fens	57
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8330	Submerged or partially submerged sea caves	57
9120	Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robur-petraeae or Ilici-Fagenion)	57
9130	Asperulo-Fagetum beech forests	57
9160	Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli	57
9180	Tilio-Acerion forests of slopes, scree and ravines	57
9190	Old acidophilous oak woods with Quercus robur on sandy plains	57
91A0	Old sessile oak woods with Ilex and Blechnum in the British Isles	57
91C0	Caledonian forest	57
91D0	Bog woodland	57
91E0	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	57
91J0	Taxus baccata woods of the British Isles	57

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A	> 15%-100%	62
B	> 2%-15%	62
C	≤ 2%	62
D	Non-significant population	62

3.2 Degree of conservation (abbreviated to 'Con.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	63
B	Good conservation	63
C	Average or reduced conservation	63

3.2 Isolation (abbreviated to 'Iso.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Population (almost) Isolated	63
B	Population not-isolated, but on margins of area of distribution	63
C	Population not-isolated within extended distribution range	63

3.2 Global Grade (abbreviated to 'Glo.' or 'G.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	63
B	Good value	63
C	Significant value	63

3.3 Other species – essentially covers bird assemblage types

CODE	DESCRIPTION	PAGE NO
WATR	Non-breeding waterbird assemblage	UK specific code
SBA	Breeding seabird assemblage	UK specific code

BBA	Breeding bird assemblage (applies only to sites classified pre 2000)	UK specific code
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4.1 Habitat class code

CODE	DESCRIPTION	PAGE NO
N01	Marine areas, Sea inlets	65
N02	Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins)	65
N03	Salt marshes, Salt pastures, Salt steppes	65
N04	Coastal sand dunes, Sand beaches, Machair	65
N05	Shingle, Sea cliffs, Islets	65
N06	Inland water bodies (Standing water, Running water)	65
N07	Bogs, Marshes, Water fringed vegetation, Fens	65
N08	Heath, Scrub, Maquis and Garrigue, Phygrana	65
N09	Dry grassland, Steppes	65
N10	Humid grassland, Mesophile grassland	65
N11	Alpine and sub-Alpine grassland	65
N14	Improved grassland	65
N15	Other arable land	65
N16	Broad-leaved deciduous woodland	65
N17	Coniferous woodland	65
N19	Mixed woodland	65
N21	Non-forest areas cultivated with woody plants (including Orchards, groves, Vineyards, Dehesas)	65
N22	Inland rocks, Screes, Sands, Permanent Snow and ice	65
N23	Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites)	65
N25	Grassland and scrub habitats (general)	65
N26	Woodland habitats (general)	65

4.3 Threats code

CODE	DESCRIPTION	PAGE NO
A01	Cultivation	65
A02	Modification of cultivation practices	65
A03	Mowing / cutting of grassland	65
A04	Grazing	65
A05	Livestock farming and animal breeding (without grazing)	65
A06	Annual and perennial non-timber crops	65
A07	Use of biocides, hormones and chemicals	65
A08	Fertilisation	65
A10	Restructuring agricultural land holding	65
A11	Agriculture activities not referred to above	65
B01	Forest planting on open ground	65
B02	Forest and Plantation management & use	65
B03	Forest exploitation without replanting or natural regrowth	65
B04	Use of biocides, hormones and chemicals (forestry)	65
B06	Grazing in forests/ woodland	65
B07	Forestry activities not referred to above	65
C01	Mining and quarrying	65
C02	Exploration and extraction of oil or gas	65
C03	Renewable abiotic energy use	65
D01	Roads, paths and railroads	65
D02	Utility and service lines	65
D03	Shipping lanes, ports, marine constructions	65
D04	Airports, flightpaths	65
D05	Improved access to site	65
E01	Urbanised areas, human habitation	65
E02	Industrial or commercial areas	65

CODE	DESCRIPTION	PAGE NO
E03	Discharges	65
E04	Structures, buildings in the landscape	65
E06	Other urbanisation, industrial and similar activities	65
F01	Marine and Freshwater Aquaculture	65
F02	Fishing and harvesting aquatic resources	65
F03	Hunting and collection of wild animals (terrestrial), including damage caused by game (excessive density), and taking/removal of terrestrial animals (including collection of insects, reptiles, amphibians, birds of prey, etc., trapping, poisoning, poaching, predator control, accidental capture (e.g. due to fishing gear), etc.)	65
F04	Taking / Removal of terrestrial plants, general	65
F05	Illegal taking/ removal of marine fauna	65
F06	Hunting, fishing or collecting activities not referred to above	65
G01	Outdoor sports and leisure activities, recreational activities	65
G02	Sport and leisure structures	65
G03	Interpretative centres	65
G04	Military use and civil unrest	65
G05	Other human intrusions and disturbances	65
H01	Pollution to surface waters (limnic & terrestrial, marine & brackish)	65
H02	Pollution to groundwater (point sources and diffuse sources)	65
H03	Marine water pollution	65
H04	Air pollution, air-borne pollutants	65
H05	Soil pollution and solid waste (excluding discharges)	65
H06	Excess energy	65
H07	Other forms of pollution	65
I01	Invasive non-native species	65
I02	Problematic native species	65
I03	Introduced genetic material, GMO	65
J01	Fire and fire suppression	65
J02	Human induced changes in hydraulic conditions	65
J03	Other ecosystem modifications	65
K01	Abiotic (slow) natural processes	65
K02	Biocenotic evolution, succession	65
K03	Interspecific faunal relations	65
K04	Interspecific floral relations	65
K05	Reduced fecundity/ genetic depression	65
L05	Collapse of terrain, landslide	65
L07	Storm, cyclone	65
L08	Inundation (natural processes)	65
L10	Other natural catastrophes	65
M01	Changes in abiotic conditions	65
M02	Changes in biotic conditions	65
U	Unknown threat or pressure	65
XO	Threats and pressures from outside the Member State	65

5.1 Designation type codes

CODE	DESCRIPTION	PAGE NO
UK00	No Protection Status	67
UK01	National Nature Reserve	67
UK04	Site of Special Scientific Interest (GB)	67
UK05	Marine Conservation Zone	67
UK06	Nature Conservation Marine Protected Area	67
UK86	Special Area (Channel Islands)	67
UK98	Area of Special Scientific Interest (NI)	67
IN00	Ramsar Convention site	67
IN08	Special Protection Area	67
IN09	Special Area of Conservation	67

STANDARD DATA FORM for sites within the 'UK national site network of European sites'

Special Protection Areas (SPAs) are classified and Special Areas of Conservation (SACs) are designated under:

- the Conservation of Habitats and Species Regulations 2017 (as amended) in England and Wales (including the adjacent territorial sea) and to a limited extent in Scotland (reserved matters) and Northern Ireland (excepted matters);
- the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) in Scotland;
- the Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 (as amended) in Northern Ireland; and
- the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) in the UK offshore area.

Each SAC or SPA (forming part of the UK national site network of European sites) has its own Standard Data Form containing site-specific information. The information provided here generally follows the same documenting format for SACs and SPAs, as set out in the [Official Journal of the European Union recording the Commission Implementing Decision of 11 July 2011 \(2011/484/EU\)](#).

Please note that these forms contain a number of codes, all of which are explained either within the data forms themselves or in the end notes.

More general information on SPAs and SACs in the UK is available from the [SPA homepage](#) and [SAC homepage](#) on the JNCC website. These webpages also provide links to Standard Data Forms for all SAC and SPA sites in the UK.

<https://jncc.gov.uk/>



NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),
Proposed Sites for Community Importance (pSCI),
Sites of Community Importance (SCI) and
for Special Areas of Conservation (SAC)

SITE UK0030048
SITENAME Mendip Woodlands

TABLE OF CONTENTS

- [1. SITE IDENTIFICATION](#)
- [2. SITE LOCATION](#)
- [3. ECOLOGICAL INFORMATION](#)
- [4. SITE DESCRIPTION](#)
- [5. SITE PROTECTION STATUS AND RELATION WITH CORINE BIOTOPES](#)
- [6. SITE MANAGEMENT](#)

1. SITE IDENTIFICATION

1.1 Type B	1.2 Site code UK0030048	Back to top
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1.3 Site name

Mendip Woodlands

1.4 First Compilation date 1998-03	1.5 Update date 2015-12
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1.6 Respondent:

Name/Organisation: Joint Nature Conservation Committee
Address: Joint Nature Conservation Committee Monkstone House City Road Peterborough PE1 1JY
Email:

Date site proposed as SCI:	1998-03
Date site confirmed as SCI:	2004-12
Date site designated as SAC:	2005-04
National legal reference of SAC designation:	Regulations 11 and 13-15 of the Conservation of Habitats and Species Regulations 2010 (http://www.legislation.gov.uk/uksi/2010/490/contents/made).

2. SITE LOCATION

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2.1 Site-centre location [decimal degrees]:

Longitude

-2.421666667

Latitude

51.20694444

2.2 Area [ha]:

251.39

2.3 Marine area [%]

0.0

2.4 Sitenlength [km]:

0.0

2.5 Administrative region code and name

NUTS level 2 code

Region Name

UKK2

Dorset and Somerset




2.6 Biogeographical Region(s)

Atlantic (100.0
%)

3. ECOLOGICAL INFORMATION

3.1 Habitat types present on the site and assessment for them

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Annex I Habitat types						Site assessment			
Code	PF	NP	Cover [ha]	Cave [number]	Data quality	A B C D	A B C		
						Representativity	Relative Surface	Conservation	Global
6210 			4.02	0	G	D			
9180 	X		82.98	0	G	A	C	A	A
91E0 	X		1.01	0	G	D			

- **PF:** for the habitat types that can have a non-priority as well as a priority form (6210, 7130, 9430) enter "X" in the column PF to indicate the priority form.
- **NP:** in case that a habitat type no longer exists in the site enter: x (optional)
- **Cover:** decimal values can be entered
- **Caves:** for habitat types 8310, 8330 (caves) enter the number of caves if estimated surface is not available.
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation)

3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them

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Species					Population in the site						Site assessment			
G	Code	Scientific Name	S	NP	T	Size		Unit	Cat.	D.qual.	A B C D	A B C		
						Min	Max				Pop.	Con.	Iso.	Glo.
M	1304	Rhinolophus ferrumequinum			p	1	5	i		M	D			
M	1303	Rhinolophus hipposideros			p	6	10	i		M	D			

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see [reference portal](#))
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

4. SITE DESCRIPTION

4.1 General site character

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Habitat class	% Cover
N09	1.5
N16	98.5
Total Habitat Cover	100

Other Site Characteristics

1 Terrestrial: Soil & Geology: basic,limestone,nutrient-poor,sedimentary 2 Terrestrial: Geomorphology and landscape: hilly,lowland,caves,escarpment

4.2 Quality and importance

Tilio-Acerion forests of slopes, screes and ravines for which this is considered to be one of the best areas in the United Kingdom.

4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]
H	H04		B
H	G05		I
H	K04		I
H	I02		B

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]
H	D05		I
H	A04		I

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

4.5 Documentation

Conservation Objectives - the Natural England links below provide access to the Conservation Objectives (and other site-related information) for its terrestrial and inshore Natura 2000 sites, including conservation advice packages and supporting documents for European Marine Sites within English waters and for cross-border sites. See also the 'UK Approach' document for more information (link via the JNCC website).

Link(s): <http://publications.naturalengland.org.uk/category/6490068894089216>

<http://publications.naturalengland.org.uk/category/3212324>

http://jncc.defra.gov.uk/pdf/Natura2000_StandardDataForm_UKApproach_Dec2015.pdf

5. SITE PROTECTION STATUS (optional)

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5.1 Designation types at national and regional level:

Code	Cover [%]	Code	Cover [%]	Code	Cover [%]
UK04	100.0	UK01	25.7		

6. SITE MANAGEMENT

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6.1 Body(ies) responsible for the site management:

Organisation:	Natural England
Address:	
Email:	

6.2 Management Plan(s):

An actual management plan does exist:

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No, but in preparation
<input checked="" type="checkbox"/>	No

6.3 Conservation measures (optional)

For available information, including on Conservation Objectives, see Section 4.5.

EXPLANATION OF CODES USED IN THE SPECIAL AREA OF CONSERVATION (SAC) AND SPECIAL PROTECTION AREA (SPA) STANDARD DATA FORMS

The codes in the table below generally follow those explained in the [official European Union guidelines for the Standard Data Form](#) (also referencing the relevant page number).

1.1 Site type

CODE	DESCRIPTION	PAGE NO
A	SPA (classified Special Protection Area)	53
B	cSAC, SCI or SAC (candidate Special Area of Conservation, Site of Community Importance, designated Special Area of Conservation)	53
C	SPA area/boundary is the same as the cSAC/SCI/SAC i.e. a co-classified/designated site (Note: this situation only occurs in Gibraltar)	53

3.1 Habitat code

CODE	DESCRIPTION	PAGE NO
1110	Sandbanks which are slightly covered by sea water all the time	57
1130	Estuaries	57
1140	Mudflats and sandflats not covered by seawater at low tide	57
1150	Coastal lagoons	57
1160	Large shallow inlets and bays	57
1170	Reefs	57
1180	Submarine structures made by leaking gases	57
1210	Annual vegetation of drift lines	57
1220	Perennial vegetation of stony banks	57
1230	Vegetated sea cliffs of the Atlantic and Baltic Coasts	57
1310	Salicornia and other annuals colonizing mud and sand	57
1320	Spartina swards (Spartinion maritimae)	57
1330	Atlantic salt meadows (Glaucio-Puccinellietalia maritimae)	57
1340	Inland salt meadows	57
1420	Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi)	57
2110	Embryonic shifting dunes	57
2120	Shifting dunes along the shoreline with Ammophila arenaria ("white dunes")	57
2130	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	57
2140	Decalcified fixed dunes with Empetrum nigrum	57
2150	Atlantic decalcified fixed dunes (Calluno-Ulicetea)	57
2160	Dunes with Hippophya• rhamnoides	57
2170	Dunes with Salix repens ssp. argentea (Salicion arenariae)	57
2190	Humid dune slacks	57
21A0	Machairs (* in Ireland)	57
2250	Coastal dunes with Juniperus spp.	57
2330	Inland dunes with open Corynephorus and Agrostis grasslands	57
3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)	57
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea	57
3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	57
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation	57

CODE	DESCRIPTION	PAGE NO
3160	Natural dystrophic lakes and ponds	57
3170	Mediterranean temporary ponds	57
3180	Turloughs	57
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation	57
4010	Northern Atlantic wet heaths with Erica tetralix	57
4020	Temperate Atlantic wet heaths with Erica ciliaris and Erica tetralix	57
4030	European dry heaths	57
4040	Dry Atlantic coastal heaths with Erica vagans	57
4060	Alpine and Boreal heaths	57
4080	Sub-Arctic Salix spp. scrub	57
5110	Stable xerothermophilous formations with Buxus sempervirens on rock slopes (Berberidion p.p.)	57
5130	Juniperus communis formations on heaths or calcareous grasslands	57
6130	Calaminarian grasslands of the Violetalia calaminariae	57
6150	Siliceous alpine and boreal grasslands	57
6170	Alpine and subalpine calcareous grasslands	57
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)	57
6230	Species-rich Nardus grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe)	57
6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	57
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	57
6510	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	57
6520	Mountain hay meadows	57
7110	Active raised bogs	57
7120	Degraded raised bogs still capable of natural regeneration	57
7130	Blanket bogs (* if active bog)	57
7140	Transition mires and quaking bogs	57
7150	Depressions on peat substrates of the Rhynchosporion	57
7210	Calcareous fens with Cladium mariscus and species of the Caricion davallianae	57
7220	Petrifying springs with tufa formation (Cratoneurion)	57
7230	Alkaline fens	57
7240	Alpine pioneer formations of the Caricion bicoloris-atrofuscae	57
8110	Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani)	57
8120	Calcareous and calcshist scree of the montane to alpine levels (Thlaspietalia rotundifoliae)	57
8210	Calcareous rocky slopes with chasmophytic vegetation	57
8220	Siliceous rocky slopes with chasmophytic vegetation	57
8240	Limestone pavements	57
8310	Caves not open to the public	57
8330	Submerged or partially submerged sea caves	57
9120	Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robur-petraeae or Ilici-Fagenion)	57
9130	Asperulo-Fagetum beech forests	57
9160	Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli	57
9180	Tilio-Acerion forests of slopes, scree and ravines	57
9190	Old acidophilous oak woods with Quercus robur on sandy plains	57
91A0	Old sessile oak woods with Ilex and Blechnum in the British Isles	57
91C0	Caledonian forest	57
91D0	Bog woodland	57
91E0	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	57
91J0	Taxus baccata woods of the British Isles	57

3.1 Habitat representativity (abbreviated to 'Representativity' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent representativity	57
B	Good representativity	57
C	Significant representativity	57
D	Non-significant presence representativity	57

3.1 Relative surface

CODE	DESCRIPTION	PAGE NO
A	> 15%-100%	58
B	> 2%-15%	58
C	≤ 2%	58

3.1 Degree of conservation (abbreviated to 'Conservation' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	59
B	Good conservation	59
C	Average or reduced conservation	59

3.1 Global assessment (abbreviated to 'Global' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	59
B	Good value	59
C	Significant value	59

3.2 Population (abbreviated to 'Pop.' in data form)

CODE	DESCRIPTION	PAGE NO
A	> 15%-100%	62
B	> 2%-15%	62
C	≤ 2%	62
D	Non-significant population	62

3.2 Degree of conservation (abbreviated to 'Con.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	63
B	Good conservation	63
C	Average or reduced conservation	63

3.2 Isolation (abbreviated to 'Iso.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Population (almost) Isolated	63
B	Population not-isolated, but on margins of area of distribution	63
C	Population not-isolated within extended distribution range	63

3.2 Global Grade (abbreviated to 'Glo.' or 'G.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	63
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C	Significant value	63

3.3 Other species – essentially covers bird assemblage types

CODE	DESCRIPTION	PAGE NO
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SBA	Breeding seabird assemblage	UK specific code

BBA	Breeding bird assemblage (applies only to sites classified pre 2000)	UK specific code
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4.1 Habitat class code

CODE	DESCRIPTION	PAGE NO
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N02	Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins)	65
N03	Salt marshes, Salt pastures, Salt steppes	65
N04	Coastal sand dunes, Sand beaches, Machair	65
N05	Shingle, Sea cliffs, Islets	65
N06	Inland water bodies (Standing water, Running water)	65
N07	Bogs, Marshes, Water fringed vegetation, Fens	65
N08	Heath, Scrub, Maquis and Garrigue, Phygrana	65
N09	Dry grassland, Steppes	65
N10	Humid grassland, Mesophile grassland	65
N11	Alpine and sub-Alpine grassland	65
N14	Improved grassland	65
N15	Other arable land	65
N16	Broad-leaved deciduous woodland	65
N17	Coniferous woodland	65
N19	Mixed woodland	65
N21	Non-forest areas cultivated with woody plants (including Orchards, groves, Vineyards, Dehesas)	65
N22	Inland rocks, Screes, Sands, Permanent Snow and ice	65
N23	Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites)	65
N25	Grassland and scrub habitats (general)	65
N26	Woodland habitats (general)	65

4.3 Threats code

CODE	DESCRIPTION	PAGE NO
A01	Cultivation	65
A02	Modification of cultivation practices	65
A03	Mowing / cutting of grassland	65
A04	Grazing	65
A05	Livestock farming and animal breeding (without grazing)	65
A06	Annual and perennial non-timber crops	65
A07	Use of biocides, hormones and chemicals	65
A08	Fertilisation	65
A10	Restructuring agricultural land holding	65
A11	Agriculture activities not referred to above	65
B01	Forest planting on open ground	65
B02	Forest and Plantation management & use	65
B03	Forest exploitation without replanting or natural regrowth	65
B04	Use of biocides, hormones and chemicals (forestry)	65
B06	Grazing in forests/ woodland	65
B07	Forestry activities not referred to above	65
C01	Mining and quarrying	65
C02	Exploration and extraction of oil or gas	65
C03	Renewable abiotic energy use	65
D01	Roads, paths and railroads	65
D02	Utility and service lines	65
D03	Shipping lanes, ports, marine constructions	65
D04	Airports, flightpaths	65
D05	Improved access to site	65
E01	Urbanised areas, human habitation	65
E02	Industrial or commercial areas	65

CODE	DESCRIPTION	PAGE NO
E03	Discharges	65
E04	Structures, buildings in the landscape	65
E06	Other urbanisation, industrial and similar activities	65
F01	Marine and Freshwater Aquaculture	65
F02	Fishing and harvesting aquatic resources	65
F03	Hunting and collection of wild animals (terrestrial), including damage caused by game (excessive density), and taking/removal of terrestrial animals (including collection of insects, reptiles, amphibians, birds of prey, etc., trapping, poisoning, poaching, predator control, accidental capture (e.g. due to fishing gear), etc.)	65
F04	Taking / Removal of terrestrial plants, general	65
F05	Illegal taking/ removal of marine fauna	65
F06	Hunting, fishing or collecting activities not referred to above	65
G01	Outdoor sports and leisure activities, recreational activities	65
G02	Sport and leisure structures	65
G03	Interpretative centres	65
G04	Military use and civil unrest	65
G05	Other human intrusions and disturbances	65
H01	Pollution to surface waters (limnic & terrestrial, marine & brackish)	65
H02	Pollution to groundwater (point sources and diffuse sources)	65
H03	Marine water pollution	65
H04	Air pollution, air-borne pollutants	65
H05	Soil pollution and solid waste (excluding discharges)	65
H06	Excess energy	65
H07	Other forms of pollution	65
I01	Invasive non-native species	65
I02	Problematic native species	65
I03	Introduced genetic material, GMO	65
J01	Fire and fire suppression	65
J02	Human induced changes in hydraulic conditions	65
J03	Other ecosystem modifications	65
K01	Abiotic (slow) natural processes	65
K02	Biocenotic evolution, succession	65
K03	Interspecific faunal relations	65
K04	Interspecific floral relations	65
K05	Reduced fecundity/ genetic depression	65
L05	Collapse of terrain, landslide	65
L07	Storm, cyclone	65
L08	Inundation (natural processes)	65
L10	Other natural catastrophes	65
M01	Changes in abiotic conditions	65
M02	Changes in biotic conditions	65
U	Unknown threat or pressure	65
XO	Threats and pressures from outside the Member State	65

5.1 Designation type codes

CODE	DESCRIPTION	PAGE NO
UK00	No Protection Status	67
UK01	National Nature Reserve	67
UK04	Site of Special Scientific Interest (GB)	67
UK05	Marine Conservation Zone	67
UK06	Nature Conservation Marine Protected Area	67
UK86	Special Area (Channel Islands)	67
UK98	Area of Special Scientific Interest (NI)	67
IN00	Ramsar Convention site	67
IN08	Special Protection Area	67
IN09	Special Area of Conservation	67

STANDARD DATA FORM for sites within the 'UK national site network of European sites'

Special Protection Areas (SPAs) are classified and Special Areas of Conservation (SACs) are designated under:

- the Conservation of Habitats and Species Regulations 2017 (as amended) in England and Wales (including the adjacent territorial sea) and to a limited extent in Scotland (reserved matters) and Northern Ireland (excepted matters);
- the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) in Scotland;
- the Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 (as amended) in Northern Ireland; and
- the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) in the UK offshore area.

Each SAC or SPA (forming part of the UK national site network of European sites) has its own Standard Data Form containing site-specific information. The information provided here generally follows the same documenting format for SACs and SPAs, as set out in the [Official Journal of the European Union recording the Commission Implementing Decision of 11 July 2011 \(2011/484/EU\)](#).

Please note that these forms contain a number of codes, all of which are explained either within the data forms themselves or in the end notes.

More general information on SPAs and SACs in the UK is available from the [SPA homepage](#) and [SAC homepage](#) on the JNCC website. These webpages also provide links to Standard Data Forms for all SAC and SPA sites in the UK.

<https://jncc.gov.uk/>



NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),
Proposed Sites for Community Importance (pSCI),
Sites of Community Importance (SCI) and
for Special Areas of Conservation (SAC)

SITE UK0030052
SITENAME North Somerset and Mendip Bats

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- [1. SITE IDENTIFICATION](#)
- [2. SITE LOCATION](#)
- [3. ECOLOGICAL INFORMATION](#)
- [4. SITE DESCRIPTION](#)
- [5. SITE PROTECTION STATUS AND RELATION WITH CORINE BIOTOPES](#)
- [6. SITE MANAGEMENT](#)

1. SITE IDENTIFICATION

1.1 Type B	1.2 Site code UK0030052	Back to top
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1.3 Site name

North Somerset and Mendip Bats

1.4 First Compilation date 1998-03	1.5 Update date 2015-12
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1.6 Respondent:

Name/Organisation: Joint Nature Conservation Committee
Address: Joint Nature Conservation Committee Monkstone House City Road Peterborough PE1 1JY
Email:

Date site proposed as SCI:	1998-03
Date site confirmed as SCI:	2004-12
Date site designated as SAC:	2005-04
National legal reference of SAC designation:	Regulations 11 and 13-15 of the Conservation of Habitats and Species Regulations 2010 (http://www.legislation.gov.uk/uksi/2010/490/contents/made).

2. SITE LOCATION

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2.1 Site-centre location [decimal degrees]:

Longitude

-2.746388889

Latitude

51.28611111

2.2 Area [ha]:

555.93

2.3 Marine area [%]

0.0

2.4 Sitelength [km]:

0.0

2.5 Administrative region code and name

NUTS level 2 code

Region Name

UKK2	Dorset and Somerset
UKK1	Gloucestershire, Wiltshire and Bristol/Bath area

2.6 Biogeographical Region(s)

Atlantic (100.0
%)

3. ECOLOGICAL INFORMATION

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3.1 Habitat types present on the site and assessment for them

Annex I Habitat types						Site assessment			
Code	PF	NP	Cover [ha]	Cave [number]	Data quality	A B C D	A B C		
						Representativity	Relative Surface	Conservation	Global
4030			10.56	0	G	D			
6210			151.77	0	G	B	C	A	B
8310			10.01	0	G	C	C	B	C
9180	X		138.43	0	G	B	C	B	B

- PF:** for the habitat types that can have a non-priority as well as a priority form (6210, 7130, 9430) enter "X" in the column PF to indicate the priority form.
- NP:** in case that a habitat type no longer exists in the site enter: x (optional)
- Cover:** decimal values can be entered
- Caves:** for habitat types 8310, 8330 (caves) enter the number of caves if estimated surface is not available.
- Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation)

3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them

Species					Population in the site						Site assessment			
G	Code	Scientific Name	S	NP	T	Size		Unit	Cat.	D.qual.	A B C D	A B C		
						Min	Max				Pop.	Con.	Iso.	Glo.
I	1065	Euphydryas (Eurodryas, Hypodryas) aurinia			p				P	DD	D			
M	1304	Rhinolophus ferrumequinum			p	101	250	i		M	B	A	C	A
M	1303	Rhinolophus hipposideros			p	101	250	i		M	C	B	C	B

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see [reference portal](#))
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

4. SITE DESCRIPTION

4.1 General site character

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Habitat class	% Cover
N16	30.0
N08	22.5
N23	1.0
N09	27.5
N19	19.0
Total Habitat Cover	100

Other Site Characteristics

1 Terrestrial: Soil & Geology: sedimentary,nutrient-poor,basic,limestone 2 Terrestrial: Geomorphology and landscape: hilly,lowland,caves

4.2 Quality and importance

Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia) for which this is considered to be one of the best areas in the United Kingdom. Caves not open to the public for which the area is considered to support a significant presence. Tilio-Acerion forests of slopes, screes and ravines for

which this is considered to be one of the best areas in the United Kingdom. Rhinolophus ferrumequinum for which this is considered to be one of the best areas in the United Kingdom. Rhinolophus hipposideros for which this is considered to be one of the best areas in the United Kingdom.

4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]
H	B02		I
H	E06		B
H	A04		I
H	K04		I
H	U		O

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]
H	B02		I
H	A04		I
H	A02		I

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

4.5 Documentation

Conservation Objectives - the Natural England links below provide access to the Conservation Objectives (and other site-related information) for its terrestrial and inshore Natura 2000 sites, including conservation advice packages and supporting documents for European Marine Sites within English waters and for cross-border sites. See also the 'UK Approach' document for more information (link via the JNCC website).

Link(s): <http://publications.naturalengland.org.uk/category/6490068894089216>

<http://publications.naturalengland.org.uk/category/3212324>

http://jncc.defra.gov.uk/pdf/Natura2000_StandardDataForm_UKApproach_Dec2015.pdf

5. SITE PROTECTION STATUS (optional)

5.1 Designation types at national and regional level:

[Back to top](#)

Code	Cover [%]	Code	Cover [%]	Code	Cover [%]
UK04	100.0				

6. SITE MANAGEMENT

6.1 Body(ies) responsible for the site management:

[Back to top](#)

Organisation:	Natural England
Address:	
Email:	

6.2 Management Plan(s):

An actual management plan does exist:

<input type="checkbox"/> Yes
<input type="checkbox"/>

☐ No, but in preparation

☒ No

6.3 Conservation measures (optional)

For available information, including on Conservation Objectives, see Section 4.5.

EXPLANATION OF CODES USED IN THE SPECIAL AREA OF CONSERVATION (SAC) AND SPECIAL PROTECTION AREA (SPA) STANDARD DATA FORMS

The codes in the table below generally follow those explained in the [official European Union guidelines for the Standard Data Form](#) (also referencing the relevant page number).

1.1 Site type

CODE	DESCRIPTION	PAGE NO
A	SPA (classified Special Protection Area)	53
B	cSAC, SCI or SAC (candidate Special Area of Conservation, Site of Community Importance, designated Special Area of Conservation)	53
C	SPA area/boundary is the same as the cSAC/SCI/SAC i.e. a co-classified/designated site (Note: this situation only occurs in Gibraltar)	53

3.1 Habitat code

CODE	DESCRIPTION	PAGE NO
1110	Sandbanks which are slightly covered by sea water all the time	57
1130	Estuaries	57
1140	Mudflats and sandflats not covered by seawater at low tide	57
1150	Coastal lagoons	57
1160	Large shallow inlets and bays	57
1170	Reefs	57
1180	Submarine structures made by leaking gases	57
1210	Annual vegetation of drift lines	57
1220	Perennial vegetation of stony banks	57
1230	Vegetated sea cliffs of the Atlantic and Baltic Coasts	57
1310	Salicornia and other annuals colonizing mud and sand	57
1320	Spartina swards (Spartinion maritimae)	57
1330	Atlantic salt meadows (Glaucio-Puccinellietalia maritimae)	57
1340	Inland salt meadows	57
1420	Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi)	57
2110	Embryonic shifting dunes	57
2120	Shifting dunes along the shoreline with Ammophila arenaria ("white dunes")	57
2130	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	57
2140	Decalcified fixed dunes with Empetrum nigrum	57
2150	Atlantic decalcified fixed dunes (Calluno-Ulicetea)	57
2160	Dunes with Hippophya• rhamnoides	57
2170	Dunes with Salix repens ssp. argentea (Salicion arenariae)	57
2190	Humid dune slacks	57
21A0	Machairs (* in Ireland)	57
2250	Coastal dunes with Juniperus spp.	57
2330	Inland dunes with open Corynephorus and Agrostis grasslands	57
3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)	57
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea	57
3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	57
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation	57

CODE	DESCRIPTION	PAGE NO
3160	Natural dystrophic lakes and ponds	57
3170	Mediterranean temporary ponds	57
3180	Turloughs	57
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation	57
4010	Northern Atlantic wet heaths with Erica tetralix	57
4020	Temperate Atlantic wet heaths with Erica ciliaris and Erica tetralix	57
4030	European dry heaths	57
4040	Dry Atlantic coastal heaths with Erica vagans	57
4060	Alpine and Boreal heaths	57
4080	Sub-Arctic Salix spp. scrub	57
5110	Stable xerothermophilous formations with Buxus sempervirens on rock slopes (Berberidion p.p.)	57
5130	Juniperus communis formations on heaths or calcareous grasslands	57
6130	Calaminarian grasslands of the Violetalia calaminariae	57
6150	Siliceous alpine and boreal grasslands	57
6170	Alpine and subalpine calcareous grasslands	57
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)	57
6230	Species-rich Nardus grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe)	57
6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	57
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	57
6510	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	57
6520	Mountain hay meadows	57
7110	Active raised bogs	57
7120	Degraded raised bogs still capable of natural regeneration	57
7130	Blanket bogs (* if active bog)	57
7140	Transition mires and quaking bogs	57
7150	Depressions on peat substrates of the Rhynchosporion	57
7210	Calcareous fens with Cladium mariscus and species of the Caricion davallianae	57
7220	Petrifying springs with tufa formation (Cratoneurion)	57
7230	Alkaline fens	57
7240	Alpine pioneer formations of the Caricion bicoloris-atrofuscae	57
8110	Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani)	57
8120	Calcareous and calcshist scree of the montane to alpine levels (Thlaspietalia rotundifoliae)	57
8210	Calcareous rocky slopes with chasmophytic vegetation	57
8220	Siliceous rocky slopes with chasmophytic vegetation	57
8240	Limestone pavements	57
8310	Caves not open to the public	57
8330	Submerged or partially submerged sea caves	57
9120	Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robur-petraeae or Ilici-Fagenion)	57
9130	Asperulo-Fagetum beech forests	57
9160	Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli	57
9180	Tilio-Acerion forests of slopes, scree and ravines	57
9190	Old acidophilous oak woods with Quercus robur on sandy plains	57
91A0	Old sessile oak woods with Ilex and Blechnum in the British Isles	57
91C0	Caledonian forest	57
91D0	Bog woodland	57
91E0	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	57
91J0	Taxus baccata woods of the British Isles	57

3.1 Habitat representativity (abbreviated to 'Representativity' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent representativity	57
B	Good representativity	57
C	Significant representativity	57
D	Non-significant presence representativity	57

3.1 Relative surface

CODE	DESCRIPTION	PAGE NO
A	> 15%-100%	58
B	> 2%-15%	58
C	≤ 2%	58

3.1 Degree of conservation (abbreviated to 'Conservation' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	59
B	Good conservation	59
C	Average or reduced conservation	59

3.1 Global assessment (abbreviated to 'Global' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	59
B	Good value	59
C	Significant value	59

3.2 Population (abbreviated to 'Pop.' in data form)

CODE	DESCRIPTION	PAGE NO
A	> 15%-100%	62
B	> 2%-15%	62
C	≤ 2%	62
D	Non-significant population	62

3.2 Degree of conservation (abbreviated to 'Con.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	63
B	Good conservation	63
C	Average or reduced conservation	63

3.2 Isolation (abbreviated to 'Iso.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Population (almost) Isolated	63
B	Population not-isolated, but on margins of area of distribution	63
C	Population not-isolated within extended distribution range	63

3.2 Global Grade (abbreviated to 'Glo.' or 'G.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	63
B	Good value	63
C	Significant value	63

3.3 Other species – essentially covers bird assemblage types

CODE	DESCRIPTION	PAGE NO
WATR	Non-breeding waterbird assemblage	UK specific code
SBA	Breeding seabird assemblage	UK specific code

BBA	Breeding bird assemblage (applies only to sites classified pre 2000)	UK specific code
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4.1 Habitat class code

CODE	DESCRIPTION	PAGE NO
N01	Marine areas, Sea inlets	65
N02	Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins)	65
N03	Salt marshes, Salt pastures, Salt steppes	65
N04	Coastal sand dunes, Sand beaches, Machair	65
N05	Shingle, Sea cliffs, Islets	65
N06	Inland water bodies (Standing water, Running water)	65
N07	Bogs, Marshes, Water fringed vegetation, Fens	65
N08	Heath, Scrub, Maquis and Garrigue, Phygrana	65
N09	Dry grassland, Steppes	65
N10	Humid grassland, Mesophile grassland	65
N11	Alpine and sub-Alpine grassland	65
N14	Improved grassland	65
N15	Other arable land	65
N16	Broad-leaved deciduous woodland	65
N17	Coniferous woodland	65
N19	Mixed woodland	65
N21	Non-forest areas cultivated with woody plants (including Orchards, groves, Vineyards, Dehesas)	65
N22	Inland rocks, Screes, Sands, Permanent Snow and ice	65
N23	Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites)	65
N25	Grassland and scrub habitats (general)	65
N26	Woodland habitats (general)	65

4.3 Threats code

CODE	DESCRIPTION	PAGE NO
A01	Cultivation	65
A02	Modification of cultivation practices	65
A03	Mowing / cutting of grassland	65
A04	Grazing	65
A05	Livestock farming and animal breeding (without grazing)	65
A06	Annual and perennial non-timber crops	65
A07	Use of biocides, hormones and chemicals	65
A08	Fertilisation	65
A10	Restructuring agricultural land holding	65
A11	Agriculture activities not referred to above	65
B01	Forest planting on open ground	65
B02	Forest and Plantation management & use	65
B03	Forest exploitation without replanting or natural regrowth	65
B04	Use of biocides, hormones and chemicals (forestry)	65
B06	Grazing in forests/ woodland	65
B07	Forestry activities not referred to above	65
C01	Mining and quarrying	65
C02	Exploration and extraction of oil or gas	65
C03	Renewable abiotic energy use	65
D01	Roads, paths and railroads	65
D02	Utility and service lines	65
D03	Shipping lanes, ports, marine constructions	65
D04	Airports, flightpaths	65
D05	Improved access to site	65
E01	Urbanised areas, human habitation	65
E02	Industrial or commercial areas	65

CODE	DESCRIPTION	PAGE NO
E03	Discharges	65
E04	Structures, buildings in the landscape	65
E06	Other urbanisation, industrial and similar activities	65
F01	Marine and Freshwater Aquaculture	65
F02	Fishing and harvesting aquatic resources	65
F03	Hunting and collection of wild animals (terrestrial), including damage caused by game (excessive density), and taking/removal of terrestrial animals (including collection of insects, reptiles, amphibians, birds of prey, etc., trapping, poisoning, poaching, predator control, accidental capture (e.g. due to fishing gear), etc.)	65
F04	Taking / Removal of terrestrial plants, general	65
F05	Illegal taking/ removal of marine fauna	65
F06	Hunting, fishing or collecting activities not referred to above	65
G01	Outdoor sports and leisure activities, recreational activities	65
G02	Sport and leisure structures	65
G03	Interpretative centres	65
G04	Military use and civil unrest	65
G05	Other human intrusions and disturbances	65
H01	Pollution to surface waters (limnic & terrestrial, marine & brackish)	65
H02	Pollution to groundwater (point sources and diffuse sources)	65
H03	Marine water pollution	65
H04	Air pollution, air-borne pollutants	65
H05	Soil pollution and solid waste (excluding discharges)	65
H06	Excess energy	65
H07	Other forms of pollution	65
I01	Invasive non-native species	65
I02	Problematic native species	65
I03	Introduced genetic material, GMO	65
J01	Fire and fire suppression	65
J02	Human induced changes in hydraulic conditions	65
J03	Other ecosystem modifications	65
K01	Abiotic (slow) natural processes	65
K02	Biocenotic evolution, succession	65
K03	Interspecific faunal relations	65
K04	Interspecific floral relations	65
K05	Reduced fecundity/ genetic depression	65
L05	Collapse of terrain, landslide	65
L07	Storm, cyclone	65
L08	Inundation (natural processes)	65
L10	Other natural catastrophes	65
M01	Changes in abiotic conditions	65
M02	Changes in biotic conditions	65
U	Unknown threat or pressure	65
XO	Threats and pressures from outside the Member State	65

5.1 Designation type codes

CODE	DESCRIPTION	PAGE NO
UK00	No Protection Status	67
UK01	National Nature Reserve	67
UK04	Site of Special Scientific Interest (GB)	67
UK05	Marine Conservation Zone	67
UK06	Nature Conservation Marine Protected Area	67
UK86	Special Area (Channel Islands)	67
UK98	Area of Special Scientific Interest (NI)	67
IN00	Ramsar Convention site	67
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IN09	Special Area of Conservation	67

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- the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) in Scotland;
- the Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 (as amended) in Northern Ireland; and
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<https://jncc.gov.uk/>



NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),
Proposed Sites for Community Importance (pSCI),
Sites of Community Importance (SCI) and
for Special Areas of Conservation (SAC)

SITE UK0013030
SITENAME Severn Estuary/ Môr Hafren

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- [5. SITE PROTECTION STATUS AND RELATION WITH CORINE BIOTOPES](#)
- [6. SITE MANAGEMENT](#)

1. SITE IDENTIFICATION

1.1 Type B	1.2 Site code UK0013030	Back to top
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1.3 Site name

Severn Estuary/ Môr Hafren

1.4 First Compilation date 2007-08	1.5 Update date 2015-12
--	-----------------------------------

1.6 Respondent:

Name/Organisation: Joint Nature Conservation Committee
Address: Joint Nature Conservation Committee Monkstone House City Road Peterborough PE1 1JY
Email:

Date site proposed as SCI:	2007-08
Date site confirmed as SCI:	2008-12
Date site designated as SAC:	2010-12
National legal reference of SAC designation:	Regulations 11 and 13-15 of the Conservation of Habitats and Species Regulations 2010 (http://www.legislation.gov.uk/uksi/2010/490/contents/made).

2. SITE LOCATION

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2.1 Site-centre location [decimal degrees]:

Longitude

-2.978055556

Latitude

51.46861111

2.2 Area [ha]:

73714.11

2.3 Marine area [%]

98.0

2.4 Sitelength [km]:

0.0

2.5 Administrative region code and name

NUTS level 2 code

Region Name

UKK2	Dorset and Somerset
UKZZ	Extra-Regio
UKL2	East Wales
UKK1	Gloucestershire, Wiltshire and Bristol/Bath area








2.6 Biogeographical Region(s)

Atlantic (100.0
%)

3. ECOLOGICAL INFORMATION

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3.1 Habitat types present on the site and assessment for them

Annex I Habitat types						Site assessment			
Code	PF	NP	Cover [ha]	Cave [number]	Data quality	A B C D	A B C		
						Representativity	Relative Surface	Conservation	Global
1110 			11779.51	0	G	C	C	B	C
1130 			73677.25	0	G	A	A	B	B
1140 			20271.38	0	G	A	B	B	B
1170 			1474.28	0	P	C	C	A	C
1310 				0		D			
1320 			191.66	0	G	D			
1330 			656.06	0	G	A	B	B	A

2110				0		D			
------	--	--	--	---	--	---	--	--	--

- **PF:** for the habitat types that can have a non-priority as well as a priority form (6210, 7130, 9430) enter "X" in the column PF to indicate the priority form.
- **NP:** in case that a habitat type no longer exists in the site enter: x (optional)
- **Cover:** decimal values can be entered
- **Caves:** for habitat types 8310, 8330 (caves) enter the number of caves if estimated surface is not available.
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation)

3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them

Species					Population in the site						Site assessment			
G	Code	Scientific Name	S	NP	T	Size		Unit	Cat.	D.qual.	A B C D	A B C		
						Min	Max				Pop.	Con.	Iso.	Glo.
F	1102	Alosa alosa			p				P	DD	D			
F	1103	Alosa fallax			p				P	DD	A	B	C	A
F	1099	Lampetra fluviatilis			p				P	DD	C	B	C	B
F	1095	Petromyzon marinus			p				P	DD	C	A	C	B

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see [reference portal](#))
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

4. SITE DESCRIPTION

4.1 General site character

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Habitat class	% Cover
N02	99.0
N03	1.0
Total Habitat Cover	100

Other Site Characteristics

1 Terrestrial: Soil & Geology: mud,clay,shingle,sedimentary,sand,peat 2 Terrestrial: Geomorphology and landscape: coastal 3 Marine:

Geology: sandstone/mudstone, pebble, sand, peat, gravel, shingle, sedimentary, cobble, biogenic reef, limestone/chalk, mud 4 Marine: Geomorphology: intertidal sediments (including sandflat/mudflat), estuary, subtidal rock (including rocky reefs), subtidal sediments (including sandbank/mudbank), intertidal rock, cliffs, pools, tidal rapids, islands, open coast (including bay), islands

4.2 Quality and importance

Sandbanks which are slightly covered by sea water all the time for which the area is considered to support a significant presence. Estuaries for which this is considered to be one of the best areas in the United Kingdom. Mudflats and sandflats not covered by seawater at low tide for which this is considered to be one of the best areas in the United Kingdom. Reefs for which the area is considered to support a significant presence. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) for which this is considered to be one of the best areas in the United Kingdom. *Petromyzon marinus* for which this is considered to be one of the best areas in the United Kingdom. *Lampetra fluviatilis* for which this is considered to be one of the best areas in the United Kingdom. *Alosa fallax* for which this is considered to be one of the best areas in the United Kingdom.

4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]
H	J02		B
H	M01		B
H	A02		I
H	E06		B
H	G01		I

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]
H	A02		I
M	G03		B
H	D05		I
H	A04		I

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

4.5 Documentation

Conservation Objectives - the Natural England links below provide access to the Conservation Objectives (and other site-related information) for its terrestrial and inshore Natura 2000 sites, including conservation advice packages and supporting documents for European Marine Sites within English waters and for cross-border sites. The Natural Resources Wales weblink below provides access to information on its designated sites. Detailed information about this Natura 2000 site can be accessed via the Management Plan link provided in Section 6.2. See also the 'UK Approach' document for more information (link via the JNCC website).

Link(s): <http://publications.naturalengland.org.uk/category/6490068894089216>

<http://publications.naturalengland.org.uk/category/3212324>

<https://naturalresources.wales/guidance-and-advice/environmental-topics/wildlife-and-biodiversity/protected-areas-of-lan>

http://jncc.defra.gov.uk/pdf/Natura2000_StandardDataForm_UKApproach_Dec2015.pdf

5. SITE PROTECTION STATUS (optional)

5.1 Designation types at national and regional level:

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Code	Cover [%]	Code	Cover [%]	Code	Cover [%]
UK00	77.3	UK04	22.7	UK01	3.4

6. SITE MANAGEMENT

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6.1 Body(ies) responsible for the site management:

Organisation:	Natural England
Address:	
Email:	

Organisation:	Natural Resources Wales
Address:	
Email:	

6.2 Management Plan(s):

An actual management plan does exist:

<input checked="" type="checkbox"/>	Yes	Name: SEVERN ESTUARY / MÔR HAFREN
		Link: https://naturalresources.wales/media/673887/severn-estuary-sac-spa-and-ramsar-reg-33-advice-from-ne-and-ccw-jur
<input type="checkbox"/>	No, but in preparation	
<input type="checkbox"/>	No	

6.3 Conservation measures (optional)

For available information, including on Conservation Objectives, see Section 4.5.

EXPLANATION OF CODES USED IN THE SPECIAL AREA OF CONSERVATION (SAC) AND SPECIAL PROTECTION AREA (SPA) STANDARD DATA FORMS

The codes in the table below generally follow those explained in the [official European Union guidelines for the Standard Data Form](#) (also referencing the relevant page number).

1.1 Site type

CODE	DESCRIPTION	PAGE NO
A	SPA (classified Special Protection Area)	53
B	cSAC, SCI or SAC (candidate Special Area of Conservation, Site of Community Importance, designated Special Area of Conservation)	53
C	SPA area/boundary is the same as the cSAC/SCI/SAC i.e. a co-classified/designated site (Note: this situation only occurs in Gibraltar)	53

3.1 Habitat code

CODE	DESCRIPTION	PAGE NO
1110	Sandbanks which are slightly covered by sea water all the time	57
1130	Estuaries	57
1140	Mudflats and sandflats not covered by seawater at low tide	57
1150	Coastal lagoons	57
1160	Large shallow inlets and bays	57
1170	Reefs	57
1180	Submarine structures made by leaking gases	57
1210	Annual vegetation of drift lines	57
1220	Perennial vegetation of stony banks	57
1230	Vegetated sea cliffs of the Atlantic and Baltic Coasts	57
1310	Salicornia and other annuals colonizing mud and sand	57
1320	Spartina swards (Spartinion maritimae)	57
1330	Atlantic salt meadows (Glaucio-Puccinellietalia maritimae)	57
1340	Inland salt meadows	57
1420	Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi)	57
2110	Embryonic shifting dunes	57
2120	Shifting dunes along the shoreline with Ammophila arenaria ("white dunes")	57
2130	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	57
2140	Decalcified fixed dunes with Empetrum nigrum	57
2150	Atlantic decalcified fixed dunes (Calluno-Ulicetea)	57
2160	Dunes with Hippophya• rhamnoides	57
2170	Dunes with Salix repens ssp. argentea (Salicion arenariae)	57
2190	Humid dune slacks	57
21A0	Machairs (* in Ireland)	57
2250	Coastal dunes with Juniperus spp.	57
2330	Inland dunes with open Corynephorus and Agrostis grasslands	57
3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)	57
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea	57
3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	57
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation	57

CODE	DESCRIPTION	PAGE NO
3160	Natural dystrophic lakes and ponds	57
3170	Mediterranean temporary ponds	57
3180	Turloughs	57
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation	57
4010	Northern Atlantic wet heaths with Erica tetralix	57
4020	Temperate Atlantic wet heaths with Erica ciliaris and Erica tetralix	57
4030	European dry heaths	57
4040	Dry Atlantic coastal heaths with Erica vagans	57
4060	Alpine and Boreal heaths	57
4080	Sub-Arctic Salix spp. scrub	57
5110	Stable xerothermophilous formations with Buxus sempervirens on rock slopes (Berberidion p.p.)	57
5130	Juniperus communis formations on heaths or calcareous grasslands	57
6130	Calaminarian grasslands of the Violetalia calaminariae	57
6150	Siliceous alpine and boreal grasslands	57
6170	Alpine and subalpine calcareous grasslands	57
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)	57
6230	Species-rich Nardus grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe)	57
6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	57
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	57
6510	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	57
6520	Mountain hay meadows	57
7110	Active raised bogs	57
7120	Degraded raised bogs still capable of natural regeneration	57
7130	Blanket bogs (* if active bog)	57
7140	Transition mires and quaking bogs	57
7150	Depressions on peat substrates of the Rhynchosporion	57
7210	Calcareous fens with Cladium mariscus and species of the Caricion davallianae	57
7220	Petrifying springs with tufa formation (Cratoneurion)	57
7230	Alkaline fens	57
7240	Alpine pioneer formations of the Caricion bicoloris-atrofuscae	57
8110	Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani)	57
8120	Calcareous and calcshist scree of the montane to alpine levels (Thlaspietalia rotundifoliae)	57
8210	Calcareous rocky slopes with chasmophytic vegetation	57
8220	Siliceous rocky slopes with chasmophytic vegetation	57
8240	Limestone pavements	57
8310	Caves not open to the public	57
8330	Submerged or partially submerged sea caves	57
9120	Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robur-petraeae or Ilici-Fagenion)	57
9130	Asperulo-Fagetum beech forests	57
9160	Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli	57
9180	Tilio-Acerion forests of slopes, scree and ravines	57
9190	Old acidophilous oak woods with Quercus robur on sandy plains	57
91A0	Old sessile oak woods with Ilex and Blechnum in the British Isles	57
91C0	Caledonian forest	57
91D0	Bog woodland	57
91E0	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	57
91J0	Taxus baccata woods of the British Isles	57

3.1 Habitat representativity (abbreviated to 'Representativity' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent representativity	57
B	Good representativity	57
C	Significant representativity	57
D	Non-significant presence representativity	57

3.1 Relative surface

CODE	DESCRIPTION	PAGE NO
A	> 15%-100%	58
B	> 2%-15%	58
C	≤ 2%	58

3.1 Degree of conservation (abbreviated to 'Conservation' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	59
B	Good conservation	59
C	Average or reduced conservation	59

3.1 Global assessment (abbreviated to 'Global' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	59
B	Good value	59
C	Significant value	59

3.2 Population (abbreviated to 'Pop.' in data form)

CODE	DESCRIPTION	PAGE NO
A	> 15%-100%	62
B	> 2%-15%	62
C	≤ 2%	62
D	Non-significant population	62

3.2 Degree of conservation (abbreviated to 'Con.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	63
B	Good conservation	63
C	Average or reduced conservation	63

3.2 Isolation (abbreviated to 'Iso.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Population (almost) Isolated	63
B	Population not-isolated, but on margins of area of distribution	63
C	Population not-isolated within extended distribution range	63

3.2 Global Grade (abbreviated to 'Glo.' or 'G.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	63
B	Good value	63
C	Significant value	63

3.3 Other species – essentially covers bird assemblage types

CODE	DESCRIPTION	PAGE NO
WATR	Non-breeding waterbird assemblage	UK specific code
SBA	Breeding seabird assemblage	UK specific code

BBA	Breeding bird assemblage (applies only to sites classified pre 2000)	UK specific code
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4.1 Habitat class code

CODE	DESCRIPTION	PAGE NO
N01	Marine areas, Sea inlets	65
N02	Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins)	65
N03	Salt marshes, Salt pastures, Salt steppes	65
N04	Coastal sand dunes, Sand beaches, Machair	65
N05	Shingle, Sea cliffs, Islets	65
N06	Inland water bodies (Standing water, Running water)	65
N07	Bogs, Marshes, Water fringed vegetation, Fens	65
N08	Heath, Scrub, Maquis and Garrigue, Phygrana	65
N09	Dry grassland, Steppes	65
N10	Humid grassland, Mesophile grassland	65
N11	Alpine and sub-Alpine grassland	65
N14	Improved grassland	65
N15	Other arable land	65
N16	Broad-leaved deciduous woodland	65
N17	Coniferous woodland	65
N19	Mixed woodland	65
N21	Non-forest areas cultivated with woody plants (including Orchards, groves, Vineyards, Dehesas)	65
N22	Inland rocks, Screes, Sands, Permanent Snow and ice	65
N23	Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites)	65
N25	Grassland and scrub habitats (general)	65
N26	Woodland habitats (general)	65

4.3 Threats code

CODE	DESCRIPTION	PAGE NO
A01	Cultivation	65
A02	Modification of cultivation practices	65
A03	Mowing / cutting of grassland	65
A04	Grazing	65
A05	Livestock farming and animal breeding (without grazing)	65
A06	Annual and perennial non-timber crops	65
A07	Use of biocides, hormones and chemicals	65
A08	Fertilisation	65
A10	Restructuring agricultural land holding	65
A11	Agriculture activities not referred to above	65
B01	Forest planting on open ground	65
B02	Forest and Plantation management & use	65
B03	Forest exploitation without replanting or natural regrowth	65
B04	Use of biocides, hormones and chemicals (forestry)	65
B06	Grazing in forests/ woodland	65
B07	Forestry activities not referred to above	65
C01	Mining and quarrying	65
C02	Exploration and extraction of oil or gas	65
C03	Renewable abiotic energy use	65
D01	Roads, paths and railroads	65
D02	Utility and service lines	65
D03	Shipping lanes, ports, marine constructions	65
D04	Airports, flightpaths	65
D05	Improved access to site	65
E01	Urbanised areas, human habitation	65
E02	Industrial or commercial areas	65

CODE	DESCRIPTION	PAGE NO
E03	Discharges	65
E04	Structures, buildings in the landscape	65
E06	Other urbanisation, industrial and similar activities	65
F01	Marine and Freshwater Aquaculture	65
F02	Fishing and harvesting aquatic resources	65
F03	Hunting and collection of wild animals (terrestrial), including damage caused by game (excessive density), and taking/removal of terrestrial animals (including collection of insects, reptiles, amphibians, birds of prey, etc., trapping, poisoning, poaching, predator control, accidental capture (e.g. due to fishing gear), etc.)	65
F04	Taking / Removal of terrestrial plants, general	65
F05	Illegal taking/ removal of marine fauna	65
F06	Hunting, fishing or collecting activities not referred to above	65
G01	Outdoor sports and leisure activities, recreational activities	65
G02	Sport and leisure structures	65
G03	Interpretative centres	65
G04	Military use and civil unrest	65
G05	Other human intrusions and disturbances	65
H01	Pollution to surface waters (limnic & terrestrial, marine & brackish)	65
H02	Pollution to groundwater (point sources and diffuse sources)	65
H03	Marine water pollution	65
H04	Air pollution, air-borne pollutants	65
H05	Soil pollution and solid waste (excluding discharges)	65
H06	Excess energy	65
H07	Other forms of pollution	65
I01	Invasive non-native species	65
I02	Problematic native species	65
I03	Introduced genetic material, GMO	65
J01	Fire and fire suppression	65
J02	Human induced changes in hydraulic conditions	65
J03	Other ecosystem modifications	65
K01	Abiotic (slow) natural processes	65
K02	Biocenotic evolution, succession	65
K03	Interspecific faunal relations	65
K04	Interspecific floral relations	65
K05	Reduced fecundity/ genetic depression	65
L05	Collapse of terrain, landslide	65
L07	Storm, cyclone	65
L08	Inundation (natural processes)	65
L10	Other natural catastrophes	65
M01	Changes in abiotic conditions	65
M02	Changes in biotic conditions	65
U	Unknown threat or pressure	65
XO	Threats and pressures from outside the Member State	65

5.1 Designation type codes

CODE	DESCRIPTION	PAGE NO
UK00	No Protection Status	67
UK01	National Nature Reserve	67
UK04	Site of Special Scientific Interest (GB)	67
UK05	Marine Conservation Zone	67
UK06	Nature Conservation Marine Protected Area	67
UK86	Special Area (Channel Islands)	67
UK98	Area of Special Scientific Interest (NI)	67
IN00	Ramsar Convention site	67
IN08	Special Protection Area	67
IN09	Special Area of Conservation	67

STANDARD DATA FORM for sites within the 'UK national site network of European sites'

Special Protection Areas (SPAs) are classified and Special Areas of Conservation (SACs) are designated under:

- the Conservation of Habitats and Species Regulations 2017 (as amended) in England and Wales (including the adjacent territorial sea) and to a limited extent in Scotland (reserved matters) and Northern Ireland (excepted matters);
- the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) in Scotland;
- the Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 (as amended) in Northern Ireland; and
- the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) in the UK offshore area.

Each SAC or SPA (forming part of the UK national site network of European sites) has its own Standard Data Form containing site-specific information. The information provided here generally follows the same documenting format for SACs and SPAs, as set out in the [Official Journal of the European Union recording the Commission Implementing Decision of 11 July 2011 \(2011/484/EU\)](#).

Please note that these forms contain a number of codes, all of which are explained either within the data forms themselves or in the end notes.

More general information on SPAs and SACs in the UK is available from the [SPA homepage](#) and [SAC homepage](#) on the JNCC website. These webpages also provide links to Standard Data Forms for all SAC and SPA sites in the UK.

<https://jncc.gov.uk/>



NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),
Proposed Sites for Community Importance (pSCI),
Sites of Community Importance (SCI) and
for Special Areas of Conservation (SAC)

SITE UK9015022
SITENAME Severn Estuary

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- [2. SITE LOCATION](#)
- [3. ECOLOGICAL INFORMATION](#)
- [4. SITE DESCRIPTION](#)
- [5. SITE PROTECTION STATUS AND RELATION WITH CORINE BIOTOPES](#)
- [6. SITE MANAGEMENT](#)

1. SITE IDENTIFICATION

1.1 Type A	1.2 Site code UK9015022	Back to top
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1.3 Site name

Severn Estuary

1.4 First Compilation date 1995-07	1.5 Update date 2015-12
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1.6 Respondent:

Name/Organisation: Joint Nature Conservation Committee
Address: Joint Nature Conservation Committee Monkstone House City Road Peterborough PE1 1JY
Email:

1.7 Site indication and designation / classification dates

Date site classified as SPA:	1995-07
National legal reference of SPA designation	Regulations 12A and 13-15 of the Conservation Habitats and Species Regulations 2010, (http://www.legislation.gov.uk/ukxi/2010/490/contents/made) as amended by The Conservation of Habitats and Species (Amendment) Regulations 2011 (http://www.legislation.gov.uk/ukxi/2011/625/contents/made).

2. SITE LOCATION

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2.1 Site-centre location [decimal degrees]:

Longitude

-3.049166667

Latitude

51.22472222

2.2 Area [ha]:

24487.91

2.3 Marine area [%]

90.3

2.4 Sitelength [km]:

0.0

2.5 Administrative region code and name

NUTS level 2 code

Region Name

UKL2	East Wales
UKK2	Dorset and Somerset
UKL1	West Wales and The Valleys
UKK1	Gloucestershire, Wiltshire and Bristol/Bath area

2.6 Biogeographical Region(s)

Atlantic (100.0
%)

3. ECOLOGICAL INFORMATION

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3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them

Species						Population in the site					Site assessment			
G	Code	Scientific Name	S	NP	T	Size		Unit	Cat.	D.qual.	A B C D	A B C		
						Min	Max				Pop.	Con.	Iso.	Glo.
B	A051	Anas strepera			w	282	282	i		G	B		C	
B	A394	Anser albifrons albifrons			w	2664	2664	i		G	A		B	
B	A672	Calidris alpina alpina			w	44624	44624	i		G	B		C	
B	A037	Cygnus columbianus bewickii			w	280	280	i		G	B		C	
B	A048	Tadorna tadorna			w	3330	3330	i		G	B		C	
B	A162	Tringa totanus			w	2330	2330	i		G	B		C	

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see [reference portal](#))
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

3.3 Other important species of flora and fauna (optional)

Species					Population in the site			Motivation						
Group	CODE	Scientific Name	S	NP	Size		Unit	Cat.	Species Annex		Other categories			
					Min	Max		C R V P	IV	V	A	B	C	D
B	WATR	Waterbird assemblage			84317	84317	i						X	

- **Group:** A = Amphibians, B = Birds, F = Fish, Fu = Fungi, I = Invertebrates, L = Lichens, M = Mammals, P = Plants, R = Reptiles
- **CODE:** for Birds, Annex IV and V species the code as provided in the reference portal should be used in addition to the scientific name
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Unit:** i = individuals, p = pairs or other units according to the standard list of population units and codes in accordance with Article 12 and 17 reporting, (see [reference portal](#))
- **Cat.:** Abundance categories: C = common, R = rare, V = very rare, P = present
- **Motivation categories:** IV, V: Annex Species (Habitats Directive), A: National Red List data; B: Endemics; C: International Conventions; D: other reasons

4. SITE DESCRIPTION

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4.1 General site character

Habitat class	% Cover
N04	4.0
N02	89.0
N14	1.0
N03	6.0
Total Habitat Cover	100

Other Site Characteristics

3 Marine:
 Geology: limestone/chalk,sandstone/mudstone,clay,shingle,sedimentary,mud,sand,cobble,peat,gravel,biogenic reef
 4 Marine: Geomorphology: islands,intertidal rock,subtidal rock (including rocky reefs),tidal rapids,intertidal sediments (including sandflat/mudflat),open coast (including bay),subtidal sediments (including sandbank/mudbank),pools,cliffs,estuary

4.2 Quality and importance

ARTICLE 4.1 QUALIFICATION (79/409/EEC) Over winter the area regularly supports: *Cygnus columbianus bewickii* (Western Siberia/North-eastern & North-western Europe) 3.9% of the GB population 5 year peak mean 1991/92-1995/96 ARTICLE 4.2 QUALIFICATION (79/409/EEC) Over winter the area regularly supports: *Anas strepera* (North-western Europe) 0.9% of the population 5 year peak mean 1991/92-1995/96 *Anser albifrons albifrons* (North-western Siberia/North-eastern & North-western Europe) 0.4% of the population 5 year peak mean 1991/92-1995/96 *Calidris alpina alpina* (Northern Siberia/Europe/Western Africa) 3.3% of the population 5 year peak mean 1991/92-1995/96 *Tadorna tadorna* (North-western Europe) 1.1% of the population 5 year peak mean 1991/92-1995/96 *Tringa totanus* (Eastern Atlantic - wintering) 1.3% of the population 5 year peak mean 1991/92-1995/96 ARTICLE 4.2 QUALIFICATION (79/409/EEC): AN INTERNATIONALLY IMPORTANT ASSEMBLAGE OF BIRDS Over winter the area regularly supports: 84317 waterfowl (5 year peak mean 1991/92-1995/96) Including: *Cygnus columbianus bewickii* , *Tadorna tadorna* , *Anas strepera* , *Calidris alpina alpina* , *Tringa totanus*

4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]
H	J02		B
H	M01		B
H	A02		I
H	E06		B
H	G01		I

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]
H	A02		I
M	G03		B
H	A03		I
H	A04		I
H	D05		I
H	A03		I
H	D05		I
H	A02		I
H	A04		I

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

4.5 Documentation

Conservation Objectives - the Natural England links below provide access to the Conservation Objectives (and other site-related information) for its terrestrial and inshore Natura 2000 sites, including conservation advice packages and supporting documents for European Marine Sites within English waters and for cross-border sites. The Natural Resources Wales weblink below provides access to information on its designated sites. Detailed information about this Natura 2000 site can be accessed via the Management Plan link provided in Section 6.2. See also the 'UK Approach' document for more information (link via the JNCC website).

Link(s): <http://publications.naturalengland.org.uk/category/6490068894089216>

<http://publications.naturalengland.org.uk/category/3212324>

<https://naturalresources.wales/guidance-and-advice/environmental-topics/wildlife-and-biodiversity/protected-areas-of-lan>

http://jncc.defra.gov.uk/pdf/Natura2000_StandardDataForm_UKApproach_Dec2015.pdf

5. SITE PROTECTION STATUS (optional)

5.1 Designation types at national and regional level:

[Back to top](#)

Code	Cover [%]	Code	Cover [%]
------	-----------	------	-----------

Code

Cover [%]

UK01	9.0
------	-----

UK04	100.2
------	-------

6. SITE MANAGEMENT

[Back to top](#)

6.1 Body(ies) responsible for the site management:

Organisation:	Natural England
Address:	
Email:	

Organisation:	Natural Resources Wales
Address:	
Email:	

6.2 Management Plan(s):

An actual management plan does exist:

<input checked="" type="checkbox"/>	Yes	Name: SEVERN ESTUARY
		Link:
		https://naturalresources.wales/media/673887/severn-estuary-sac-spa-and-ramsar-reg-33-advice-from-ne-and-ccw-jur
<input type="checkbox"/>	No, but in preparation	
<input type="checkbox"/>	No	

6.3 Conservation measures (optional)

For available information, including on Conservation Objectives, see Section 4.5.

EXPLANATION OF CODES USED IN THE SPECIAL AREA OF CONSERVATION (SAC) AND SPECIAL PROTECTION AREA (SPA) STANDARD DATA FORMS

The codes in the table below generally follow those explained in the [official European Union guidelines for the Standard Data Form](#) (also referencing the relevant page number).

1.1 Site type

CODE	DESCRIPTION	PAGE NO
A	SPA (classified Special Protection Area)	53
B	cSAC, SCI or SAC (candidate Special Area of Conservation, Site of Community Importance, designated Special Area of Conservation)	53
C	SPA area/boundary is the same as the cSAC/SCI/SAC i.e. a co-classified/designated site (Note: this situation only occurs in Gibraltar)	53

3.1 Habitat code

CODE	DESCRIPTION	PAGE NO
1110	Sandbanks which are slightly covered by sea water all the time	57
1130	Estuaries	57
1140	Mudflats and sandflats not covered by seawater at low tide	57
1150	Coastal lagoons	57
1160	Large shallow inlets and bays	57
1170	Reefs	57
1180	Submarine structures made by leaking gases	57
1210	Annual vegetation of drift lines	57
1220	Perennial vegetation of stony banks	57
1230	Vegetated sea cliffs of the Atlantic and Baltic Coasts	57
1310	Salicornia and other annuals colonizing mud and sand	57
1320	Spartina swards (Spartinion maritimae)	57
1330	Atlantic salt meadows (Glaucio-Puccinellietalia maritimae)	57
1340	Inland salt meadows	57
1420	Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi)	57
2110	Embryonic shifting dunes	57
2120	Shifting dunes along the shoreline with Ammophila arenaria ("white dunes")	57
2130	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	57
2140	Decalcified fixed dunes with Empetrum nigrum	57
2150	Atlantic decalcified fixed dunes (Calluno-Ulicetea)	57
2160	Dunes with Hippophya• rhamnoides	57
2170	Dunes with Salix repens ssp. argentea (Salicion arenariae)	57
2190	Humid dune slacks	57
21A0	Machairs (* in Ireland)	57
2250	Coastal dunes with Juniperus spp.	57
2330	Inland dunes with open Corynephorus and Agrostis grasslands	57
3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)	57
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea	57
3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	57
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation	57

CODE	DESCRIPTION	PAGE NO
3160	Natural dystrophic lakes and ponds	57
3170	Mediterranean temporary ponds	57
3180	Turloughs	57
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation	57
4010	Northern Atlantic wet heaths with Erica tetralix	57
4020	Temperate Atlantic wet heaths with Erica ciliaris and Erica tetralix	57
4030	European dry heaths	57
4040	Dry Atlantic coastal heaths with Erica vagans	57
4060	Alpine and Boreal heaths	57
4080	Sub-Arctic Salix spp. scrub	57
5110	Stable xerothermophilous formations with Buxus sempervirens on rock slopes (Berberidion p.p.)	57
5130	Juniperus communis formations on heaths or calcareous grasslands	57
6130	Calaminarian grasslands of the Violetalia calaminariae	57
6150	Siliceous alpine and boreal grasslands	57
6170	Alpine and subalpine calcareous grasslands	57
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)	57
6230	Species-rich Nardus grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe)	57
6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	57
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	57
6510	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	57
6520	Mountain hay meadows	57
7110	Active raised bogs	57
7120	Degraded raised bogs still capable of natural regeneration	57
7130	Blanket bogs (* if active bog)	57
7140	Transition mires and quaking bogs	57
7150	Depressions on peat substrates of the Rhynchosporion	57
7210	Calcareous fens with Cladium mariscus and species of the Caricion davallianae	57
7220	Petrifying springs with tufa formation (Cratoneurion)	57
7230	Alkaline fens	57
7240	Alpine pioneer formations of the Caricion bicoloris-atrofuscae	57
8110	Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani)	57
8120	Calcareous and calcshist scree of the montane to alpine levels (Thlaspietalia rotundifoliae)	57
8210	Calcareous rocky slopes with chasmophytic vegetation	57
8220	Siliceous rocky slopes with chasmophytic vegetation	57
8240	Limestone pavements	57
8310	Caves not open to the public	57
8330	Submerged or partially submerged sea caves	57
9120	Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robur-petraeae or Ilici-Fagenion)	57
9130	Asperulo-Fagetum beech forests	57
9160	Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli	57
9180	Tilio-Acerion forests of slopes, scree and ravines	57
9190	Old acidophilous oak woods with Quercus robur on sandy plains	57
91A0	Old sessile oak woods with Ilex and Blechnum in the British Isles	57
91C0	Caledonian forest	57
91D0	Bog woodland	57
91E0	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	57
91J0	Taxus baccata woods of the British Isles	57

3.1 Habitat representativity (abbreviated to 'Representativity' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent representativity	57
B	Good representativity	57
C	Significant representativity	57
D	Non-significant presence representativity	57

3.1 Relative surface

CODE	DESCRIPTION	PAGE NO
A	> 15%-100%	58
B	> 2%-15%	58
C	≤ 2%	58

3.1 Degree of conservation (abbreviated to 'Conservation' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	59
B	Good conservation	59
C	Average or reduced conservation	59

3.1 Global assessment (abbreviated to 'Global' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	59
B	Good value	59
C	Significant value	59

3.2 Population (abbreviated to 'Pop.' in data form)

CODE	DESCRIPTION	PAGE NO
A	> 15%-100%	62
B	> 2%-15%	62
C	≤ 2%	62
D	Non-significant population	62

3.2 Degree of conservation (abbreviated to 'Con.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	63
B	Good conservation	63
C	Average or reduced conservation	63

3.2 Isolation (abbreviated to 'Iso.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Population (almost) Isolated	63
B	Population not-isolated, but on margins of area of distribution	63
C	Population not-isolated within extended distribution range	63

3.2 Global Grade (abbreviated to 'Glo.' or 'G.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	63
B	Good value	63
C	Significant value	63

3.3 Other species – essentially covers bird assemblage types

CODE	DESCRIPTION	PAGE NO
WATR	Non-breeding waterbird assemblage	UK specific code
SBA	Breeding seabird assemblage	UK specific code

BBA	Breeding bird assemblage (applies only to sites classified pre 2000)	UK specific code
-----	--	------------------

4.1 Habitat class code

CODE	DESCRIPTION	PAGE NO
N01	Marine areas, Sea inlets	65
N02	Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins)	65
N03	Salt marshes, Salt pastures, Salt steppes	65
N04	Coastal sand dunes, Sand beaches, Machair	65
N05	Shingle, Sea cliffs, Islets	65
N06	Inland water bodies (Standing water, Running water)	65
N07	Bogs, Marshes, Water fringed vegetation, Fens	65
N08	Heath, Scrub, Maquis and Garrigue, Phygrana	65
N09	Dry grassland, Steppes	65
N10	Humid grassland, Mesophile grassland	65
N11	Alpine and sub-Alpine grassland	65
N14	Improved grassland	65
N15	Other arable land	65
N16	Broad-leaved deciduous woodland	65
N17	Coniferous woodland	65
N19	Mixed woodland	65
N21	Non-forest areas cultivated with woody plants (including Orchards, groves, Vineyards, Dehesas)	65
N22	Inland rocks, Screes, Sands, Permanent Snow and ice	65
N23	Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites)	65
N25	Grassland and scrub habitats (general)	65
N26	Woodland habitats (general)	65

4.3 Threats code

CODE	DESCRIPTION	PAGE NO
A01	Cultivation	65
A02	Modification of cultivation practices	65
A03	Mowing / cutting of grassland	65
A04	Grazing	65
A05	Livestock farming and animal breeding (without grazing)	65
A06	Annual and perennial non-timber crops	65
A07	Use of biocides, hormones and chemicals	65
A08	Fertilisation	65
A10	Restructuring agricultural land holding	65
A11	Agriculture activities not referred to above	65
B01	Forest planting on open ground	65
B02	Forest and Plantation management & use	65
B03	Forest exploitation without replanting or natural regrowth	65
B04	Use of biocides, hormones and chemicals (forestry)	65
B06	Grazing in forests/ woodland	65
B07	Forestry activities not referred to above	65
C01	Mining and quarrying	65
C02	Exploration and extraction of oil or gas	65
C03	Renewable abiotic energy use	65
D01	Roads, paths and railroads	65
D02	Utility and service lines	65
D03	Shipping lanes, ports, marine constructions	65
D04	Airports, flightpaths	65
D05	Improved access to site	65
E01	Urbanised areas, human habitation	65
E02	Industrial or commercial areas	65

CODE	DESCRIPTION	PAGE NO
E03	Discharges	65
E04	Structures, buildings in the landscape	65
E06	Other urbanisation, industrial and similar activities	65
F01	Marine and Freshwater Aquaculture	65
F02	Fishing and harvesting aquatic resources	65
F03	Hunting and collection of wild animals (terrestrial), including damage caused by game (excessive density), and taking/removal of terrestrial animals (including collection of insects, reptiles, amphibians, birds of prey, etc., trapping, poisoning, poaching, predator control, accidental capture (e.g. due to fishing gear), etc.)	65
F04	Taking / Removal of terrestrial plants, general	65
F05	Illegal taking/ removal of marine fauna	65
F06	Hunting, fishing or collecting activities not referred to above	65
G01	Outdoor sports and leisure activities, recreational activities	65
G02	Sport and leisure structures	65
G03	Interpretative centres	65
G04	Military use and civil unrest	65
G05	Other human intrusions and disturbances	65
H01	Pollution to surface waters (limnic & terrestrial, marine & brackish)	65
H02	Pollution to groundwater (point sources and diffuse sources)	65
H03	Marine water pollution	65
H04	Air pollution, air-borne pollutants	65
H05	Soil pollution and solid waste (excluding discharges)	65
H06	Excess energy	65
H07	Other forms of pollution	65
I01	Invasive non-native species	65
I02	Problematic native species	65
I03	Introduced genetic material, GMO	65
J01	Fire and fire suppression	65
J02	Human induced changes in hydraulic conditions	65
J03	Other ecosystem modifications	65
K01	Abiotic (slow) natural processes	65
K02	Biocenotic evolution, succession	65
K03	Interspecific faunal relations	65
K04	Interspecific floral relations	65
K05	Reduced fecundity/ genetic depression	65
L05	Collapse of terrain, landslide	65
L07	Storm, cyclone	65
L08	Inundation (natural processes)	65
L10	Other natural catastrophes	65
M01	Changes in abiotic conditions	65
M02	Changes in biotic conditions	65
U	Unknown threat or pressure	65
XO	Threats and pressures from outside the Member State	65

5.1 Designation type codes

CODE	DESCRIPTION	PAGE NO
UK00	No Protection Status	67
UK01	National Nature Reserve	67
UK04	Site of Special Scientific Interest (GB)	67
UK05	Marine Conservation Zone	67
UK06	Nature Conservation Marine Protected Area	67
UK86	Special Area (Channel Islands)	67
UK98	Area of Special Scientific Interest (NI)	67
IN00	Ramsar Convention site	67
IN08	Special Protection Area	67
IN09	Special Area of Conservation	67

STANDARD DATA FORM for sites within the 'UK national site network of European sites'

Special Protection Areas (SPAs) are classified and Special Areas of Conservation (SACs) are designated under:

- the Conservation of Habitats and Species Regulations 2017 (as amended) in England and Wales (including the adjacent territorial sea) and to a limited extent in Scotland (reserved matters) and Northern Ireland (excepted matters);
- the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) in Scotland;
- the Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 (as amended) in Northern Ireland; and
- the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) in the UK offshore area.

Each SAC or SPA (forming part of the UK national site network of European sites) has its own Standard Data Form containing site-specific information. The information provided here generally follows the same documenting format for SACs and SPAs, as set out in the [Official Journal of the European Union recording the Commission Implementing Decision of 11 July 2011 \(2011/484/EU\)](#).

Please note that these forms contain a number of codes, all of which are explained either within the data forms themselves or in the end notes.

More general information on SPAs and SACs in the UK is available from the [SPA homepage](#) and [SAC homepage](#) on the JNCC website. These webpages also provide links to Standard Data Forms for all SAC and SPA sites in the UK.

<https://jncc.gov.uk/>



NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),
Proposed Sites for Community Importance (pSCI),
Sites of Community Importance (SCI) and
for Special Areas of Conservation (SAC)

SITE UK9010031
SITENAME Somerset Levels and Moors

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- [1. SITE IDENTIFICATION](#)
- [2. SITE LOCATION](#)
- [3. ECOLOGICAL INFORMATION](#)
- [4. SITE DESCRIPTION](#)
- [5. SITE PROTECTION STATUS AND RELATION WITH CORINE BIOTOPES](#)
- [6. SITE MANAGEMENT](#)

1. SITE IDENTIFICATION

1.1 Type A	1.2 Site code UK9010031	Back to top
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1.3 Site name

Somerset Levels and Moors

1.4 First Compilation date 1997-06	1.5 Update date 2015-12
--	-----------------------------------

1.6 Respondent:

Name/Organisation: Joint Nature Conservation Committee
Address: Joint Nature Conservation Committee Monkstone House City Road Peterborough PE1 1JY
Email:

1.7 Site indication and designation / classification dates

Date site classified as SPA:	1997-06
National legal reference of SPA designation	Regulations 12A and 13-15 of the Conservation Habitats and Species Regulations 2010, (http://www.legislation.gov.uk/ukxi/2010/490/contents/made) as amended by The Conservation of Habitats and Species (Amendment) Regulations 2011 (http://www.legislation.gov.uk/ukxi/2011/625/contents/made).

2. SITE LOCATION

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2.1 Site-centre location [decimal degrees]:

Longitude

-2.866666667

Latitude

51.17055556

2.2 Area [ha]:

6395.47

2.3 Marine area [%]

0.0

2.4 Sitelength [km]:

0.0

2.5 Administrative region code and name

NUTS level 2 code

Region Name

UKK2	Dorset and Somerset
------	---------------------

2.6 Biogeographical Region(s)

Atlantic (100.0
%)

3. ECOLOGICAL INFORMATION

3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them

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Species						Population in the site					Site assessment			
G	Code	Scientific Name	S	NP	T	Size		Unit	Cat.	D.qual.	A B C D	A B C		
						Min	Max				Pop.	Con.	Iso.	Glo.
B	A052	Anas crecca			w	13307	13307	i		G	B		C	
B	A037	Cygnus columbianus bewickii			w	191	191	i		G	B		B	
B	A140	Pluvialis apricaria			w	3029	3029	i		G	C		C	
B	A142	Vanellus vanellus			w	36316	36316	i		G	B		C	

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see [reference portal](#))
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with

some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

3.3 Other important species of flora and fauna (optional)

Species					Population in the site			Motivation						
Group	CODE	Scientific Name	S	NP	Size		Unit	Cat.	Species Annex		Other categories			
					Min	Max		C R V P	IV	V	A	B	C	D
B	WATR	Waterbird assemblage			73014	73014	i						X	

- **Group:** A = Amphibians, B = Birds, F = Fish, Fu = Fungi, I = Invertebrates, L = Lichens, M = Mammals, P = Plants, R = Reptiles
- **CODE:** for Birds, Annex IV and V species the code as provided in the reference portal should be used in addition to the scientific name
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Unit:** i = individuals, p = pairs or other units according to the standard list of population units and codes in accordance with Article 12 and 17 reporting, (see [reference portal](#))
- **Cat.:** Abundance categories: C = common, R = rare, V = very rare, P = present
- **Motivation categories:** IV, V: Annex Species (Habitats Directive), A: National Red List data; B: Endemics; C: International Conventions; D: other reasons

4. SITE DESCRIPTION

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4.1 General site character

Habitat class	% Cover
N14	26.0
N10	52.0
N16	4.0
N23	5.0
N06	5.0
N15	1.0
N21	2.0
N07	5.0
Total Habitat Cover	100

Other Site Characteristics

1 Terrestrial: Soil & Geology: peat,neutral,alluvium,clay 2 Terrestrial: Geomorphology and landscape: lowland,floodplain

4.2 Quality and importance

ARTICLE 4.1 QUALIFICATION (79/409/EEC) Over winter the area regularly supports: *Cygnus columbianus bewickii* (Western Siberia/North-eastern & North-western Europe) 2.7% of the GB population 5 year peak mean 1991/92-1995/96 *Pluvialis apricaria* [North-western Europe - breeding] 1.2% of the GB population 5 year peak mean 1991/92-1995/96 ARTICLE 4.2 QUALIFICATION (79/409/EEC) Over winter the area regularly supports: *Anas crecca* (North-western Europe) 3.3% of the population 5 year peak mean 1991/92-1995/96 *Vanellus vanellus* (Europe - breeding) 0.5% of the population 5 year peak mean

1991/92-1995/96 ARTICLE 4.2 QUALIFICATION (79/409/EEC): AN INTERNATIONALLY IMPORTANT ASSEMBLAGE OF BIRDS Over winter the area regularly supports: 73014 waterfowl (5 year peak mean 1991/92-1995/96) Including: *Cygnus columbianus bewickii* , *Anas crecca* , *Pluvialis apricaria* [North-western Europe - breeding], *Vanellus vanellus*

4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]
H	A01		I
H	A02		I
H	J02		B

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]
H	B02		I
H	A02		I
H	A04		I
H	D05		I
H	A03		I
H	D05		I
H	G03		I

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

4.5 Documentation

Conservation Objectives - the Natural England links below provide access to the Conservation Objectives (and other site-related information) for its terrestrial and inshore Natura 2000 sites, including conservation advice packages and supporting documents for European Marine Sites within English waters and for cross-border sites. See also the 'UK Approach' document for more information (link via the JNCC website).

Link(s): <http://publications.naturalengland.org.uk/category/6490068894089216>

<http://publications.naturalengland.org.uk/category/3212324>

http://jncc.defra.gov.uk/pdf/Natura2000_StandardDataForm_UKApproach_Dec2015.pdf

5. SITE PROTECTION STATUS (optional)

5.1 Designation types at national and regional level:

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Code	Cover [%]	Code	Cover [%]	Code	Cover [%]
UK04	100.0	UK01	11.9		

6. SITE MANAGEMENT

6.1 Body(ies) responsible for the site management:

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Organisation:	Natural England
Address:	
Email:	

6.2 Management Plan(s):

An actual management plan does exist:

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No, but in preparation
<input checked="" type="checkbox"/>	No

6.3 Conservation measures (optional)

For available information, including on Conservation Objectives, see Section 4.5.

EXPLANATION OF CODES USED IN THE SPECIAL AREA OF CONSERVATION (SAC) AND SPECIAL PROTECTION AREA (SPA) STANDARD DATA FORMS

The codes in the table below generally follow those explained in the [official European Union guidelines for the Standard Data Form](#) (also referencing the relevant page number).

1.1 Site type

CODE	DESCRIPTION	PAGE NO
A	SPA (classified Special Protection Area)	53
B	cSAC, SCI or SAC (candidate Special Area of Conservation, Site of Community Importance, designated Special Area of Conservation)	53
C	SPA area/boundary is the same as the cSAC/SCI/SAC i.e. a co-classified/designated site (Note: this situation only occurs in Gibraltar)	53

3.1 Habitat code

CODE	DESCRIPTION	PAGE NO
1110	Sandbanks which are slightly covered by sea water all the time	57
1130	Estuaries	57
1140	Mudflats and sandflats not covered by seawater at low tide	57
1150	Coastal lagoons	57
1160	Large shallow inlets and bays	57
1170	Reefs	57
1180	Submarine structures made by leaking gases	57
1210	Annual vegetation of drift lines	57
1220	Perennial vegetation of stony banks	57
1230	Vegetated sea cliffs of the Atlantic and Baltic Coasts	57
1310	Salicornia and other annuals colonizing mud and sand	57
1320	Spartina swards (Spartinion maritimae)	57
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	57
1340	Inland salt meadows	57
1420	Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi)	57
2110	Embryonic shifting dunes	57
2120	Shifting dunes along the shoreline with Ammophila arenaria ("white dunes")	57
2130	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	57
2140	Decalcified fixed dunes with Empetrum nigrum	57
2150	Atlantic decalcified fixed dunes (Calluno-Ulicetea)	57
2160	Dunes with Hippophya• rhamnoides	57
2170	Dunes with Salix repens ssp. argentea (Salicion arenariae)	57
2190	Humid dune slacks	57
21A0	Machairs (* in Ireland)	57
2250	Coastal dunes with Juniperus spp.	57
2330	Inland dunes with open Corynephorus and Agrostis grasslands	57
3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)	57
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea	57
3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	57
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation	57

CODE	DESCRIPTION	PAGE NO
3160	Natural dystrophic lakes and ponds	57
3170	Mediterranean temporary ponds	57
3180	Turloughs	57
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation	57
4010	Northern Atlantic wet heaths with Erica tetralix	57
4020	Temperate Atlantic wet heaths with Erica ciliaris and Erica tetralix	57
4030	European dry heaths	57
4040	Dry Atlantic coastal heaths with Erica vagans	57
4060	Alpine and Boreal heaths	57
4080	Sub-Arctic Salix spp. scrub	57
5110	Stable xerothermophilous formations with Buxus sempervirens on rock slopes (Berberidion p.p.)	57
5130	Juniperus communis formations on heaths or calcareous grasslands	57
6130	Calaminarian grasslands of the Violetalia calaminariae	57
6150	Siliceous alpine and boreal grasslands	57
6170	Alpine and subalpine calcareous grasslands	57
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)	57
6230	Species-rich Nardus grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe)	57
6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	57
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	57
6510	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	57
6520	Mountain hay meadows	57
7110	Active raised bogs	57
7120	Degraded raised bogs still capable of natural regeneration	57
7130	Blanket bogs (* if active bog)	57
7140	Transition mires and quaking bogs	57
7150	Depressions on peat substrates of the Rhynchosporion	57
7210	Calcareous fens with Cladium mariscus and species of the Caricion davallianae	57
7220	Petrifying springs with tufa formation (Cratoneurion)	57
7230	Alkaline fens	57
7240	Alpine pioneer formations of the Caricion bicoloris-atrofuscae	57
8110	Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani)	57
8120	Calcareous and calcshist scree of the montane to alpine levels (Thlaspietalia rotundifoliae)	57
8210	Calcareous rocky slopes with chasmophytic vegetation	57
8220	Siliceous rocky slopes with chasmophytic vegetation	57
8240	Limestone pavements	57
8310	Caves not open to the public	57
8330	Submerged or partially submerged sea caves	57
9120	Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robur-petraeae or Ilici-Fagenion)	57
9130	Asperulo-Fagetum beech forests	57
9160	Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli	57
9180	Tilio-Acerion forests of slopes, scree and ravines	57
9190	Old acidophilous oak woods with Quercus robur on sandy plains	57
91A0	Old sessile oak woods with Ilex and Blechnum in the British Isles	57
91C0	Caledonian forest	57
91D0	Bog woodland	57
91E0	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	57
91J0	Taxus baccata woods of the British Isles	57

3.1 Habitat representativity (abbreviated to 'Representativity' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent representativity	57
B	Good representativity	57
C	Significant representativity	57
D	Non-significant presence representativity	57

3.1 Relative surface

CODE	DESCRIPTION	PAGE NO
A	> 15%-100%	58
B	> 2%-15%	58
C	≤ 2%	58

3.1 Degree of conservation (abbreviated to 'Conservation' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	59
B	Good conservation	59
C	Average or reduced conservation	59

3.1 Global assessment (abbreviated to 'Global' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	59
B	Good value	59
C	Significant value	59

3.2 Population (abbreviated to 'Pop.' in data form)

CODE	DESCRIPTION	PAGE NO
A	> 15%-100%	62
B	> 2%-15%	62
C	≤ 2%	62
D	Non-significant population	62

3.2 Degree of conservation (abbreviated to 'Con.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	63
B	Good conservation	63
C	Average or reduced conservation	63

3.2 Isolation (abbreviated to 'Iso.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Population (almost) Isolated	63
B	Population not-isolated, but on margins of area of distribution	63
C	Population not-isolated within extended distribution range	63

3.2 Global Grade (abbreviated to 'Glo.' or 'G.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	63
B	Good value	63
C	Significant value	63

3.3 Other species – essentially covers bird assemblage types

CODE	DESCRIPTION	PAGE NO
WATR	Non-breeding waterbird assemblage	UK specific code
SBA	Breeding seabird assemblage	UK specific code

BBA	Breeding bird assemblage (applies only to sites classified pre 2000)	UK specific code
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4.1 Habitat class code

CODE	DESCRIPTION	PAGE NO
N01	Marine areas, Sea inlets	65
N02	Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins)	65
N03	Salt marshes, Salt pastures, Salt steppes	65
N04	Coastal sand dunes, Sand beaches, Machair	65
N05	Shingle, Sea cliffs, Islets	65
N06	Inland water bodies (Standing water, Running water)	65
N07	Bogs, Marshes, Water fringed vegetation, Fens	65
N08	Heath, Scrub, Maquis and Garrigue, Phygrana	65
N09	Dry grassland, Steppes	65
N10	Humid grassland, Mesophile grassland	65
N11	Alpine and sub-Alpine grassland	65
N14	Improved grassland	65
N15	Other arable land	65
N16	Broad-leaved deciduous woodland	65
N17	Coniferous woodland	65
N19	Mixed woodland	65
N21	Non-forest areas cultivated with woody plants (including Orchards, groves, Vineyards, Dehesas)	65
N22	Inland rocks, Screes, Sands, Permanent Snow and ice	65
N23	Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites)	65
N25	Grassland and scrub habitats (general)	65
N26	Woodland habitats (general)	65

4.3 Threats code

CODE	DESCRIPTION	PAGE NO
A01	Cultivation	65
A02	Modification of cultivation practices	65
A03	Mowing / cutting of grassland	65
A04	Grazing	65
A05	Livestock farming and animal breeding (without grazing)	65
A06	Annual and perennial non-timber crops	65
A07	Use of biocides, hormones and chemicals	65
A08	Fertilisation	65
A10	Restructuring agricultural land holding	65
A11	Agriculture activities not referred to above	65
B01	Forest planting on open ground	65
B02	Forest and Plantation management & use	65
B03	Forest exploitation without replanting or natural regrowth	65
B04	Use of biocides, hormones and chemicals (forestry)	65
B06	Grazing in forests/ woodland	65
B07	Forestry activities not referred to above	65
C01	Mining and quarrying	65
C02	Exploration and extraction of oil or gas	65
C03	Renewable abiotic energy use	65
D01	Roads, paths and railroads	65
D02	Utility and service lines	65
D03	Shipping lanes, ports, marine constructions	65
D04	Airports, flightpaths	65
D05	Improved access to site	65
E01	Urbanised areas, human habitation	65
E02	Industrial or commercial areas	65

CODE	DESCRIPTION	PAGE NO
E03	Discharges	65
E04	Structures, buildings in the landscape	65
E06	Other urbanisation, industrial and similar activities	65
F01	Marine and Freshwater Aquaculture	65
F02	Fishing and harvesting aquatic resources	65
F03	Hunting and collection of wild animals (terrestrial), including damage caused by game (excessive density), and taking/removal of terrestrial animals (including collection of insects, reptiles, amphibians, birds of prey, etc., trapping, poisoning, poaching, predator control, accidental capture (e.g. due to fishing gear), etc.)	65
F04	Taking / Removal of terrestrial plants, general	65
F05	Illegal taking/ removal of marine fauna	65
F06	Hunting, fishing or collecting activities not referred to above	65
G01	Outdoor sports and leisure activities, recreational activities	65
G02	Sport and leisure structures	65
G03	Interpretative centres	65
G04	Military use and civil unrest	65
G05	Other human intrusions and disturbances	65
H01	Pollution to surface waters (limnic & terrestrial, marine & brackish)	65
H02	Pollution to groundwater (point sources and diffuse sources)	65
H03	Marine water pollution	65
H04	Air pollution, air-borne pollutants	65
H05	Soil pollution and solid waste (excluding discharges)	65
H06	Excess energy	65
H07	Other forms of pollution	65
I01	Invasive non-native species	65
I02	Problematic native species	65
I03	Introduced genetic material, GMO	65
J01	Fire and fire suppression	65
J02	Human induced changes in hydraulic conditions	65
J03	Other ecosystem modifications	65
K01	Abiotic (slow) natural processes	65
K02	Biocenotic evolution, succession	65
K03	Interspecific faunal relations	65
K04	Interspecific floral relations	65
K05	Reduced fecundity/ genetic depression	65
L05	Collapse of terrain, landslide	65
L07	Storm, cyclone	65
L08	Inundation (natural processes)	65
L10	Other natural catastrophes	65
M01	Changes in abiotic conditions	65
M02	Changes in biotic conditions	65
U	Unknown threat or pressure	65
XO	Threats and pressures from outside the Member State	65

5.1 Designation type codes

CODE	DESCRIPTION	PAGE NO
UK00	No Protection Status	67
UK01	National Nature Reserve	67
UK04	Site of Special Scientific Interest (GB)	67
UK05	Marine Conservation Zone	67
UK06	Nature Conservation Marine Protected Area	67
UK86	Special Area (Channel Islands)	67
UK98	Area of Special Scientific Interest (NI)	67
IN00	Ramsar Convention site	67
IN08	Special Protection Area	67
IN09	Special Area of Conservation	67

Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7 (1990), as amended by Resolution VIII.13 of the 8th Conference of the Contracting Parties (2002) and Resolutions IX.1 Annex B, IX.6, IX.21 and IX.22 of the 9th Conference of the Contracting Parties (2005).

Notes for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.
2. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 7, 2nd edition, as amended by COP9 Resolution IX.1 Annex B). A 3rd edition of the Handbook, incorporating these amendments, is in preparation and will be available in 2006.
3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

1. Name and address of the compiler of this form:

Joint Nature Conservation Committee

Monkstone House

City Road

Peterborough

Cambridgeshire PE1 1JY

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Telephone/Fax: +44 (0)1733 – 562 626 / +44 (0)1733 – 555 948

Email: RIS@JNCC.gov.uk

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DD MM YY

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Designation date

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Site Reference Number

2. Date this sheet was completed/updated:

Designated: 26 June 1997

3. Country:

UK (England)

4. Name of the Ramsar site:

Somerset Levels and Moors

5. Designation of new Ramsar site or update of existing site:

This RIS is for: Updated information on an existing Ramsar site

6. For RIS updates only, changes to the site since its designation or earlier update:

a) Site boundary and area:

**** Important note:** If the boundary and/or area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established by the Conference of the Parties in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, prior to the submission of an updated RIS.

b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:

7. Map of site included:

Refer to Annex III of the *Explanatory Notes and Guidelines*, for detailed guidance on provision of suitable maps, including digital maps.

a) A map of the site, with clearly delineated boundaries, is included as:

- i) **hard copy** (required for inclusion of site in the Ramsar List): *yes* ✓ -or- *no* ;
- ii) **an electronic format** (e.g. a JPEG or ArcView image) *Yes*
- iii) **a GIS file providing geo-referenced site boundary vectors and attribute tables** *yes* ✓ -or- *no* ;

b) Describe briefly the type of boundary delineation applied:

e.g. the boundary is the same as an existing protected area (nature reserve, national park etc.), or follows a catchment boundary, or follows a geopolitical boundary such as a local government jurisdiction, follows physical boundaries such as roads, follows the shoreline of a waterbody, etc.

The site boundary is the same as, or falls within, an existing protected area.

For precise boundary details, please refer to paper map provided at designation

8. Geographical coordinates (latitude/longitude):

51 10 14 N 02 52 00 W

9. General location:

Include in which part of the country and which large administrative region(s), and the location of the nearest large town.

Nearest town/city: Weston-super-Mare

The Somerset Levels and Moors Ramsar site is bounded by Bridgwater Bay in the west and the higher ground of the Mendips, Dorset Hills, Blackdown Hills, Brendons and Quantocks

Administrative region: North Somerset; Somerset

10. Elevation (average and/or max. & min.) (metres): 11. Area (hectares): 6388.49

Min. 2
Max. 9
Mean 4

12. General overview of the site:

Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

The Ramsar site consists of a series of Sites of Special Scientific Interest (SSSI) within the largest area of lowland wet grassland and associated wetland habitat remaining in Britain. It covers about 35,000 ha in the flood plains of the Rivers Axe, Brue, Parrett, Tone and their tributaries. The majority of the site is only a few metres above mean sea level and drains through a large network of ditches, rhynes, drains and rivers. Flooding may affect large areas in winter depending on rainfall and tidal conditions. Parts of the site in the Brue Valley include areas of former raised peat bog which have now been substantially modified by agricultural improvement and peat extraction which has created areas of open water, fen and reedbed.

The site attracts internationally important numbers of wildfowl in winter and is one of the most important sites in southern Britain for breeding waders. The network of rhynes and ditches support an outstanding assemblage of aquatic invertebrates, particularly beetles.

13. Ramsar Criteria:

Circle or underline each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11).

2, 5, 6

14. Justification for the application of each Criterion listed in 13 above:

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

Ramsar criterion 2

Supports 17 species of British Red Data Book invertebrates.

Ramsar criterion 5

Assemblages of international importance:

Species with peak counts in winter:

97155 waterfowl (5 year peak mean 1998/99-2002/2003)

Ramsar criterion 6 – species/populations occurring at levels of international importance.

Qualifying Species/populations (as identified at designation):

Species with peak counts in winter:

Tundra swan , <i>Cygnus columbianus bewickii</i> , NW Europe	112 individuals, representing an average of 1.3% of the GB population (5 year peak mean 1998/9-2002/3)
Eurasian teal , <i>Anas crecca</i> , NW Europe	21231 individuals, representing an average of 5.3% of the population (5 year peak mean 1998/9-2002/3)
Northern lapwing , <i>Vanellus vanellus</i> , Europe - breeding	36580 individuals, representing an average of 1% of the population (5 year peak mean 1998/9-2002/3)

Species/populations identified subsequent to designation for possible future consideration under criterion 6.

Species with peak counts in winter:

Mute swan , <i>Cygnus olor</i> , Britain	842 individuals, representing an average of 2.2% of the population (5 year peak mean 1998/9-2002/3)
Eurasian wigeon , <i>Anas penelope</i> , NW Europe	25759 individuals, representing an average of 1.7% of the population (5 year peak mean 1998/9-2002/3)
Northern pintail , <i>Anas acuta</i> , NW Europe	927 individuals, representing an average of 1.5% of the population (5 year peak mean 1998/9-2002/3)
Northern shoveler , <i>Anas clypeata</i> , NW & C Europe	1094 individuals, representing an average of 2.7% of the population (5 year peak mean 1998/9-2002/3)

Contemporary data and information on waterbird trends at this site and their regional (sub-national) and national contexts can be found in the Wetland Bird Survey report, which is updated annually. See www.bto.org/survey/webs/webs-alerts-index.htm.

Details of bird species occurring at levels of National importance are given in Section 22

15. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):

Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

a) biogeographic region:

Atlantic

b) biogeographic regionalisation scheme (include reference citation):

Council Directive 92/43/EEC

16. Physical features of the site:

Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

Soil & geology	acidic, basic, neutral, clay, alluvium, peat
Geomorphology and landscape	lowland, floodplain
Nutrient status	eutrophic
pH	acidic, circumneutral
Salinity	fresh
Soil	mainly organic
Water permanence	usually seasonal / intermittent
Summary of main climatic features	Annual averages (Cardiff, 1971–2000) (www.metoffice.com/climate/uk/averages/19712000/sites/cardiff.html) Max. daily temperature: 14.3° C Min. daily temperature: 6.8° C Days of air frost: 33.0 Rainfall: 1111.7 mm Hrs. of sunshine: 1518.0

General description of the Physical Features:

The Somerset Levels and Moors are one of the largest and richest areas of traditionally managed wet grassland and fen habitats in lowland UK. The majority of the site is only a few metres above mean sea level and drains through a large network of ditches, rhynes, drains and rivers. Flooding may affect large areas in winter depending on rainfall and tidal conditions. Parts of the site in the Brue Valley include areas of former raised peatbog that have now been substantially modified by agricultural intensification and peat extraction. This has created areas of open water, fen and reedbed.

17. Physical features of the catchment area:

Describe the surface area, general geology and geomorphological features, general soil types, general land use, and climate (including climate type).

The Somerset Levels and Moors are one of the largest and richest areas of traditionally managed wet grassland and fen habitats in lowland UK. The majority of the site is only a few metres above mean sea level and drains through a large network of ditches, rhynes, drains and rivers. Flooding may affect large areas in winter depending on rainfall and tidal conditions. Parts of the site in the Brue Valley include areas of former raised peatbog that have now been substantially modified by agricultural intensification and peat extraction. This has created areas of open water, fen and reedbed.

18. Hydrological values:

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

Flood water storage / desynchronisation of flood peaks, Maintenance of water quality (removal of nutrients)

19. Wetland types:

Inland wetland

Code	Name	% Area
4	Seasonally flooded agricultural land	85.1
U	Peatlands (including peat bogs swamps, fens)	5
O	Freshwater lakes: permanent	3
Other	Other	2.9
9	Canals and drainage channels	2
Xp	Forested peatland	2

20. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site, and the ecosystem services of the site and the benefits derived from them.

The majority of the site is dominated by open wet grassland and ditches with a range of plant communities: Species-poor grassland including the semi-improved grassland communities with perennial rye grass and naturally-occurring species-poor floodplain or inundation grassland communities (National Vegetation Classification communities (NVC) include MG13, MG6, MG7, MG10).

Species-rich fen meadows and flood pastures where agricultural improvement has been less intense with MG8 *Cynosurus cristatus*- *Caltha palustris* grassland with *Cirsium dissectum* and *Caltha palustris* and mire communities such as M23, M24 and M25 with more *Juncus* and *Carex* species.

Smaller areas of drier species-rich hay meadows (MG5) with *Centaurea nigra*, *Orchis morio* and *Briza media*.

In the rivers, rhynes and ditches the floristic diversity is largely dependent upon sympathetic cleaning practises. The field ditches support the greatest floristic diversity including the species; *Wolffia arrhiza*, *Hottonia palustris* and *Hydrocharis morsus-ranae*.

Other habitats include - withy beds, orchards and pollarded willows.

The remaining habitats are largely restricted to the SSSIs within the Bure Valley where areas of former raised bog have been modified by peat extraction and agricultural improvement.

Small areas of tall herb fen (S24) with *Lathyrus palustris*, *Peucedanum palustre* and *Thelypteris palustris* and small remnants of raised bogs which are very degraded and support vegetation more akin to wet heath with *Erica tetralix* and *Molinia caerulea*.

Open water, reed swamp and reedbed with a range of species from submerged plants to tall stands of *Phragmites australis* and *Typha latifolia* are found in the flooded peat workings.

Wet woodland where peat has been cut many years ago and dominated by *Salix* spp., *Betula* spp. and *Alnus glutinosa*.

Ecosystem services

21. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g. which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

Nationally important species occurring on the site.

Higher Plants.

Althaea officinalis, *Persicaria laxiflora*, *Lathyrus palustris*, *Peucedanum palustre*, *Potamogeton coloratus*, *Potamogeton trichoides*, *Sium latifolium*, *Wolffia arrhiza*

22. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g. which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

Birds

Species currently occurring at levels of national importance:

Species with peak counts in winter:

Gadwall , <i>Anas strepera strepera</i> , NW Europe	522 individuals, representing an average of 3% of the GB population (5 year peak mean 1998/9-2002/3)
Water rail , <i>Rallus aquaticus</i> , Europe	36 individuals, representing an average of 8% of the GB population (5 year peak mean 1998/9-2002/3)
European golden plover , <i>Pluvialis apricaria</i> , P. a. altifrons Iceland & Faroes/E Atlantic	3857 individuals, representing an average of 1.5% of the GB population (5 year peak mean 1998/9-2002/3)
Ruff , <i>Philomachus pugnax</i> , Europe/W Africa	16 individuals, representing an average of 2.2% of the GB population (5 year peak mean 1998/9-2002/3)
Common snipe , <i>Gallinago gallinago gallinago</i> , Europe -breeding	1633 individuals, representing an average of 1.6% of the GB population (5 year peak mean 1998/9-2002/3)

Species Information

Nationally important species occurring on the site.

Invertebrates.

Hydrochara caraboides, *Bagous nodulosus*, *Odontomyia angulata*, *Oulema erichsoni*, *Valvata macrostoma*, *Odontomyia ornata*, *Stethophyma grossum*, *Pteromicra leucopeza*, *Lejops vittata*, *Cantharis fusca*, *Paederus caligatus*, *Hydaticus transversalis*, *Dytiscus dimidiatus*, *Hydrophilus piceus*, *Limnebus aluta*, *Laccornis oblongus*

23. Social and cultural values:

Describe if the site has any general social and/or cultural values e.g. fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values.

Aesthetic

Aquatic vegetation (e.g. reeds, willows, seaweed)

Archaeological/historical site

Environmental education/ interpretation

Livestock grazing

Non-consumptive recreation

Scientific research

Sport fishing

Tourism

Traditional cultural

b) Is the site considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning? **No**

If Yes, describe this importance under one or more of the following categories:

- i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:
- ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:
- iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:
- iv) sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

24. Land tenure/ownership:

Ownership category	On-site	Off-site
Non-governmental organisation (NGO)	+	
Local authority, municipality etc.	+	
National/Crown Estate	+	
Private	+	
Public/communal	+	

25. Current land (including water) use:

Activity	On-site	Off-site
Nature conservation	+	
Tourism	+	+
Recreation	+	+
Current scientific research	+	+
Collection of non-timber natural products: commercial	+	+
Commercial forestry	+	+

Cutting of vegetation (small-scale/subsistence)	+	+
Fishing: recreational/sport	+	+
Arable agriculture (unspecified)	+	+
Livestock watering hole/pond	+	+
Grazing (unspecified)	+	+
Permanent pastoral agriculture	+	+
Hay meadows	+	+
Hunting: recreational/sport	+	+
Industrial water supply		+
Flood control	+	+
Irrigation (incl. agricultural water supply)	+	+
Mining/quarrying	+	+
Transport route		+
Urban development		+
Non-urbanised settlements	+	

26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:

Explanation of reporting category:

1. Those factors that are still operating, but it is unclear if they are under control, as there is a lag in showing the management or regulatory regime to be successful.
2. Those factors that are not currently being managed, or where the regulatory regime appears to have been ineffective so far.

NA = Not Applicable because no factors have been reported.

Adverse Factor Category	Reporting Category	Description of the problem (Newly reported Factors only)	On-Site	Off-Site	Major Impact?
No factors reported	NA				

For category 2 factors only.

What measures have been taken / are planned / regulatory processes invoked, to mitigate the effect of these factors?

Is the site subject to adverse ecological change? NO

27. Conservation measures taken:

List national category and legal status of protected areas, including boundary relationships with the Ramsar site; management practices; whether an officially approved management plan exists and whether it is being implemented.

Conservation measure	On-site	Off-site
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Site/ Area of Special Scientific Interest (SSSI/ASSI)	+	
National Nature Reserve (NNR)	+	
Special Protection Area (SPA)	+	
Land owned by a non-governmental organisation for nature conservation	+	
Management agreement	+	
Site management statement/plan implemented	+	
Other	+	+

b) Describe any other current management practices:

The management of Ramsar sites in the UK is determined by either a formal management plan or through other management planning processes, and is overseen by the relevant statutory conservation agency. Details of the precise management practises are given in these documents.

28. Conservation measures proposed but not yet implemented:

e.g. management plan in preparation; official proposal as a legally protected area, etc.

No information available

29. Current scientific research and facilities:

e.g. details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

Fauna.

Numbers of migratory and wintering wildfowl and waders are monitored annually as part of the national Wetland Birds Survey (WeBS) organised by the British Trust for Ornithology, Wildfowl & Wetlands Trust, the Royal Society for the Protection of Birds and the Joint Nature Conservation Committee.

Separate surveys to assess bird populations in relation to the restoration of disused peat workings on Shapwick Heath SSSI.

Ditch fauna: repeat Levels and Moors wide surveys undertaken approximately every five years by EN.

Flora.

Ditch flora: repeat Levels and Moors wide surveys undertaken approximately every five years by EN.

Meadow flora: repeat surveys 4-5 year repeat surveys by EN.

Completed.**Fauna.**

Analysis of most recent trends undertaken by RSPB 2002.

Breeding waders: Four most recent major collaborative surveys on Levels and Moors, 1992, 1995, 1997, 2004.

30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:

e.g. visitor centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

Existing programmes: Guided walks and school group visits are available to Shapwick National Nature Reserves. Somerset Wildlife Trust run their own programme of events on Westhay Moor SSSI and likewise the RSPB on West Sedgemoor SSSI. English Nature's team newsletter for farmers and landowners runs regular features about the site.

Interpretation facilities: Are available at the Peat Moors visitor centre adjacent to the Shapwick National Nature Reserve. Interpretation panels have been located around the Reserve where appropriate. SWT have provided interpretation boards on Westhay Moor SSSI.

31. Current recreation and tourism:

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

Activities.

Controlled microlighting with few reported incidences of disturbance.

Wildfowling on a number of moors across the area although the affects of disturbance on the Ramsar is largely unknown and requires further work. Further work on disturbance to waterfowl has been undertaken for EN. Closer working between Wildflowing Clubs, BASC is ongoing.

Facilities provided.

Limited facilities for visitors to use the site except at NNRs in Brue Valley. General visitors and bird watchers at Shapwick National Nature Reserve, Westhay Moor and West Sedgemoor. Walking, including dog walking on droves, cycling, bird watching, coarse angling on the Main Drains may cause some limited disturbance to sites.

Seasonality.

All year.

32. Jurisdiction:

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept. of Agriculture/Dept. of Environment, etc.

Head, Natura 2000 and Ramsar Team, Department for Environment, Food and Rural Affairs, European Wildlife Division, Zone 1/07, Temple Quay House, 2 The Square, Temple Quay, Bristol, BS1 6EB

33. Management authority:

Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

Site Designations Manager, English Nature, Sites and Surveillance Team, Northminster House, Northminster Road, Peterborough, PE1 1UA, UK

34. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 15 above), list full reference citation for the scheme.

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Please return to: **Ramsar Secretariat, Rue Mauverney 28, CH-1196 Gland, Switzerland**
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ANNEX 4

Regulation 33 Advice – Severn Estuary

The Severn Estuary / Môr Hafren European Marine Site

comprising :

**The Severn Estuary / Môr Hafren
Special Area of Conservation (SAC)**

**The Severn Estuary
Special Protection Area (SPA)**

**The Severn Estuary / Môr Hafren
Ramsar Site**

**Natural England & the
Countryside Council for Wales' advice
given under Regulation 33(2)(a) of the Conservation
(Natural Habitats, &c.) Regulations 1994, as amended.**

June 2009



A Welsh version of all or part of this document can be made available on request
from the Countryside Council for Wales

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SUMMARY

This document contains Natural England and the Countryside Council for Wales' (CCW's) advice issued under Regulation 33 of the Conservation (Natural Habitats, &c.) Regulations 1994, for the *Severn Estuary European Marine Site (EMS)*, which comprises the *Special Area of Conservation (SAC)*, *Special Protection Area (SPA)*, and *Ramsar site*, namely conservation objectives and advice on operations. It also includes an explanation of the purpose and format of Natural England and CCW's "Regulation 33 advice".

Section 1 provides the legal basis and practical requirements for setting conservation objectives for Natura 2000 sites, as understood by Natural England and CCW. It also briefly explains the legal and practical basis of the operations advice.

Section 2 details the qualifying features for the Severn Estuary SAC, SPA and Ramsar site under the EU Habitats and Birds directives and the Convention on Wetlands of International Importance.

Section 3 provides a description of the features of the Severn Estuary EMS

Section 4 contains Natural England and CCW's advice as to the conservation objectives (Regulation 33(2)(a)) for SAC, SPA and Ramsar site. This section also includes the favourable condition tables for the SAC, SPA and Ramsar site.

Section 5 contains Natural England and CCW's advice on operations which may cause deterioration or disturbance of the habitats and species for which the SAC, SPA and Ramsar site has been selected (Regulation 33(2)(b)). This is provided to assist the relevant authorities and others in understanding the implications of the designation of these sites and the requirements of the Habitats Regulations and government policy.

Section 6 contains the references.

Section 7 contains a glossary of terms.

Appendices 1-9 provide maps of the extent of the SAC, SPA and Ramsar designations; the indicative extent of the habitat features, and sub features where information is available; and the low-tide distribution of birds.

Appendices 10-11 provide additional background information useful to the understanding of this advice.

Notes :

CCW and Natural England's predecessor English Nature, issued advice under Regulation 33(2)(a) and 33(2)(b) in relation to the SPA in February 2005 which is now superseded by this document.

This advice does not cover the terrestrial areas of the Severn Estuary SPA (ie ground which lies behind flood defences and which are not subject to the tidal influence of the estuary and are not therefore within the European Marine Site.

CCW and Natural England also issued advice under Regulation 33(2)(a) in relation to the cSAC in June 2008 which is also superseded by this document.

1. Introduction

This document provides advice under Regulation 33 (2) for the Severn Estuary European Marine Site (EMS), which comprises the following sites :

- Severn Estuary Special Area of Conservation (SAC)*
- Severn Estuary Special Protection Area (SPA)
- Severn Estuary Ramsar Site

(*At the time of issue of this document the Severn Estuary has been accepted by the European Commission as a Site of Community Importance (SCI) but formal notices have not yet been issued (expected to take place in 2009). Given the imminent notification of the SAC the Severn Estuary SCI is referred to as SAC throughout this document).

The indicative extent and relationship of these designated sites is shown in Appendix 1

This document:

- is designed to help relevant and competent authorities responsible for complying with the requirements of the Habitats Directive to understand the international importance of the site and the underlying physical and ecological processes supporting the habitats and species for which each of the above designated sites has been selected.
- is intended to assist the relevant authorities to develop, if considered appropriate, a management scheme under Regulation 34 of the Habitats Regulations, under which they shall exercise their functions in accordance with the requirements of the Directive;
- contains Natural England and CCW's advice to competent authorities as to the conservation objectives of each of the above designated sites, for the purpose of considering plans and projects in accordance with Article 6 of the Habitats Directive and Parts IV and IVa of the Habitats Regulations. Natural England and CCW will provide more detailed advice to competent authorities to assess the implications of particular plans or projects, where appropriate, at the time those plans or projects are being considered.

Anyone proposing to undertake plans or projects with a potential impact on site features are encouraged to consult Natural England or CCW early in the planning stages to identify possible issues of concern.

The advice in this document is subject to review by Natural England and CCW, for example to:

- add further advice on monitoring requirements in order to assess the degree to which the conservation objectives are being achieved in future;
- add further advice on operations likely to damage the features for which the SPA, SAC and Ramsar Site are selected (under Habitats Regulation 33(2)(b));
- take account of new information about the SPA, SAC and Ramsar site or its features, or any future changes to the designations.

Notes :

CCW and Natural England's predecessor English Nature, issued advice under Regulation 33(2)(a) and 33(2)(b) in relation to the SPA in February 2005 which is now superseded by this document.

This advice does not cover the terrestrial areas of the Severn Estuary SPA (ie ground which lies behind flood defences are which are not subject to the tidal influence of the estuary and are not therefore within the European Marine Site.

CCW and Natural England also issued advice under Regulation 33(2)(a) in relation to the cSAC in June 2008 which is also superseded by this document.

1.1 Natura 2000

The European Union Habitats¹ and Birds² Directives are international obligations which set out a number of actions to be taken for nature conservation. They represent one of the ways in which EU member states are fulfilling the commitments they made at the “Earth Summit” in Rio de Janeiro in 1992, for the conservation of the Earth’s biological diversity³. The Habitats Directive aims to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements, and sets out measures to maintain or restore, natural habitats and species of European Union interest at favourable conservation status⁴.

European sites include Special Areas of Conservation (SACs) designated under the 1992 Habitats Directive, which support natural habitats and species of European importance, and Special Protection Areas (SPAs) classified under the 1979 Birds Directive, which support internationally important wild bird populations. UK and Welsh Assembly Government policy also requires that Ramsar sites should receive the same level of protection as European sites⁵.

The Habitats Directive is given effect in the UK largely through the Conservation (Natural Habitats, &c.) Regulations 1994 (“the Habitats Regulations”)⁶. These Regulations set out the powers and duties of UK statutory bodies towards compliance with the requirements of the Habitats Directive. Under these Regulations, SACs together with Special Protection Areas (SPAs) classified under the 1979 EC Birds Directive for the conservation of birds, are called “European sites” and will form a network of conservation areas to be known as ‘Natura 2000’. Where SAC or SPA consist of marine areas they are referred to as European Marine Sites.⁷

There are various sources of guidance on the legal framework for European sites and European Marine Sites.⁸

A note on Ramsar :

The Convention on Wetlands of International Importance especially as Waterfowl Habitats (Ramsar Convention) was signed in Ramsar, Iran in 1971. The broad objectives of the Convention are to stem the loss and progressive encroachment on wetlands now and in the future, including through the designation of Ramsar sites.

A habitat can qualify as a Ramsar site for its representation of a wetland, or for the plant or animal species, including waterbirds, that it supports.

In accordance with Office of the Deputy Prime Minister (2005) *Planning Policy Statement 9: Biological and Geological Conservation*, Welsh Office Planning Guidance *Technical Advice Note No. 5* (TAN5), the DETR and NAW statements *Ramsar Sites in England* (November 2000) and *Ramsar Sites in Wales* (February

¹ Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora.

² Council Directive 79/409/EEC on the conservation of wild birds.

³ Biological diversity is defined as “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.” (1992 International Convention on Biological Diversity, Article 2. <http://www.biodiv.org/convention/>)

⁴ A habitat or species is defined as being at favourable conservation status when its natural range and the areas it covers within that range are stable or increasing and the specific structure and functions which are necessary for its long term maintenance exist and are likely to continue to exist for the foreseeable future.

⁵ Office of the Deputy Prime Minister (2005) *Planning Policy Statement 9: Biological and Geological Conservation*, Welsh Assembly Government (2006) *Draft Revised Technical Advice Note 5 Nature Conservation and Planning*, DETR (2000) *Ramsar sites in England*, National Assembly for Wales (20010, *Ramsar sites in Wales*.

⁶ SI 1994/2716, HMSO, London. http://www.legislation.hmsso.gov.uk/si/si1994/uksi_19942716_en_1.htm

⁷ “Marine areas” are defined in the Habitats Regulations as areas “continuously or intermittently covered by tidal waters or any part of the sea in or adjacent to Great Britain up to the limit of territorial waters.”

⁸ *European Marine Sites in England & Wales: A guide to the Conservation (Natural Habitats &c.) Regulations 1994 and to the Preparation and Application of Management Schemes* (DETR & The Welsh Office, 1998), Office of the Deputy Prime Minister (2005) *Planning Policy Statement 9: Biological and Geological Conservation*, Welsh Assembly Government (2006) *Draft Revised Technical Advice Note 5 Nature Conservation and planning*, CCW (undated) *Natura 2000: European wildlife sites*.

2001); Ramsar sites classified under the Convention on Wetlands of International Importance should be given the same consideration as European sites when considering plans and projects that may affect them.

1.2 The role of Natural England and the Countryside Council for Wales

Regulation 33 of the Habitats Regulations requires Natural England and the Countryside Council for Wales (CCW) to advise the relevant authorities⁹ for each European Marine Site in, or partly in, England and Wales as to

- (a) the conservation objectives for that site, and
- (b) any operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species, for which the site has been designated.

This document contains Natural England and CCW's advice under Regulation 33 in relation to the designated sites which comprise the Severn Estuary EMS.

The Conservation (Natural Habitats &c.) Regulations 1994, as amended transpose the Habitats Directive into law in Great Britain. They give Natural England and CCW a statutory responsibility to advise relevant authorities as to the conservation objectives for European Marine Sites and Ramsar Sites in England and Wales and to any operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species for which the sites have been designated. This information will be a key component of any management scheme that may be developed for this site. It will also aid competent authorities in defining the scope and nature of 'appropriate assessment' which the Habitats Directive requires to be undertaken for 'plans and projects' having a significant effect on the European site (Habitats Regulations 20, 48, 50, 60-62 and 85B). Note that Natural England and CCW will also advise competent authorities on individual plans and projects as they arise. Natural England and CCW are also competent and relevant authorities under the Habitats Regulations.

1.3 The precautionary principle

The advice on operations contained within this package has been made based on the precautionary principle and any actions which may need to be taken in response to concerns identified as a result of monitoring undertaken by Natural England and the Countryside Council for Wales will also be made on this basis. All forms of environmental risk should be tested against the precautionary principle which means that where there are real risks to the site, lack of full scientific certainty should not be used as a reason for postponing measures that are likely to be cost effective in preventing such damage. It does not however imply that the suggested cause of such damage must be eradicated unless proved to be harmless and it cannot be used as a licence to invent hypothetical consequences. Moreover, it is important, when considering whether the information available is sufficient, to take account of the associated balance of likely costs, including environmental costs, and benefits (DETR & the Welsh Office, 1998).

1.4 The role of other competent and relevant authorities

The Conservation (Natural Habitats &c.) Regulations 1994 require competent authorities to exercise their functions so as to secure compliance with the requirements of the Habitats and Birds Directives. The term "competent authority" includes all public bodies and statutory undertakers. The Regulations identify a number of competent authorities as "relevant authorities", with particular functions in relation to European Marine Sites. In addition to their duties as competent authorities, under Regulation 34 the relevant authorities may establish a management scheme for a European Marine Site under which they shall exercise their relevant functions. Such a management scheme should be guided by the information contained in this document. Relevant authorities must, within their areas of jurisdiction, have regard to both direct and indirect effects on an interest feature of the site. This may include consideration of issues outside the boundary of the European Marine Site.

⁹ The types of bodies that are "relevant authorities" are identified in Regulation 5 of the Habitats Regulations.

Relevant authorities should ensure that all plans for the area integrate with the management scheme for the European Marine Site. Such plans may include Shoreline Management Plans, the Environment Agency's Flood Risk Management Strategy and Catchment Flood Management Plans, Local Development Plans/Frameworks, Sites of Special Scientific Interest management plans, local Biodiversity Action Plans and sustainable development strategies for estuaries. This must occur to ensure that there is only a single management scheme through which all relevant authorities exercise their duties under the Conservation (Natural Habitats &c.) Regulations 1994.

Relevant authorities also need to have regard to changing circumstances of the European Marine Site and may therefore need to modify the management scheme and/or the way in which they exercise their functions so as to maintain the favourable condition of interest features concerned in the long term. There is no requirement for relevant authorities to take any actions outside their statutory functions. For the purposes of this document the term 'interest feature' refers to any of the habitat types or species for which the European Marine Sites have been designated.

Under certain circumstances, where another relevant authority is unable to act for legal reasons, or where there is no other relevant authority, Natural England and CCW are empowered to use their bylaw-making powers under Regulation 36 of the Habitats Regulations 1994.

None of the information contained in this document legally binds any organisation (including Natural England and CCW) to any particular course of action. However, in exercising their functions in accordance with the requirements of the Habitats Directive, as required by the Habitats Regulations, and in accordance with government policy on Ramsar sites, the relevant authorities should be guided by the advice contained in this document. This applies amongst other things to the establishment of a "management scheme"¹⁰, if such a scheme is established.

1.5 Responsibilities under other conservation designations

In addition to its SAC, SPA and Ramsar Site status, parts of the Severn Estuary are also notified as Sites of Special Scientific Interest (SSSIs) under the 1981 Wildlife and Countryside Act and Bridgwater Bay is also a National Nature Reserve. The obligations of relevant authorities and other organisations under such designations are not directly affected by the advice contained in this document.

Relevant authorities and others may have obligations towards the conservation of habitats and species that are not features for which the Severn Estuary European Marine Site has been designated, and such obligations are not affected by this document.

1.6 Role of advice provided under Regulation 33

The information provided under Regulation 33 is in two parts: the conservation objectives, and the advice on operations. The legal context for each of these elements, the format of the advice and its underlying rationale are explained here. Sections 4 (conservation objectives and favourable condition tables) and 5 (operations advice) should be read in conjunction with these explanatory notes.

The information contained in this document is based on best available knowledge at time of writing and is subject to review at Natural England and CCW's discretion.

As referred to under section 1.1. above, there are various sources of guidance on the legal framework for European sites and European Marine Sites.¹¹

¹⁰ Regulation 34 of the Habitats Regulations.

¹¹ European Marine Sites in England & Wales: A guide to the Conservation (Natural Habitats &c.) Regulations 1994 and to the Preparation and Application of Management Schemes (DETR & The Welsh Office, 1998), Office of the Deputy Prime Minister (2005) Planning Policy Statement 9: Biological and Geological Conservation, Welsh Assembly Government (2006) Draft Revised Technical Advice Note 5 Nature Conservation and planning, CCW (undated) Natura 2000: European wildlife sites.

1.6.1 Outline of legal context and purpose of conservation objectives

The conservation objectives for a European Marine Site are intended to represent the aims of the Habitats and Birds Directives in relation to that site. The Habitats Directive requires that measures taken under it, including the designation and management of SACs, be designed to maintain or restore habitats and species of European Community importance at “favourable conservation status” (FCS), as defined in Article 1 of the Directive as follows;

Favourable conservation status as defined in Article 1 of the Habitats Directive

Conservation status of a natural habitat means the sum of the influences acting on a natural habitat and its typical species that may affect its long-term natural distribution, structure and functions as well as the long-term survival of its typical species within the territory referred to in Article 2.

The conservative [sic] status of a natural habitat will be taken as ‘favourable’ when:

- its natural range and the areas it covers within that range are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- conservation status of typical species is favourable as defined in [Article] 1(i).

Conservation status of a species means the sum of the influences acting on the species concerned that may affect the long-term natural distribution and abundance of its populations within the territory referred to in Article 2;

The conservation status of a species will be taken as ‘favourable’ when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis

In addition, the Birds Directive requires that, in relation to certain species of birds listed in Annex 1 of the Directive and regularly occurring migratory species, special measures are taken in order to ensure their survival and reproduction in their area of distribution. The species listed in Annex 1 of the Birds Directive are the subject of special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution. Species listed on Annex 1 are in danger of extinction, rare or vulnerable. Annex 1 species that regularly occur at levels over 1% of the national population meet the SPA qualifying criteria.

Therefore, the conservation objectives for the Severn Estuary SAC, SPA and Ramsar site represents Natural England and the Countryside Council for Wales' current judgement of the appropriate contribution of the site to the achievement of the favourable conservation status of the habitats and species of the European Marine Site. The conservation objectives in this document are intended to guide relevant and competent authorities in the exercise of their functions to comply with the requirements of the Directives outlined above.

1.7 Condition

Natural England and CCW use the term “favourable condition” for the condition represented by the achievement of the conservation objectives, in other words the desired condition for a designated habitat or a species on an individual site.

On many terrestrial European sites, we know sufficient about the required condition of qualifying habitats to be able to define favourable condition with confidence. In contrast understanding the functioning of large, varied, dynamic marine and estuarine sites, which experience a variety of pressures resulting from historic and current activities, is much more difficult. Consequently it is much harder to precisely define favourable condition in sites like the Severn Estuary. In general the conservation objectives provided are based on a working assumption that the current condition of the features is favourable for most attributes. Nevertheless there are certain instances where the assumption does not apply. In particular some of the intertidal habitats of the Severn are subject to coastal squeeze. Where existing problems *have* been identified, the relevant objectives reflect this.

If it becomes evident that the condition of other features is significantly degraded, and is therefore unfavourable, then restorative management actions will need to be undertaken to return the interest feature to favourable condition. In future revisions of our advice under Regulation 33, Natural England and CCW will keep our assumption under review in light of ongoing and future monitoring and our developing understanding of the features and the factors affecting them.

1.8 Favourable Condition Tables

The detailed information regarding the measures and targets that may be used during site monitoring to determine whether favourable condition is being achieved in practice is presented within the Favourable Condition Tables in section 4.

The favourable condition table specifies the following (in columns from left to right):

- **Features:** interest features for which the SAC, SPA or Ramsar site is selected.
- **Subfeatures:** ecologically important sub-divisions of an interest feature. In the case of a habitat interest feature, subfeatures would be component habitats or communities (eg. defined by type and/or by geographic location within the site). In the case of species interest features, subfeatures include the population itself, or any ecologically relevant subdivisions of the population, and any habitats or communities on which it/they depend.
- **Attributes:** particular characteristics of the features or sub-features which provide an indication of the condition of the feature (eg. total population size, extent of a habitat type).
- **Measures:** what exactly about the attributes will be measured, in terms of the units of measurement to be used, arithmetic nature and an indication of the frequency at which the measurement is taken. An indication of the method that is likely to be used to obtain the observed values of attributes. The method is closely linked to the way in which the measure is expressed. It is important to note that in many cases the precise monitoring method to be used may not be known at this stage.
- **Targets:** These define the attribute values that equate to favourable condition. If changes are observed that are ‘significantly’ different from the target, this will act as a trigger for further investigation as to the cause of the change, or remedial management action. In general the targets in the favourable condition table are subject to natural processes as set out in the conservation objectives; i.e. where natural processes alone dictate that targets are not met this will not result in the condition of the feature being classed as unfavourable. The term ‘subject to natural processes’ is explained further in Section 4.1.
- **Comments:** notes on the rationale for the use of each attribute and measure.

The favourable condition table is intended to supplement the conservation objectives, including with respect to the management of established and ongoing activities, future requirements of monitoring and reporting on the condition of the features of the site and, together with the conservation objectives, informs the scope and

nature of any appropriate assessment that may be needed. The table **does not by itself** provide a comprehensive basis on which to assess plans and projects as required under the Habitats Regulations. It should be noted that appropriate assessments are a separate activity to condition monitoring, requiring consideration of issues specific to individual plans or projects. Natural England and CCW will provide more detailed advice to competent and relevant authorities to assess the implications of any given plan or project under the Regulations, where appropriate, at the time a plan or project is being considered.

The favourable condition table specifies the main types of information that Natural England and CCW may use to assess the condition of interest features. On many terrestrial European sites, we know sufficient about the preferred or target condition of qualifying species and habitats to be able to define measures and associated targets for all attributes. In European Marine Sites favourable condition is generally harder to define precisely since our knowledge of features is still developing. Accordingly, in the absence of such information, condition of interest features in European Marine Sites will, in the first instance, be assessed against targets based on their condition at the time the sites were selected, which may need to be established through baseline surveys in many cases.

The information contained within the favourable condition table is not necessarily what will be monitored but provides a basis for discussions with management and advisory groups. The attributes and associated measures and targets may be modified over time. The selection of attributes is based on the current understanding of the habitats and species and the available measuring techniques.

The appropriateness of individual attributes as indicators of condition will be reviewed as more knowledge of the condition of interest features is obtained and/or survey and monitoring techniques develop. Monitoring of the attributes may be of fairly coarse methodology, underpinned by more rigorous methods on specific areas within the site.

The favourable condition table will be an important, but not the only, driver of the site monitoring programme. Other data, such as results from compliance monitoring and appropriate assessments, will also have an important role in assessing condition of interest features. The monitoring programme will be developed as part of the management scheme process through discussion with the relevant authorities and other interested parties. Natural England and the Countryside Council for Wales will be responsible for collating the information required to assess condition, some of which may be collected by other organisations, and for judging the condition of each feature within the site, taking into account all available information and using the favourable condition table as a guide.

The conservation objectives and associated Favourable Condition Tables in this document are intended to guide relevant and competent authorities in the exercise of their functions to comply with the requirements of the Directives outlined above.

1.9 Advice on operations

1.9.1 Legal context

Natural England and CCW's specific duty in Regulation 33 to give advice on operations that are potentially damaging needs to be seen in the context of the Habitats Directive, which requires that:

- the necessary conservation measures are established which correspond to the ecological requirements of the habitats and species on the site;
- appropriate steps are taken to avoid deterioration of habitats and significant disturbance of species.
- any plan or project which is likely to have a significant effect on a site is subject to an appropriate assessment in view of the site's conservation objectives.

The operations advice, in combination with the conservation objectives, is designed to assist relevant authorities and other decision-makers in complying with these provisions. The operations advice given in this document is without prejudice to other advice given, including the conservation objectives themselves

and other advice which may be given by Natural England and CCW from time to time in relation to particular operations.

The term “operations” is taken to cover all types of human activity, irrespective of whether they are under any form of regulation or management.¹² This is because the obligations in the Directive are

defined by the conservation requirements of the habitats and species, not by existing regulatory or management regimes. Thus the advice contains reference to operations which may not be the responsibility of any of the relevant authorities.

1.9.2 Practical requirements

Operations manifest themselves through one or more factors¹³. The conservation status of a given habitat or species could potentially be affected by many different types of factor, and hence many different types of operation.¹⁴ The key practical purpose of the Regulation 33 operations advice is to assist in the identification of priorities for management, by identifying operations to which features are both ‘sensitive’ and ‘vulnerable’. Sensitivity is defined as ‘the intrinsic intolerance of a habitat, community or individual of a species to damage from an external factor.’ Vulnerability is defined as ‘the likelihood of exposure of a habitat, community or individual of a species to a factor to which it is sensitive’.¹⁵ Thus the potential for an operation to deteriorate or disturb a feature depends both on the sensitivity of the feature to the operation – through its associated factors – and the location, intensity, duration and frequency of the operation and the factors that it affects or causes.

Formulating the operations advice has three main elements:

1. Identifying factors to which the features are sensitive.
2. Identifying the types of operation that can cause or affect those factors.
3. Assessing the likelihood of those factors (and hence the features) being affected by those operations, in other words the vulnerability of the feature to those effects.

The first and second of these elements relies on current understanding of the inherent sensitivity of features to particular factors, and the effect of operations on factors. Although there will be site-specific elements to this information, it may often rely on information from a variety of sources which are not specific to this site. The third stage is very site-specific, relying on information about the types, location, intensity, duration and so on, of operations occurring or likely to occur in or around the site.

Given that in many cases, information of the type indicated in the previous paragraph is rudimentary, or simply not available a precautionary approach is adopted for the identification of factors and operations. The operations advice clearly has to be based on the best available knowledge at the time and is subject to continual review. It necessarily involves an element of risk assessment, both in terms of assessing the likelihood of an operation or factor occurring, and the likelihood of it having an adverse effect on a feature.

Natural England and CCW’s advice to the relevant authorities is that, as a minimum, the extent and management of the operations identified in Section 5 should be reviewed in the context of the conservation objectives. The advice should also help to identify the types of plans or projects that would be likely to have a significant effect and should be subject to appropriate assessment, noting that such judgements will need to be made on a case-specific basis.

¹² The term also includes what the Habitats Directive and Regulations call “plans and projects” (see footnote 9).

¹³ A factor is defined as “A component of the physical, chemical, ecological or human environment that may be influenced by a natural event or a human activity” (*Sensitivity and mapping of inshore marine biotopes in the southern Irish Sea (Sensmap): Final report*. CCW, Bangor, December 2000.)

¹⁴ The complexity of formulating operations advice is compounded by the “many-to-many” relationship that exists between operations and factors, where an operation may manifest itself through several factors, and a factor may be affected by several operations, in different ways and to different magnitudes.

¹⁵ Adapted from Hiscock, K. [ed] 1996. *Marine Nature Conservation Review: rationale and methods*. Peterborough: JNCC.

The advice in Section 5 of this document is not a list of prohibited operations, or operations necessarily requiring consultation with, or consent¹⁶ from, Natural England or CCW. The input of the relevant authorities and others is a legal and practical necessity in determining the management needs of the site. Thus, the operations advice is provided specifically with the intention of initiating dialogue between Natural England, CCW and the relevant authorities.

Note : The advice on operations previously issued for the SPA in February 2005 is superseded by the advice given in Section 5.
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¹⁶ However, in relation to land included within the European Marine Site, which has been notified as a Site of Special Scientific Interest (SSSI), owners or occupiers require Natural England or CCW's consent for any operations included in the SSSI notification, and statutory bodies intending to carry out or permit potentially damaging operations must notify Natural England or CCW and comply with certain other provisions. (Wildlife and Countryside Act 1981, section 28, as amended by the Countryside and Rights of Way Act 2000, section 75). General guidance on the operation of SSSIs is given in the CCW leaflet *Sites of Special Scientific Interest: A guide for landowners and occupiers* (Countryside Council for Wales, Bangor, 2001).

2. Qualifying features under the EU Habitats and Birds Directives and the Convention on Wetlands of International Importance

Table 1 shows the wide range of nature conservation features for which the estuary is valued and the interrelationship of these features by designation. This table outlines features of European and International importance in their own right and others of national importance for which the Severn Estuary has been designated as a Site of Special Scientific Interest (SSSI) but which form an intrinsic part of the Severn ecosystem and therefore contribute to the overarching “estuary” feature of the SAC and Ramsar Site.

Table 1 : Summary of Notified features of each designation :

Feature	SAC	SPA	Ramsar Site	SSSI (Nationally important feature)
Estuary	Yes	<i>Supporting habitat to designated bird interests</i>	Yes	(Yes)
Subtidal sandbanks	Yes	No – outside boundary of SPA	No – outside boundary of Ramsar Site	<i>No – outside boundary of SSSI</i>
Intertidal Mud and Sand	Yes	<i>Supporting habitat to designated bird interests</i>	<i>Component of Ramsar “estuaries” feature and supporting habitat to designated bird interests</i>	Yes
Atlantic salt meadow / salt marshes	Yes	<i>Supporting habitat to designated bird interests</i>	<i>Component of Ramsar “estuaries” feature and supporting habitat to designated bird interests</i>	Yes
Reefs	Yes	No	<i>Intertidal Sabellaria contiguous with subtidal reefs is a component of the hard substrates subfeature of the Ramsar “estuaries” feature</i>	No – outside boundary of SSSI
Migratory fish (river & sea lamprey & twaite shad)	Yes	No	Yes	(Yes)
Migratory fish (salmon, eel, sea trout and Allis Shad)	<i>Part of notable species sub-feature of estuary feature</i>	No	Yes	(Yes)
Assemblage of fish species (>100 species)	<i>Notable species sub-feature of estuary feature</i>	No	<i>Notable species sub-feature of estuary feature</i>	(Yes)
Internationally important populations of migratory bird species	<i>Notable species sub-feature of estuary feature</i>	Yes	Yes Internationally important populations of waterfowl	Yes
Internationally important populations of wintering bird species	<i>Notable species sub-feature of estuary feature</i>	Yes		Yes
Assemblage of nationally important populations of waterfowl	<i>Notable species sub-feature of estuary feature</i>	Yes	Yes	Yes
Hard substrate habitats (Rocky shores)	<i>Notable species sub-feature of estuary feature</i>	<i>Supporting habitat to designated bird interests</i>	<i>Component of Ramsar “estuaries” feature and supporting habitat to designated bird interests</i>	Yes
Freshwater grazing marsh / Neutral grassland	No	<i>Supporting habitat to designated bird interests within SPA but outside European Marine Site and therefore not addressed in this Regulation 33 advice document</i>		Yes (currently England only)

2.1 Qualifying interest features of the Severn Estuary / Môr Hafren SAC

The Severn Estuary has been designated an SAC on the basis that it supports occurrences of habitat types and species listed in Annexes I and II respectively of the Habitats Directive that are considered important in a European context and meeting the criteria in Annex III of the Directive. These are the interest features of the SAC and are listed in the Table 2 and their relationships are shown in Figure 1.

The designation includes an overarching “**estuaries**” feature within which **subtidal sandbanks, intertidal mudflats and sandflats, Atlantic salt meadows** and **reefs** (of *Sabellaria alveolata*) and **three species of migratory fish** are defined as both features in their own right and as sub-features of the estuary feature.

In addition **hard substrate habitats** including **eel grass beds**, the estuary-wide **assemblage of fish species** and the **assemblage of waterfowl species** (for which the Ramsar Site and SPA are specifically designated) are identified as **notable estuarine assemblages** which are an intrinsic part of the estuary ecosystem – these are therefore covered by the “estuaries” feature.

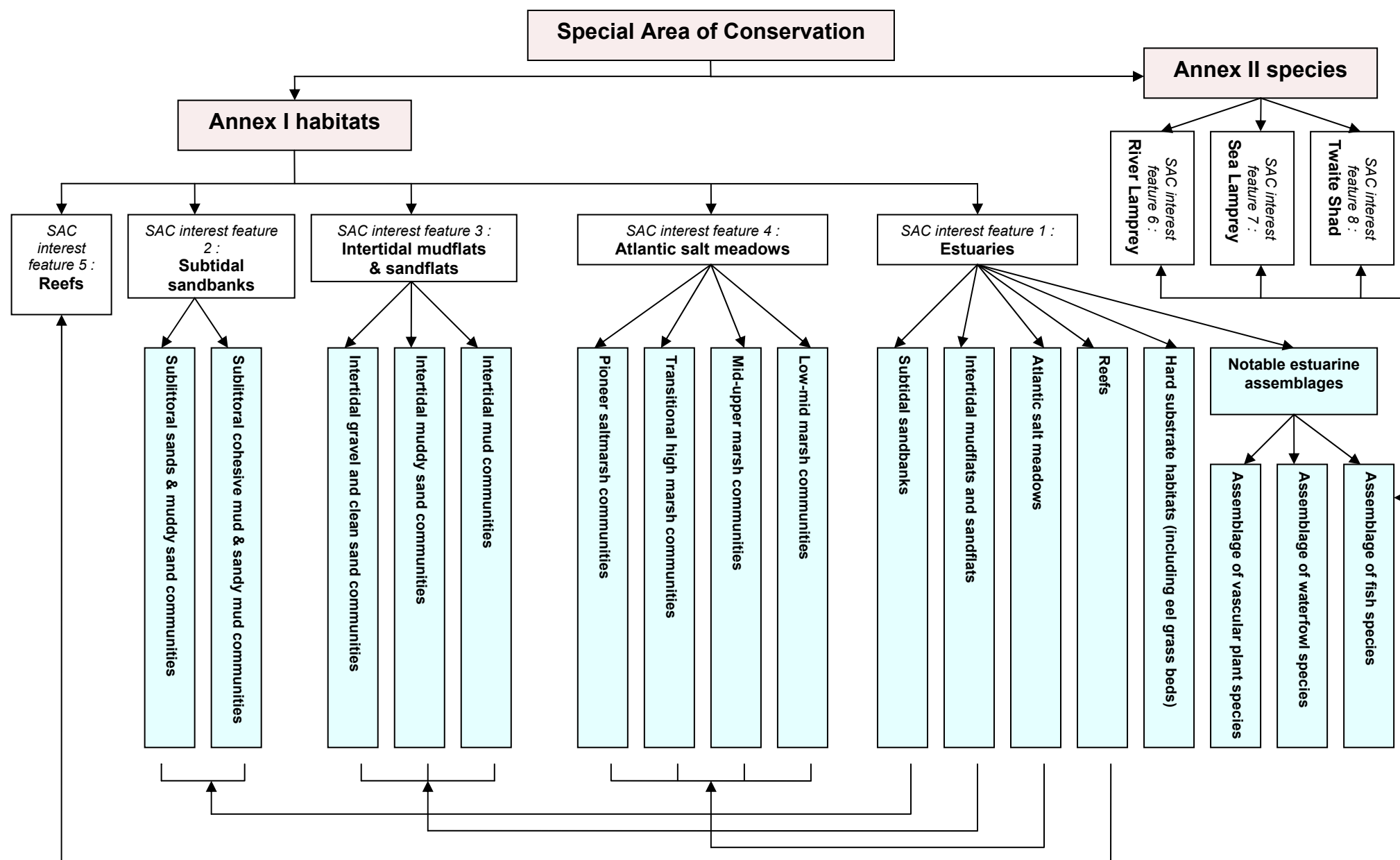
Table 2 : Interest features of the SAC

Feature name	Scientific term ¹⁰	EU Code ¹⁷
Annex I habitat types		
SAC interest feature 1: Estuaries	Estuaries	1130
SAC interest feature 2: Subtidal sandbanks	Sandbanks which are slightly covered by seawater all the time	1110
SAC interest feature 3: Intertidal mudflats and sandflats	Mudflats and sandflats not covered by seawater at low tide	1140
SAC interest feature 4: Atlantic salt meadows	Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>)	1330
SAC interest feature 5: Reefs	Reefs	1170
Annex II species		
SAC interest feature 6: River lamprey	<i>Lampetra fluviatilis</i>	1099
SAC interest feature 7: Sea lamprey	<i>Petromyzon marinus</i>	1095
SAC interest feature 8: Twaite shad	<i>Alosa fallax</i>	1103

Each interest feature has a conservation objective in Section 4 of this document.

¹⁷ European Commission (2007) Interpretation Manual of EU Habitats EUR27 July 2007, and Natura 200- Standard Data Form Explanatory Notes, Appendix C.

Figure 1 : Flow chart showing the relationship between the interest features of the Severn Estuary SAC (shown in white boxes) and their component sub features (shown in blue boxes). NB Some habitats that are sub features of the Annex II estuary feature are also features in their own right with their own sub features.



2.2 Qualifying interest features of the Severn Estuary / Môr Hafren SPA

The Severn Estuary was classified as an SPA on 13 July 1995 (subsuming a previously designated SPA called the Upper Severn Estuary) . The 1995 citation accompanying the classification is the baseline for the advice issued in this document. The qualifying interest features of the Severn Estuary SPA are shown in Table 3.

It should be noted that since designation changes in bird numbers have occurred in relation to the qualifying thresholds, which have themselves changed. These changes are highlighted by the SPA review published by the JNCC and details are also shown in Table 3. These changes are likely to be the subject of formal changes to the SPA designation in due course, however at present the legally protected species remain those in the original 1995 citation. (Note : Further information on the peak counts of the SPA species and waterfowl assemblage between 1988/9 and 2006/07 are given in Appendix 11.)

The SPA within the European Marine Site boundary includes saltmarshes and the adjacent extensive areas of intertidal mud, sand and rocky shores. All these habitats provide essential food and resting places for the wide range of wintering and migratory waterfowl and are therefore identified as key “supporting habitats” for the conservation of these species. The relationship between the features and supporting habitats supporting habitats is shown in Table 3. The supporting habitats are mapped in Appendix 8 to show their distribution and extent.

Notes relating to Table 3

*¹ Severn Estuary SPA original citation from July 1995 (though updated by Natural England in July 2002, version 2.3).

*² JNCC Severn Estuary SPA Review, dated 2001 available from the JNCC www.jncc.gov.uk/pdf/SPA/UK9015022.pdf (Stroud, DA, et al., 2001)

*³ JNCC Natura 2000 Standard Data Form, May 2006, version 1.1.

*⁴ 5 year peak mean, 1988/89 – 1992/93.

*⁵ 5 year peak mean, 1991/92 – 1995/96.

*⁶ 5 year peak mean, 01/04/1998.

Table 3 : The qualifying interest features and supporting habitats of the Severn Estuary SPA.

Species	Original SPA citation (1995) * ¹	SPA Review (2001) * ²	Natura 2000 form (2006) * ³	Notes	Supporting habitats
Internationally important populations of regularly occurring Annex 1 species [under Article 4.1 of the EU Birds Directive].					
SPA interest feature 1 : Bewick's swan <i>Cygnus columbianus bewickii</i>	✓	✓	✓	Over-wintering	Intertidal mudflats and sandflats Saltmarsh
Internationally important populations of regularly occurring migratory bird species [under Article 4.2 of the EU Birds Directive].					
SPA interest feature 2 : European white-fronted goose <i>Anser albifrons albifrons</i>	✓	x	✓	Over-wintering	Intertidal mudflats and sandflats Saltmarsh Hard substrate habitats (Freshwater coastal grazing marsh, improved grassland and open standing waters also occur within the SPA but these habitats lie outside EMS boundary)
SPA interest feature 3 : Dunlin <i>Calidris alpina alpina</i>	✓	✓	✓		
SPA interest feature 4 : Redshank <i>Tringa totanus</i>	✓	✓	✓		
SPA interest feature 5 : Shelduck <i>Tadorna tadorna</i>	✓	✓	✓		
SPA interest feature 6 : Gadwall <i>Anas strepera</i>	✓	x	✓		
Curlew <i>Numenius arquata</i>	x	✓	x		
Pintail <i>Anas acuta</i>	x	✓	x		
Ringed plover <i>Charadrius hiaticula</i>	x	✓	x	On passage	
SPA interest feature 7 : Internationally important assemblage of waterfowl (wildfowl & waders) [under Article 4.2 of the EU Birds Directive].					
Bewick's swan <i>Cygnus columbianus bewickii</i>	✓	✓	The Natura 2000 data form does not list separate waterfowl species within this assemblage.	The wintering waterfowl assemblage includes all regularly occurring waterfowl. Species that qualify as a listed component of the assemblage include all the internationally important regularly occurring migratory species as well as the Annex 1 wintering species. The list also includes species present in nationally important numbers or species whose populations exceed 2,000 individuals In the original citation, in winter, it is stated that the area regularly supported 68,026 individual waterbirds * ⁴ . In the SPA Review it is stated that the area regularly supports 93,986 individual waterfowl in winter * ⁵ . In the Natura 2000 form, in winter, it is stated that the area regularly supports 84,317 waterfowl * ⁶ .	Intertidal mudflats and sandflats Saltmarsh Hard substrate habitats (Freshwater coastal grazing marsh, improved grassland and open standing waters also occur within the SPA but these habitats lie outside EMS boundary)
European white-fronted goose <i>Anser albifrons albifrons</i>	✓	✓			
Dunlin <i>Calidris alpina alpina</i>	✓	✓			
Redshank <i>Tringa totanus</i>	✓	✓			
Shelduck <i>Tadorna tadorna</i>	✓	✓			
Gadwall <i>Anas strepera</i>	✓	✓			
Wigeon <i>Anas penelope</i>	✓	✓			
Teal <i>Anas crecca</i>	✓	✓			
Pintail <i>Anas acuta</i>	✓	✓			
Pochard <i>Aythya ferina</i>	✓	✓			
Tufted duck <i>Aythya fuligula</i>	✓	✓			
Ringed plover <i>Charadrius hiaticula</i>	✓	x			
Grey plover <i>Pluvialis squatarola</i>	✓	✓			
Curlew <i>Numenius arquata</i>	✓	✓			
Whimbrel <i>Numenius phaeopus</i>	✓	✓			

Species	Original SPA citation (1995) * ¹	SPA Review (2001) * ²	Natura 2000 form (2006) * ³	Notes	Supporting habitats
Spotted redshank <i>Tringa erythropus</i>	✓	x			
Lapwing <i>Vanellus vanellus</i>	x	✓			
Mallard <i>Anas platyrhynchos</i>	x	✓			
Shoveler <i>Anas clypeata</i>	x	✓			

Information on populations of bird species using the Severn Estuary European Marine Site at the time the SPA was classified is contained in Table 4 and their relationships are shown in Figure 2.

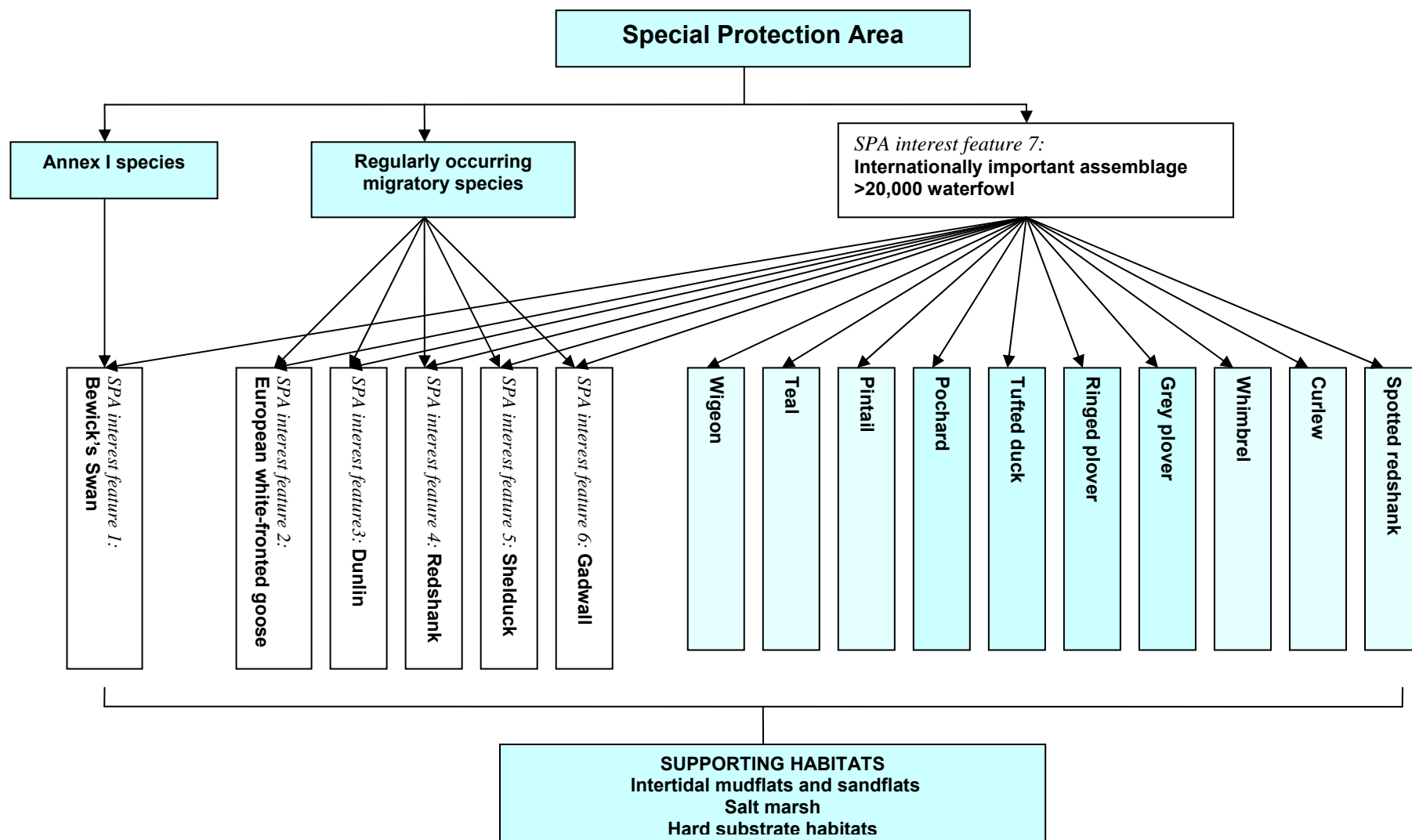
Table 4 : Information on populations of bird species using the Severn Estuary European Marine Site at the time the Severn Estuary SPA was classified (1995).

Internationally important populations of regularly occurring Annex 1 species		
Species	Population (5 yr peak mean :1988/9 to 1992/3)	
SPA interest feature 1: Bewick’s swan	289 birds	4.1% Great Britain 1.7% NW Europe
Internationally important populations of regularly occurring migratory bird species		
Species (wintering)	Population (5 yr peak mean: 1988/9 to 1992/3)	
SPA interest feature 2: European white-fronted goose	3,002	50% British, 1% North West Europe
SPA interest feature 3: Dunlin	41,683	2.9% East Atlantic flyway
SPA interest feature 4: Redshank	2,013	1.3% East Atlantic flyway
SPA interest feature 5: Shelduck	2,892	1.2% North West Europe
SPA interest feature 6: Gadwall	330	2.8 % NW Europe
SPA interest feature 7: An internationally important assemblage of waterfowl (Assemblage includes above species plus the following listed nationally important populations)		
Importance	Population (5 yr peak mean: 1988/9 to 1992/3)	
The Severn Estuary supports over 20,000 wintering waterfowl.	68,026 individual birds comprising 17,502 wildfowl and 50,524 waders	
Nationally important bird populations within internationally important assemblage of waterfowl		
Species	Population (5 yr peak mean: 1988/9 to 1992/3)	
Wigeon	3,977 birds	1.6% Great Britain
Teal	1,998	2.0% Great Britain
Pintail	523	2.1% Great Britain
Pochard	1,686	3.8% Great Britain
Tufted duck	913	1.5% Great Britain
Ringed plover	227	1.0% Great Britain
Grey plover	781	3.7% Great Britain
Curlew	3,096	3.4% Great Britain
Whimbrel	246	4.9% Great Britain
Spotted redshank	3	1.5% Great Britain
Notes : 1. Previous advice issued in respect of the Severn Estuary SPA in February 2005 excluded Gadwall for the listed species of internationally important populations of regularly occurring migratory birds as they were considered not to use the European Marine Site area to any significant degree. Further recent evidence (2002/03 Low Tide Bird Counts) has demonstrated that this species does make use of areas within the European Marine Site and has consequently now been included. 2. The SPA review has identified that since the classification of the Severn Estuary SPA in 1995 the Severn Estuary now supports nationally important populations of Mallard, Lapwing and Shoveler.		

(Note : Further information on the peak counts of the SPA species and waterfowl assemblage between 1988/9 and 2006/07 are given in Appendix 11.)

Each interest feature has a conservation objective in Section 4 of this document. Reference should also be made to sections of this document that relate to the Severn Estuary SAC interest features (particularly with respect to the conservation requirements of the supporting habitats) and the Severn Estuary Ramsar Site interest features.

Figure 2 : Flow chart showing the relationship between the qualifying bird species features (in white boxes) of the Severn Estuary SPA and their supporting habitats



2.3 Qualifying interest features of the Severn Estuary/ Môr Hafren Ramsar Site

The Severn Estuary was classified as a Ramsar Site on 13 July 1995 (subsuming a previously designated Upper Severn Estuary Ramsar Site). The 1995 citation is the basis for the advice issued in this document as this defines the legally protected species covered by the Ramsar designation at this time.

It should be noted that a number of changes have been made to the criteria since the listing of the Severn Estuary Ramsar Site and it is these new (2005) criteria which are now presented on the JNCC website used by many authorities as a reference source. For completeness qualification under both the criteria used at the time of 1995 Ramsar designation and the revised 2005 criteria have been outlined in Table 5 which provides a confirmation of the defined Ramsar features for which Conservation Objectives have been written.

The qualifying interest features of the Severn Estuary Ramsar Site overlap with those of the Severn Estuary SPA and SAC. To facilitate the development of integrated objectives across the designations the Ramsar criteria have been interpreted and the Ramsar features defined so that they are consistent with those already identified in the SAC and SPA sections of this document.

Table 5 : confirmation of Ramsar features in context of 1995 and 2005 Ramsar criteria

Ramsar Features (for which conservation objectives have been written)	Criteria at designation (1995) (original criteria)	Revised Criteria (2005) (criteria currently used on JNCC website)
Ramsar interest feature 1: *Estuaries <i>- characteristic physical form and flow, estuarine habitat communities and species assemblages</i> <i>- estuarine habitat communities and species assemblages</i>	Criterion 1 : qualifies due to its immense tidal range affecting both the physical environment and biological communities present	Criterion 1 : qualifies due to immense tidal range (second-largest in world), this affects both the physical environment and biological communities.
	Criterion 2b : qualifies due to its unusual estuarine communities, reduced species diversity and high productivity. The high tidal range leads to strong tidal streams and high turbidity, producing communities characteristic of the extreme physical conditions of liquid mud and tide swept sand and rock	Criterion 3 : qualifies due to its unusual estuarine communities, reduced diversity and high productivity
Ramsar interest feature 2: Assemblage of migratory fish species : Sea Lamprey River Lamprey Twaite Shad Allis Shad Salmon Sea Trout Eel	Criterion 2c : qualifies as it is important for the run of migratory fish between sea and river via estuary. Species include Salmon <i>Salmo salar</i> , sea trout <i>S. trutta</i> , sea lamprey <i>Petromyzon marinus</i> , river lamprey <i>Lampetra fluviatilis</i> , allis shad <i>Alosa alosa</i> , twaite shad <i>A. fallax</i> , and eel <i>Anguilla anguilla</i> .	Criterion 4 : qualifies as it is important for the run of migratory fish between sea and river via estuary. Species include Salmon <i>Salmo salar</i> , sea trout <i>S. trutta</i> , sea lamprey <i>Petromyzon marinus</i> , river lamprey <i>Lampetra fluviatilis</i> , allis shad <i>Alosa alosa</i> , twaite shad <i>A. fallax</i> , and eel <i>Anguilla anguilla</i> .
<i>* The wider estuarine fish assemblage is covered as a "notable species assemblage" sub feature of the SAC "Estuaries" feature</i>		Criterion 8 : qualifies as the fish assemblage of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded.

Table continued ...

Ramsar Features (for which conservation objectives have been written)	Criteria at designation (1995) (original criteria)	Revised Criteria (2005) (criteria currently used on JNCC website)
<p><i>Ramsar interest feature 3:</i> Bewick's Swan</p> <p><i>Ramsar interest feature 4:</i> European white-fronted goose</p> <p><i>Ramsar interest feature 5:</i> Dunlin <i>Ramsar interest feature 6:</i> Redshank <i>Ramsar interest feature 7:</i> Shelduck <i>Ramsar interest feature 8:</i> Gadwall</p> <p>ie Internationally important populations of waterfowl</p>	<p>Criterion 3c : qualifies by regularly in winter supporting internationally important populations (1% or more) of species of waterfowl</p> <p>Bewick's swan European white-fronted goose Dunlin Redshank Shelduck Gadwall</p>	<p>Criterion 6 : qualifies as it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.</p> <p>Species with peak counts in winter - at designation: Tundra/Bewick's swan Greater /European white-fronted goose Dunlin Common redshank Common shelduck Gadwall</p>
<p><i>Ramsar interest feature 9:</i> Internationally important assemblage of waterfowl</p> <p>This feature incorporates :</p> <ul style="list-style-type: none"> waterfowl which contribute to the total peak winter count (criterion 3a) the above internationally important wintering populations (qualifying under criterion 3c) the migratory passage species (qualifying under criterion 2c) the nationally important populations (identified under other notable features of the Ramsar Site citation) <p>The species are as follows : (w = wintering and p = passage):</p>	<p>Qualifies under Criterion 2c as it is particularly important for migratory birds during passage periods in spring and autumn. Nationally important populations of :</p> <p>Ringed plover Dunlin Whimbrel Redshank</p>	<p>Populations identified subsequent to designation: Ringed plover (spring/autumn) Eurasian teal (winter) Northern pintail (winter) Lesser black-backed gull (breeding)</p>
	<p>Criterion 3a : qualifies by regularly supporting in winter over 20,000 waterfowl - (1988/89 to 1992/93 average peak count was 68,026 waterfowl: 17,502 wildfowl and 50,524 waders)</p>	<p>Criterion 5 : qualifies as it supports an assemblage of international importance - (1998/99-2002/2003 5 year peak mean was 70,919 waterfowl)</p>
<p>Bewick's swan (w) European white-fronted goose (w) Shelduck (w) Dunlin (w, p) Redshank (w, p) Gadwall (w) Ringed plover (w, p) Whimbrel (p) Teal (w) Pintail (w) Wigeon (w) Pochard (w) Tufted duck (w) Grey plover (w) Curlew (w) Spotted redshank (w)</p>	<p>Other notable features : Nationally important wintering populations of:</p> <p>Wigeon, teal, pintail, pochard, tufted duck, ringed plover, grey plover, curlew and spotted redshank. Also nationally important breeding population of Lesser Black backed gull</p>	

Each interest feature has a conservation objective in Section 4 of this document.

Reference should also be made to sections of this document that relate to the Severn Estuary SAC interest features (particularly with respect to the conservation requirements of the supporting habitats) and the Severn Estuary SPA interest features.

Information on the populations of bird species using the Severn Estuary Ramsar Site at the time of designation is contained in Table 6 and their relationships are shown in Figure 3. Ramsar interest feature 9 incorporates both wintering and passage populations of some birds and hence some species are included more than once in the lists given in Table 6.

Table 6 : Information on populations of bird species using the Severn Estuary Ramsar Site at the time of classification (1995)

<i>Ramsar interest features3 to 8:</i> Internationally important <u>populations</u> of wintering waterfowl (1995 Ramsar Criterion 3c)		
Species	Population (5 yr peak mean: 1988/9 to 1992/3)	
<i>Ramsar interest feature 3: Bewick’s swan</i>	289	4.1% Great Britain, 1.7% North West Europe
<i>Ramsar interest feature 4: European white-fronted goose</i>	3,002	50% British, 1% North West Europe
<i>Ramsar interest feature 5: Dunlin</i>	41,683	2.9% East Atlantic flyway, 9.6% British
<i>Ramsar interest feature 6: Redshank</i>	2,013	1.3% East Atlantic flyway, 2.6% British
<i>Ramsar interest feature 7: Shelduck</i>	2,892	1.2% NW European, 3.9 % British
<i>Ramsar interest feature 8: Gadwall</i>	330	2.8 % NW European, 5.5 % British
<i>Ramsar interest feature 9:</i> Internationally important <u>assemblage</u> of waterfowl (1995 Ramsar Criterion 2c, 3a and 3c) <i>(Assemblage includes above wintering species populations plus the following listed nationally important populations (migratory passage and wintering species))</i>		
International importance (1995 Ramsar Criterion 3a)	Population (5 yr peak mean: 1988/9 to 1992/3)	
Regularly supporting in winter over 20,000 waterfowl.	68,026 individual birds comprising 17,502 wildfowl and 50,524 waders	
Nationally important bird populations within internationally important assemblage of waterfowl (1995 Ramsar Criterion 2c and other nationally important populations)		
Species	Population (5 yr peak mean: 1987/8 to 1991/2)	
Dunlin	3,510 (spring migration) 5,500 (autumn migration)	1.7 % British passage 2.7 % British passage
Redshank	2,456 (autumn migration)	2 % British passage
Ringed plover	442 (spring migration) 1,573 (autumn migration)	1.4 % British passage 5.2 % British passage
Whimbrel	246 (spring migration) 66 (autumn migration)	4.9 % British passage 1.3 % British passage
	Population (5 yr peak mean: 1988/9 to 1992/3)	
Wigeon	3,977 birds	1.6% Great Britain
Teal	1,998	2.0% Great Britain
Pintail	523	2.1% Great Britain
Pochard	1,686	3.8% Great Britain
Tufted duck	913	1.5% Great Britain
Grey plover	781	3.7% Great Britain
Curlew	3,096	3.4% Great Britain
Spotted redshank	3	1.5% Great Britain

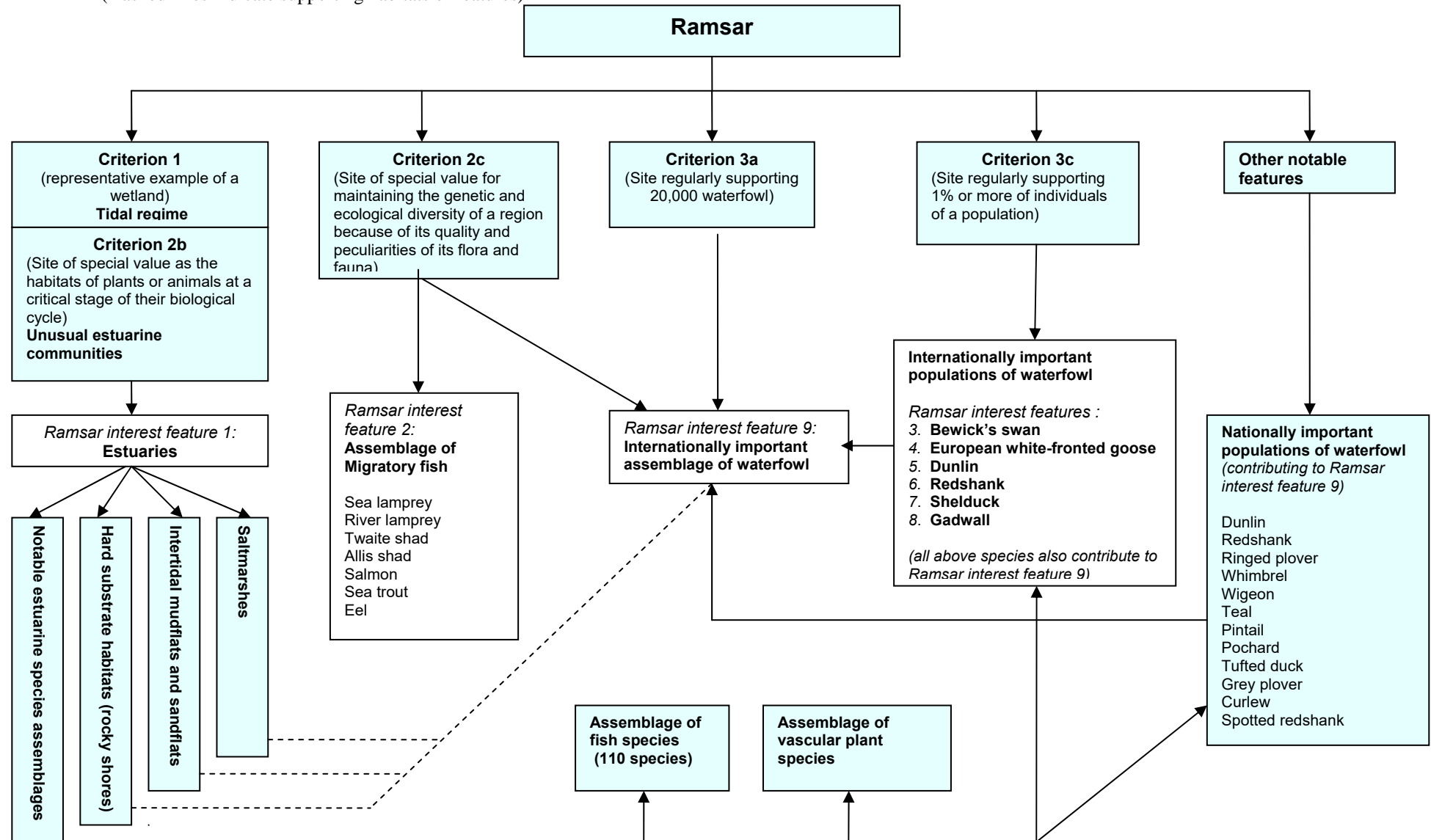
(Note : Further information on the peak counts of the SPA species and waterfowl assemblage between 1988/9 and 2006/07 are given in Appendix 11.)

The Ramsar Site within the European Marine Site boundary includes saltmarshes and the adjacent extensive areas of intertidal mud, sand and rocky shores. All these habitats provide essential food and resting places for the wide range of wintering and migratory waterfowl and are therefore identified as key “supporting habitats” for the conservation of these species. The relationship between the Ramsar Site bird features (Ramsar interest features 3 to 9) and their supporting habitats is shown in Table 7. The supporting habitats are mapped in Appendix 8 to show their distribution and extent.

Table 7 : A summary of the qualifying bird features and associated supporting habitats within the Severn Estuary Ramsar Site

Designation	Qualifying feature	Protected Supporting habitats		
		Estuary		
		Intertidal mudflats and sandflats	Hard substrate habitats (rocky shores)	Saltmarsh
Ramsar Site (classified 13 July 1995)	<i>Ramsar interest features 3 to 8 :</i> Internationally important populations of individual species of waterfowl	✓	✓	✓
	<i>Ramsar interest feature 9:</i> Internationally important assemblage of waterfowl	✓	✓	✓

Figure 3 : Flow chart showing the relationship between the interest features (in white boxes) for which the Severn Estuary Ramsar Site qualifies.
(Dashed lines indicate supporting habitats of features)



3. General description of the Severn Estuary and its designated features

Introduction

The Severn Estuary is the largest example of a coastal plain estuary in the United Kingdom and one of the largest estuaries in Europe. The overall area of the European and International conservation designations is 73,715.4 ha (see Appendix 1) of which roughly two thirds is composed of subtidal habitats (stable sandbanks and shifting sediments of gravel, sand and mud) and one third is composed of intertidal habitats (tide washed mud and sand, saltmarshes and rocky shores).

The estuary lies in the broad Severn Vale, with most of the sediments on the margins of the estuary having accumulated since the last ice age. As with many other estuaries in England and Wales, it has been a focus for human activity, a location for settlement, a source of food, water and raw materials and a gateway for trading and exploration. The Estuary and its coastal hinterland support the cities of Cardiff, Bristol, Newport and Gloucester. Today, major industries are sited around the Estuary's shores. There are modern port installations, chemical processing companies and nuclear power stations among others. Exploitation of the natural resources includes commercial shrimp fishing and fishing for salmon using putchers, lave nets, draught nets and bag nets. The Severn supports an important eel and elver fishery. Aggregate extraction also occurs within the estuary.

Alongside all these competing activities, the Estuary also supports a wide array of habitats and species of international importance for nature conservation.

Human activity has increasingly influenced the character of the marginal wetland mudflats and marshes, with extensive land claim occurring during and since the Roman period. Sediment flows and fluxes affecting the estuary are of particular importance for estuarine processes and ecology and the morphology of the estuary is constantly changing due to the complex hydrodynamics. Sediment deposits provide essential material to maintain the mudflats, sandflats and saltmarsh. Estuary-wide fluctuations in the wind-wave climate over recent centuries have led to major movements of the high-tide shoreline, and some reclaimed lands have been lost (Allen, 1990, Atkins, W.S. 2004). In addition, the Severn Estuary CHaMP (ABPMer, 2006) predicts losses of intertidal mudflats and sandflats and saltmarsh habitats over the next 100 years in response to rising sea-level.

A number of habitats and species have also been recognised through the designation of several Sites of Special Scientific Interest (most notably, the Upper Severn Estuary, Severn Estuary and Bridgwater Bay SSSIs in the 1980's) which underpin the European and International designations.

The following sections briefly describe each of the main habitat and species features covered by the three designations and the inter-relationships between them. All feature descriptions are based on best available knowledge at the present time and in some cases this is limited. For example there is limited information on the extent of the subtidal reef habitat within the estuary. Maps showing the distribution of the habitats are indicative only and the advice in this document is provided on the basis of current knowledge and may be subject to change as knowledge improves.

3.1 Estuaries

3.1.1 Range

Estuaries are habitat complexes which comprise an interdependent mosaic of subtidal and intertidal habitats, which are closely associated with surrounding terrestrial habitats. Many of these habitats, such as mudflats and sandflats not covered by sea water at low tide, saltmarshes, sandbanks which are slightly covered by sea water all the time and reefs, are identified as Annex I habitat types in their own right.

Estuaries are defined as the downstream part of a river valley, subject to the tide and extending from the limit of brackish water. There is a gradient of salinity from freshwater in the river to increasingly marine conditions towards the open sea.

Estuaries are widespread throughout the Atlantic coasts of Europe. Approximately one-quarter of the area of estuaries in north-western Europe occurs in the UK. The UK has over 90 estuaries¹⁸.

The selection of estuary sites has taken account of the UK's EU responsibility for this habitat type, and the SAC series contains a high proportion of the total UK resource. Sites have been selected to represent the geographical range of estuaries in the UK, and to encompass examples of the four geomorphological sub-types (coastal plain, bar-built, complex, and ria estuaries) and the associated range of communities. Selection has generally favoured larger estuaries, as they display a wider variety of habitats, but smaller estuaries have also been selected where they have specific features of interest, such as undisturbed transitions from marine to terrestrial habitats, or are representative of a particular geomorphological sub-type.

The Severn Estuary is the largest example of a coastal plain estuary in the UK, and one of the largest estuaries in Europe. It contributes approximately 30% of the UK Natura 2000 resource for estuaries, by area.¹⁹

3.1.2 Extent and Distribution

The extent of the Estuary feature is 73678 ha.

The Severn Estuary SAC covers the extent of the tidal influence from an upstream limit between Frampton and Awre in Gloucestershire out seawards to a line drawn between Penarth Head in Wales and Hinckley point in Somerset. It includes subtidal and intertidal areas landward to the line of high ground and flood defences (banks and walls) that provide the limit of tidal inundation.

The Estuary is an over-arching feature which incorporates all aspects of the physical, chemical and biological attributes of the estuary as an ecosystem. The physical nature of the tidal regime determines not only the structure of the estuary and individual habitats but also the conditions affecting it and the biological communities it therefore supports.

3.1.3 Structure and Function

The Severn Estuary is important for its immense tidal range, which affects both the physical environment and the diversity and productivity of the biological communities. The tidal range is the second largest in the world, reaching in excess of 13 m at Avonmouth²⁰. This macrotidal environment is partly due to the estuary's funnel shape which concentrates the tidal wave as it moves up the Bristol Channel. Tidal currents

¹⁸ JNCC website

¹⁹ Based on Natura 2000 Standard data forms for all UK Natura 2000 sites which have estuaries as a feature- source: JNCC website <http://www.jncc.gov.uk/ProtectedSites/SACselection/habitat.asp?FeatureIntCode=H1130>

²⁰ Data on tidal range can be found on the Proudman Oceanographic Laboratory website <http://www.pol.ac.uk/ntsIf/tides/?port=0060>.

are also amplified and exceed 7 metres per second close to Avonmouth (British Geological Survey, 1996). These factors make the estuary important in representing one of the most dynamic estuarine systems in the UK, Europe and the world.

There are several major rivers, including the Taff, Usk, Wye, Severn, Avon and Parrett which feed into the estuary, and influence the salinity regime. Together these rivers tend to produce a marked east-west salinity gradient and a range of conditions varying from brackish to fully saline, depending on the season and rainfall, which in turn influences the occurrence and distribution of habitats and species throughout the estuary and its fringes.

Fine sediments which are mainly derived from erosion of the intertidal zone and suspended sediments in river water entering the estuary create high turbidity, which has its highest average level between Avonmouth and the outer part of Bridgwater Bay (British Geological Survey, 1996, ABPMer, 2006). The strong tidal currents create a highly dynamic environment and the resultant scouring of the seabed and high turbidity give rise to low diversity communities. The Severn has an extreme type of hydrodynamic and sedimentary regime which distinguishes it from other estuaries and which dominates the whole system. It is estimated that the estuary carries 10 million tons of suspended sediments on spring tides (Kirby & Parker, 1983; Kirby, 1986). Such conditions were initiated by the start of sea-level rise in late glacial times, with some evidence for steady sedimentation persisting for at least 5000 years, during which there has been a steady rise in sea level of 5 m, a trend which is continuing at present (British Geological Survey, 1996). Defra guidance²¹ indicates sea-level rise for Wales and the South West to be 3.5 mm per annum to 2025, rising to 8 mm per annum (2025-2055), 11.5 mm (2055-2085) and 14.5 mm (2085-2115).

3.1.4 Typical Habitats and Species

The extreme hydrodynamic and sedimentary conditions essentially determine the type of habitats and species present and result in characteristic animal and plant communities. Typical species for each habitat are given in the individual habitat sections.

The predominant unconsolidated sediments are muds and sands which form the basis of the structure of the estuarine habitats which include saltmarshes (section 3.5), intertidal mud and sand flats (section 3.4) and subtidal sand banks (section 3.3), mixed mud and sand, rock outcrops, boulder and shingle shores (section 3.7) as well as biogenic (worm built) reefs (section 3.6). There are also sandy beaches on the southern shores in the outer part of the estuary, backed by sand dunes.

The intertidal zone of mudflats, sandbanks, rocky platforms and saltmarsh is one of the largest and most important in Britain and this range of habitats provide an ecosystem of great importance for a wide range of fish (section 3.8) and bird (section 3.9) species – for feeding, breeding, resting and migration.

3.1.5 Natural Processes

The structure of estuaries is largely determined by geomorphological and hydrographic factors, with the original shaping forces having their beginnings in the geological origins of the adjacent land areas and the influence of major geological events such as ice ages and periods of higher and lower sea levels.

The shape of the estuaries, their macro- and micro-topography, and bathymetry, are important components of the character of the habitats and influences the distribution and abundance of marine life, *i.e.* the features' typical species. It is both determined by, and influences, natural environmental processes and consequently, can be impacted either directly or indirectly (through changes to natural processes) by man.

Estuaries are complex dynamic systems that have a natural tendency to accumulate sediment, thereby changing their form from their original Holocene morphology to a state where tidal energy is dissipated by

²¹ Defra, 2006. Flood and Coastal Defence Appraisal Guidance FCDPAG3 Economic Appraisal Supplementary Note to Operating Authorities – Climate Change Impacts October 2006

sub- and intertidal sediment banks. The width and depth of the estuary will therefore change over time towards a state of dynamic equilibrium or “most probable state”.

The velocities of currents passing through the mouth are determined partly by the tidal range and partly by the cross sectional area of the mouth itself. If these velocities are higher than the sediment erosion threshold, erosion will widen the channel and lower velocities will ensue. If velocities are lower than the sediment depositional threshold, deposition will narrow the mouth and higher velocities will ensue. In this way, an equilibrium cross section will evolve which balances tidal prism, velocities and erosion/depositional thresholds. Sea level rise means that estuaries will show a natural tendency to migrate inland (roll-over) and may erode at the mouth. Where changes in extent are attributable to the estuary adjusting to equilibrium, then the feature should be determined favourable. Where this process is constrained by hard sea defence, then this would be considered as coastal squeeze. (JNCC Common Standards Monitoring Guidance for Estuaries (version 4)).

A complex pattern and combination of physical, chemical and biological conditions and processes operates within estuaries, with many parameters varying temporally and spatially. These parameters establish the baseline conditions in the estuary and continually shape the estuaries and the habitats and wildlife they support. The key parameters are: the flood hydrograph²²; the nature of the catchment and its influence on freshwater flow and nutrient and sediment input; the nature of the estuary sediment; and the relatively high sediment levels in the estuaries resulting in low water retention within the estuary system and exposure of significant proportions of sediment at low tide. The biological communities of the estuaries have developed in response to these prevailing conditions and the daily patterns of water flow, exposure, sediment movement and water chemistry.

3.2 Subtidal sandbanks

3.2.1 Range

Sandbanks which are slightly covered by sea water all the time (subtidal sandbanks) consist of sandy sediments that are permanently covered by shallow sea water, typically at depths of less than 20 m below chart datum (but sometimes including channels or other areas greater than 20 m deep). The habitat comprises distinct banks (i.e. elongated, rounded or irregular ‘mound’ shapes) which may arise from horizontal or sloping plains of sandy sediment. Where the areas of horizontal or sloping sandy habitat are closely associated with the banks, they are included within the Annex I type.

Sandbanks which are slightly covered by sea water all the time occur widely on the Atlantic coasts of north-west Europe, and occur widely around the UK coast. They are widespread in inshore waters (within 12 nautical miles of the coast) and also occur offshore in the southern North Sea and in the Irish Sea (between 12 and 200 nautical miles).

The UK SAC series includes large sublittoral sandbanks showing good habitat structure and function. The selected sites represent the range of variation within the four main sub-types (gravelly and clean sands, muddy sands, eelgrass beds, and maerl beds), which are often associated with different physiographic features (e.g. estuaries, open coast, bays, sea lochs). The differing character of this habitat around the UK coast has also been taken into account.

The Severn Estuary subtidal sandbanks can be considered to contribute to the gravelly and clean sand sandbank resource. The Severn Estuary contributes approximately 3% of the UK Natura 2000 resource for subtidal sandbanks, by area.²³

²² A flood hydrograph is a dual plot of river discharge (line) and rainfall (bars) over time

²³ Based on Natura 2000 Standard data forms for all UK Natura 2000 sites which have estuaries as a feature- source: JNCC website <http://www.jncc.gov.uk/ProtectedSites/SACselection/habitat.asp?FeatureIntCode=H1130>

3.2.2 Extent and Distribution

The subtidal sandbanks are largely restricted to the middle and outer parts of the estuary. The sand banks of the Middle and Welsh Grounds are relatively permanent sandbank features in the Severn Estuary, along with other long established sandbank features at Cardiff Grounds and in Bridgwater Bay. The tops of these banks are intertidal, and the permanently submerged parts of the banks are considered to contribute to the subtidal sandbanks habitat.

There are other areas of subtidal sandbank habitat within the Estuary, again sometimes the top of the bank may be exposed at low tide, with the submerged sections contributing to the subtidal sandbanks habitat. These banks are more ephemeral in nature, but are still considered part of the feature, and reflect the dynamic nature of the Severn Estuary. The areas where ephemeral subtidal sandbanks are known to occur include areas offshore from Avonmouth and at English Grounds (near Clevedon).

The approximate area of the more permanent subtidal sandbanks is 1,300 hectares and there are approximately 10,440 hectares of associated ephemeral sandbanks. Areas of associated sediments have been defined by using the sediment environments of the Bristol Channel Marine Aggregates Resources and Constraints project, commissioned by the National Assembly for Wales (Posford Duvivier and ABP, 2000). Further detail is given in section 4.1.2.1.

3.2.3 Structure and Function

The subtidal area of the Severn Estuary is subject to strong tidal currents resulting in the high mobility of sediments which range from gravely to muddy sands. The high mobility of the sediments and high turbidity means that these habitats only support animals that can tolerate the shifting seabed and scouring action of suspended sand.

As described above the subtidal sandbanks habitat includes some long established and relatively permanent sandbank features and associated sediments which form more ephemeral sandbanks. The sediments of both the more permanent sandbank features and the associated sediments (ephemeral banks) together comprise the subtidal sandbanks feature of the SAC (see map in Appendix 3).

These subtidal areas play an important role in holding and supplying sediment for other habitats notably the intertidal mud and sandflats, saltmarshes and reef features and it is likely that subtidal invertebrate communities play a role as a food resource for some species of the fish assemblage feature of the SAC and Ramsar Site.

3.2.4 Typical species

The subtidal sandbanks feature has two distinct sub-features composed of communities which are determined principally by the degree of sediment mobility, grade of sediments, mix of sediments (in terms of proportions of sand and mud) and salinity.

The first sub-feature is composed of sand and muddy sand communities dominated by worms, and burrowing shrimps which can tolerate the high sediment mobility. The second sub feature is composed of mud and sandy mud dominated communities which are slightly more stable and support a greater abundance of burrowing worms.

The typical species of these communities include a range of worms, shrimps, snails and bivalves. The species diversity of these habitats is often low but overall biomass can be high.

3.2.5 Natural Processes

Subtidal sandbanks are dynamic features with their size, shape, aspect and orientation, as well as the macro- and micro-topography and sediment characteristics largely determined by the sediment supply and the influence of the hydrodynamic processes affecting each bank. They change shape over time and while some are ephemeral others may be relatively stable and long established. Mobile sediments that form temporary

sandbanks are considered to be associated sediments that should be retained in the system but their location may change.

3.3 Intertidal mudflats and sandflats

3.3.1 Range

Intertidal mudflats and sandflats are submerged at high tide and exposed at low tide. They form a major component of Estuaries and Large shallow inlets and bays in the UK but also occur extensively along the open coast and in lagoonal inlets. The physical structure of the intertidal flats ranges from mobile, coarse-sand beaches on wave-exposed coasts to stable, fine-sediment mudflats in estuaries and other marine inlets. This habitat type can be divided into three broad categories (clean sands, muddy sands and muds), although in practice there is a continuous gradation between them. Within this range the plant and animal communities present vary according to the type of sediment, its stability and the salinity of the water.

Mudflats and sandflats not covered by sea water at low tide are a widespread habitat type on coasts of Atlantic Europe, particularly around the North Sea, and occur widely throughout the UK.

Sites have been selected to encompass the range of geographical, physical and ecological variation shown by this habitat type in the UK. Examples of clean sands, muddy sands, and mudflats have all been included. Sites with large areas of intertidal flats, as well as a range of environmental conditions and an associated diversity of communities, were favoured.

The intertidal part of the Severn Estuary supports extensive mudflats and sandflats. These cover an area of approximately 20,300 ha - the fourth largest area in a UK estuary and representing approximately 7 % of the total UK resource of this habitat type (approximately 10% of the UK Natura 2000 resource for Intertidal mudflats and sandflats, by area.²⁴)

The intertidal mudflats and sandflats of the Severn Estuary are representative of estuarine mudflats and sandflats influenced by strong tidal streams and extreme silt loading.

3.3.2 Extent and Distribution

The Intertidal mudflats and sandflats feature in the Severn Estuary covers an area of approximately 20,300ha.

The Intertidal mudflats and sandflats feature is distributed throughout the Severn Estuary with extensive mudflats fronting the Welsh shore and Bridgwater Bay, and large banks of clean sands in the more central parts of the estuary at Middle and Welsh Grounds.

3.3.3 Structure and Function

This habitat type can be divided into three broad categories (which form the three main sub-features identified for this feature in the Severn Estuary), clean sands and gravels, muddy sands, and muds, although in practice there is a continuous gradation between them (Countryside Council for Wales, 2006; English Nature, 2006). The composition of the sediments and level of consolidation are the most important factors in determining the fauna of these communities and individual species distribution is largely dependant on the salinity which limits the penetration of marine species upstream where freshwater influences are strongest.

²⁴ Based on Natura 2000 Standard data forms for all UK Natura 2000 sites which have estuaries as a feature- source: JNCC website <http://www.jncc.gov.uk/ProtectedSites/SACselection/habitat.asp?FeatureIntCode=H1130>

The gravel and clean sand communities occur predominantly in the mid and upper parts of the estuary forming large banks in the centre the estuary (Frampton Sands, Lydney Sands, Oldbury Sands, Bedwyn Sands and the Welsh Grounds) through which the main tidal channel flows keeping sediments mobile.

The sandy mud communities occur in restricted locations forming the transition between the clean sand and mud communities particularly in the mid estuary and at the lowest extremes of the tide and at the flanks of the main channel.

The mud communities form in the sheltered edges of the estuary particularly where the coastline forms natural embayments and are predominantly found in the mid to outer estuary at Bridgewater Bay and on the Cardiff and Newport frontages although a narrow fringe of these communities is present throughout the estuary. These communities take the form of firm mud banks adjacent to the saltmarshes often with a liquid mud surface kept fluid by the high tidal currents.

3.3.4 Typical Species

Muddy areas in the Estuary such as those between Cardiff to Newport are generally soft and mobile, colonised by high densities of relatively few species characterised by *Hediste diversicolor* and *Macoma balthica*. Other typical species include *Nephtys hombergii*, *Hydrobia ulvae*, *Tubificoides benedii*, *Streblospio shrubsolii*, *Pygospio elegans*, and Enchytraeidae. *Corophium volutator* is also widespread in these muddy areas especially near the mudflat saltmarsh boundary. In some mid shore areas with sandier sediments *Arenicola marina*, and *Macoma balthica* are present.

Lower shore coarse sand banks such as Bedwyn and Oldbury, are dominated by mobile species such as *Bathyporeia pelagica*, *Eurydice pulchra*, and *Nephtys cirrosa*. The south side of the lower estuary has pockets of littoral muddy sand on the upper shore characterised by *Macoma balthica*, *Hydrobia ulvae*, *Bathyporeia pelagica*, and *Nephtys hombergii*. Lower down the shore the sediments become muddier and support species such as *Scoloplos armiger*, *Aphelocheata marioni* and *Hediste diversicolor*.

Upstream of Sudbrook the infauna becomes less diverse as the salinity decreases. Mud flats here support ragworm *Hediste diversicolor*, patchy Baltic tellin *Macoma balthica* and laver spire shell *Hydrobia ulvae*, with occasional peppery furrow shell *Scrobicularia plana* near the back of the shore. Within the pills along the site and in the upper reaches towards the road crossing the soft mud often supports few species including *Hediste diversicolor* and *Oligochaeta* spp.

The high biomass of invertebrates in the mudflats of the Severn provide an important food source for a diverse range and large number of fish and benthic predators. These intertidal areas are therefore important in supporting the fish assemblage subfeature of the SAC and Ramsar Site.

Mudflats also provide a valuable feeding, roosting and resting area for a wide range of species of wading birds and waterfowl and are therefore important supporting habitats for the wintering and passage bird features of the SPA and Ramsar Site.

3.3.5 Natural Processes

Intertidal mudflats and sandflats are dynamic features. Their distribution, extent, shape, topography, aspect and orientation is the product of complex interaction between hydrodynamic and sediment transport processes, sediment supply and coastal morphology. Hydrographic functions that structure intertidal mudflats and sandflats encompass highly dynamic hydrodynamic and other properties that vary with short and long-term natural cycles, climate influences and stochastic events.

The structure of intertidal mudflats and sandflats varies depending on the physical conditions and forces acting on them (in particular the degree of exposure to wave action and tidal currents) as well as the nature of the sediments occurring in any one location. The sediments vary from mobile coarse sand in more wave exposed areas to stable, fine sediment expanses of mudflat in estuaries and other marine inlets.

Intertidal mudflats and sandflats support a variety of different wildlife communities. These are predominantly infaunal communities of a variety of different animal species such as worms, molluscs and crustaceans living within the sediment habitat. The type of sediment, its stability and the salinity of the water have a large influence on the wildlife species present.

3.4 Atlantic salt meadow

3.4.1 Range

Atlantic salt meadows develop when halophytic vegetation colonises soft intertidal sediments of mud and sand in areas protected from strong wave action. This vegetation forms the middle and upper reaches of saltmarshes, where tidal inundation still occurs but with decreasing frequency and duration. A wide range of community types is represented and the saltmarshes can cover large areas, especially where there has been little or no enclosure on the landward side. The vegetation varies with climate and the frequency and duration of tidal inundation. Grazing by domestic livestock is particularly significant in determining the structure and species composition of the habitat type and in determining its relative value for plants, for invertebrates and for wintering or breeding waterfowl.

This Annex I type is predominantly found on Atlantic coasts in western Europe. Atlantic salt meadows occur on North Sea, English Channel and Atlantic shores. There are more than 29,000 ha of the habitat type in the UK, mostly in the large, sheltered estuaries of south-east, south-west and north-west England and in south Wales. Smaller areas of saltmarsh are found in Scotland.

Sites have been selected to cover the geographical range and ecological variation of Atlantic salt meadows in the UK. The sites selected are for the most part the largest examples of this habitat type, with good structure and function, and which support a well-developed zonation of plant communities within the saltmarsh. There are transitions to other high-quality habitat assemblages at many of the sites that have been selected. Sites with complete sequences of vegetation and transitions to other habitats, such as sand dunes, represent the range of variation of the habitat type, and this has been an important consideration in site selection.

The Severn Estuary holds the largest aggregation of saltmarsh in the south and south-west of the UK. It covers approximately 1,400 ha, representing about 4% of the total area of saltmarsh in the UK (Dargie, 2000).

3.4.2 Extent and Distribution

The Severn Estuary is fringed by saltmarsh. The huge tidal range in the Severn Estuary has led to extensive saltmarsh community development with an expanded zonation.

3.4.3 Structure and Function

The saltmarshes of the Severn Estuary have four principal zones corresponding to the four main sub-features that have been identified for this feature. Two of these zones (the lower to mid marsh communities and the mid to upper marsh communities) contain the principle saltmarsh types which are defined as Atlantic salt meadow as per the Annex 1 habitat description. However these occur in an intimate mosaic and in transition with the communities of the other two zones (in the pioneer saltmarsh and transitional high marsh communities) which are therefore considered in this advice as part of the feature. Section 4.1.4.1 and Table 11 provide further details of these zones and their typical species.

The pioneer saltmarsh communities play an important role in saltmarsh development as colonising plants (*eg Spartina sp. and Salicornia sp.*) stabilise and trap sediments. The upper marsh transitions to terrestrial and freshwater habitats support a range of nationally scarce and uncommon plant species and support tidal debris strandlines of value for invertebrates which are important components of the estuary feature.

Some of the saltmarshes show a sequence of saltmarsh cliffs or steps related to past cycles of accretion and erosion and in places the saltmarshes are also cut transversely by “pills” where freshwater streams enter the estuary. These features add diversity to the saltmarsh by initiating new patterns of species zonation. Recent monitoring has identified that there is a complicated present day pattern of erosion and accretion of the saltmarshes throughout the estuary and some parts appear to be exhibiting the effects of coastal squeeze – the constriction of saltmarsh habitats between rising sea levels and hard defences at the back of the saltmarsh .

Saltmarshes and mudflats have an important role to play in estuarine processes, both through the recycling of nutrients within the estuary and through their role as soft sea defences, dissipating wave energy. They are highly productive biologically, providing organic material that support other features within the marine ecosystem and they also have an important physical role, acting as a sediment store to the estuary as a whole.

Saltmarshes also provide a valuable feeding and roosting and resting areas (particularly at high tide) for a wide range of species of waterfowl and are therefore very important supporting habitats for the wintering and passage bird features of the SPA and Ramsar Site. The habitats within the “pills” provide important shelter and feeding habitats for both fish and bird species.

The Severn Estuary saltmarshes are generally grazed by sheep and/or cattle. Grazing is a significant factor in determining the plant communities found within them and their value for dependant species such as birds and rare plants.

3.4.4 Typical Species

The saltmarsh communities present relate to the four principal zones referred to above.

The low to mid marsh communities include transitional low saltmarsh with *Puccinellia maritima*, annual *Salicornia* sp. and *Suaeda maritima*; *Aster tripolium* (rayed) saltmarsh; *Puccinellia maritima* saltmarsh; *Atriplex portulacoides* saltmarsh; and *Juncus maritimus* - *Triglochin maritima* saltmarsh.

The mid to upper marsh communities include *Festuca rubra* saltmarsh; *Artemisia maritima* saltmarsh; and *Juncus maritimus* salt-marsh.

The transitional high marsh communities include *Spergularia marina* - *Puccinellia distans* saltmarsh; *Elytrigia atherica* saltmarsh; *Elytrigia repens* saltmarsh; *Festuca rubra* - *Agrostis stolonifera* - *Potentilla anserina* inundation grassland; *Festuca arundinacea* coarse grassland; *Agrostis stolonifera* - *Alopecurus geniculatus* inundation grassland; *Phragmites australis* reedbed; *Bolboschoenus maritimus* swamp; and *Agrostis stolonifera* sub-community.

The pioneer saltmarsh communities include *Spartina anglica* saltmarsh; Annual *Salicornia* saltmarsh; and *Suaeda maritima* saltmarsh.

Several notable species are also present *Alopecurus bulbosus*, *Althaea officinalis*, *Bupleurum tenuissimum*, *Hordeum marinum*, *Puccinellia rupestris*, *Trifolium squamosum*, *Lepidium latifolium*, *Allium oleraceum*, and *Petroselinum segetum* (Dargie 1998).

3.4.5 Natural Processes

The location, character, and dynamic behaviour of saltmeadows are governed by four physical factors: sediment supply, tidal regime, wind-wave climate and the movement of relative sea level. There are four elements necessary for the development and growth of a salt marsh: (1) a relatively stable area of sediment that is covered by the tide for a shorter period than the time it is exposed; (2) a supply of suitable sediment available within the period of tidal cover; (3) water velocities that are sufficiently low for some of the sediment to settle out; and (4) a supply of seeds or other propagules for the establishment of vegetation cover.

The topography and microtopography of areas of Atlantic salt meadow are the product of complex interaction between hydrodynamic and sediment transport processes, sediment supply and coastal

morphology. These can be highly dynamic and vary with short and long-term natural cycles, climate influences and stochastic events, including: tidal range and excursion, salinity, water temperature and suspended particulate concentrations.

The marsh-edge morphology provides information on the short to medium term trends of marsh morphodynamics. Accreting and stable seaward marsh edges have an accretional ramp upon which pioneer and low-marsh vegetation can become established. Erosional margins are characterised either by the presence of mud-mound topography or by marsh-edge cliffs fronted by toppled cliff blocks with live or dying vegetation, rotational slide or overhanging (cantilever) blocks. Terraced marsh margins indicate episodic erosion and accretion on timescales over decades to centuries.

The Severn Estuary saltmarshes do not generally contain a pattern of creeks and pans more typical of extensive saltmarshes in estuaries with less extreme tidal ranges. Instead the saltmarshes are dissected by “pills” (steep sided natural drainage channels cutting through the saltmarsh) where freshwater streams flow into the estuary. These are often deep and steep sided funnel shaped features, often with pioneer vegetation established along their banks although in many cases the natural structure of the pill is truncated by tidal flaps or flow valves. In a few locations natural salt pans occur within the saltmarshes.

Major erosion of saltmarsh is indicated by internal dissection and enlargement of the drainage network, ultimately leading to the creation of mud basins.

Nutrient levels are a strong influence on the growth of estuarine saltmarsh plants. Nutrient cycling within saltmarshes can also have a significant effect on coastal and estuarine water quality. In this respect, healthy, functional saltmarsh habitat may have an important role to play in the control of nutrients, which are important in determining water quality.

Given favourable conditions, depending on sediment supply and hydrodynamic regime, mudflats evolve into saltmarshes by way of substrate stabilisation by algae, diatoms and early pioneer plants, giving rise to enhanced sediment accretion rates.

3.5 Reef

3.5.1 Range

Reefs are rocky marine habitats or biological concretions that rise from the seabed. They are generally subtidal but may extend as an unbroken transition into the intertidal zone, where they are exposed to the air at low tide. Intertidal areas are only included within this Annex I type where they are connected to subtidal reefs. Reefs are very variable in form and in the communities that they support. Two main types of reef can be recognised: those where animal and plant communities develop on rock or stable boulders and cobbles, and those where structure is created by the animals themselves (biogenic reefs).

Rocky reefs are extremely variable, both in structure and in the communities they support. A wide range of topographical reef forms meet the EU definition of this habitat type. These range from vertical rock walls to horizontal ledges, sloping or flat bed rock, broken rock, boulder fields, and aggregations of cobbles. In contrast to the variety of rocky reefs, there is somewhat less variation in biogenic reefs, but the associated communities can vary according to local conditions of water movement, salinity, depth and turbidity. The main species which form biogenic reefs in the UK are blue mussels *Mytilus edulis*, horse mussels *Modiolus modiolus*, ross worms *Sabellaria* spp., the serpulid worm *Serpula vermicularis*, and cold-water corals such as *Lophelia pertusa*.

Reefs occur widely around the UK coast, and are found in both inshore and offshore waters. There is a far greater range and extent of rocky reefs than biogenic concretions. Only a few invertebrate species are able to develop biogenic reefs, and these have a restricted distribution and extent in the UK.

The Severn Estuary has areas of biogenic reefs, formed by the tube-dwelling polychaete worm *Sabellaria alveolata*. *Sabellaria alveolata* reefs in the UK are predominantly an intertidal habitat but the Severn Estuary

is one of the few places where *Sabellaria alveolata* reefs occur extensively in the subtidal, as well as the intertidal.

3.5.2 Extent and Distribution

There are patches of intertidal *Sabellaria alveolata* reef throughout the Estuary, although it tends to be more common on the English side. The subtidal *Sabellaria alveolata* tends to be in the outer parts of the Estuary, southwest of a line between Clevedon and Newport. The exact distribution of subtidal *Sabellaria alveolata* reef in the Severn Estuary is unknown, partly due to the difficulties in sampling this habitat.

3.5.3 Structure and Function

Sabellaria alveolata is a species of small worm which constructs tubes using sand particles, to build honeycomb-like structures. *Sabellaria alveolata* reefs are often also known as honeycomb worm reefs.

These biogenic reefs tend to increase habitat diversity for other species (Holt et al 1998), sometimes leading to higher species diversity within *Sabellaria* reefs compared to the surrounding sediment or rock habitats (Dubois et al 2002). *Sabellaria alveolata* reefs cycle through different phases, from newly settled worms through vigorous fast growing reef to older, more biodiverse hummocks (Cunningham et al, 1984). At other sites each of these phases tends to have a different community of plants and animals associated with it, so all phases are considered important for biodiversity (Collins, 2001; Dubois et al, 2002).

In order to thrive, *Sabellaria alveolata* requires an abundance of suitable coarse sand to support tube building (and therefore reef growth), as well as the availability of suitable substrates (pebbles, cobbles, boulders, bedrock) to attach to. Larval supply is also important and *Sabellaria* larvae are thought to stay in the water column for one to six months (Jackson 2008). The worms are filter feeders and therefore food within the water column (suspended detritus material) is also needed. *Sabellaria* larvae are thought to settle preferentially in areas where *Sabellaria* reef has been present in the past (Holt et al, 1998).

3.5.4 Typical Species

The *Sabellaria alveolata* reef biotopes which have been recorded in the Severn Estuary are *Sabellaria alveolata* on variable salinity sublittoral mixed sediment and *Sabellaria alveolata* reefs on sand-abraded eulittoral rock.

In the Severn Estuary (both subtidal and intertidal) the presence of *Sabellaria alveolata* reefs generally increases species diversity, relative to the surrounding rock or sediment, although the diversity of *Sabellaria alveolata* reefs in the Severn is still thought to be comparatively low compared to other areas of the UK. Species commonly found associated with subtidal *Sabellaria alveolata* reef from infaunal samples include *Eulalia tripunctata*, *Mediomastus fragilis*, *Typosyllis armillaris*, *Melinna cristata*, *Harpinia pectinata*, *Ampharete grubei*, *Golfingia vulgaris*, *Pygospio elegans*, *Arenicola marina*, *Autolytus sp*, *Sphenia binghami* and *Harmothoe impar* (Mettam et al. 1994 and Marine Recorder database).

Species found in intertidal *Sabellaria alveolata* reefs in the Severn Estuary at Goldcliff and Lavernock point include *Crangon crangon*, *Actinia equina*, *Cancer pagarus*, *Porcellana platycheles*, *Littorina spp.*, *Pholas dactylus*, *Elminius modestus*, *Fucus serratus*, *Corralina officinalis* and *Enteromorpha spp.* (O'Riordan, 2006).

3.5.5 Natural Processes

Little is known about the nature of the *Sabellaria alveolata* reef in the Severn Estuary, especially in the subtidal. However, at other sites *Sabellaria alveolata* is known to have a very variable recruitment and the cover in any one area may vary greatly over a number of years (Wilson, 1974). A typical life span of 4-5 years for worms in colonies forming reefs on bedrock and large boulders has been reported from other areas (Wilson, 1971), with a likely maximum of around 9 years (Gruet, 1982; Wilson, 1971). However, it is suspected that there are many colonies on intertidal cobble and small boulder scars on moderately exposed shores where shorter lifespans are likely due to the unstable nature of the substratum (Holt et al, 1998). As

mentioned above, *Sabellaria alveolata* reefs cycle through several different phases, all of which are considered important for biodiversity.

3.6 Other estuarine habitats : Hard substrate habitats (rocky shores) and eel grass beds

3.6.1 Extent and Distribution

There is approximately 1,500 ha of hard substrate habitat within the Severn Estuary, consisting of boulders, rock, mussel/cobble scars, rocky pools and shingle (Countryside Council for Wales, 2006; English Nature, 2006). The largest areas of hard substrate are located towards the outer estuary at Brean Down, Anchor Head and Sand Point together with rocky platforms and cliffs at Clevedon and Portishead. There are also extensive rock platforms at English stones, Aust and Beachley.

Beds of eelgrass (*Zostera* spp.), the largest in Wales, occur on some of the more sheltered mixed hard substrate areas around the Welsh side of the Second Severn Crossing.

3.6.2 Structure and Function

Hard substrate habitats in the Severn Estuary display different characteristics to other areas in Wales. Where there is bedrock, fucoid algae cover is dense but with little associated flora and fauna. Areas of soft clay rock around Penarth also support the boring bivalves *Barnea candida* and *Pholas datylus*. Pebble and cobble shores tend to be dominated by barnacles mostly *Elminius modestus*, and sparse rough periwinkles and winkles. In the sublittoral fringe on bedrock, cobbles and pebbles, hydroids, bryozoans, sponges and barnacles dominate. These species form communities that are usually associated with subtidal habitats (adapted from Brazier et al 2007).

These habitats provide a wide range of services for estuarine species. They are important components of the SAC Estuary feature, important supporting habitats for the wintering and passage bird features of the SPA and Ramsar Site and also important supporting habitats for the fish assemblage of the SAC and Ramsar designations.

Seagrass beds are one of the most productive habitats of shallow water coastal ecosystems supporting large numbers of algae, invertebrates and fish and are an important food source for several species of ducks and geese including wigeon and European white-fronted geese. The *Zostera* beds in the Severn are unusual in that they occur in an area of mixed cobbles, sand and mud with large boulders, in other parts of Wales they are associated with mudflats. Both species of *Zostera* occur within the bed. On more dry elevated areas of sediment *Zostera noltii* can be found, whereas wet depressions and channels are dominated by *Zostera marina*. *Zostera* coverage can be patchy but locally abundant. Hard substrata within the *Zostera* bed is dominated by fucoid algae, ephemeral green algae and barnacles.

3.6.3 Typical Species

Typical fauna and flora of rocky and mixed shore areas of the Severn include spiral wrack, bladder wrack, eggwrack and serrated wrack, periwinkles, limpets, barnacles and whelks. On lower shore rock, cobbles and pebbles barnacles dominate including the barnacle *Balanus crenatus* and hydroids *Tubularia indivisa* and *Sertularia cupressina* the bryozoan *Alcyonidium diaphanum* and mermaids glove sponge *Haliclona oculata*.

Both species of eelgrass, *Zostera marina*, and *Z. noltii* have been recorded in the estuary. These are of restricted distribution in British estuaries. It is unusual to have both species in one location.

3.6.4 Natural Processes

The extent and distribution of the rocky shore habitat is largely determined by the underlying geology and sedimentology, along with orientation and aspect and the influence of the prevailing physical conditions such as the degree of exposure to wave action and tidal currents. These factors, combined with the influence of others, such as water quality (including turbidity) and sediment chemistry, influence the assemblages of marine species associated with the different rocky habitats throughout the estuary.

Seagrass beds typically occur in sheltered environments such as shallow inlets and are usually found on soft sediments. The *Zostera* beds in the Severn are unusual in that they occur in an area of mixed cobbles gravel sand and mud.

3.7 Fish

3.7.1 Introduction

The fish fauna of the Severn Estuary is very diverse (Potts & Swaby 1994, Bird 2008). More than 110 species of fish have been identified including a wide range of migratory species and estuarine specialists and some more typically marine and freshwater species reflecting the influence of the wider Bristol Channel and major rivers entering the estuary (Severn, Wye, Usk, Avon Parrett).

3.7.2 Fish features of the Severn Estuary European Marine Site

The Severn Estuary is of particular importance for migratory fish. The estuary is one of the most important British estuaries for three rare species - river lamprey *Lampetra fluviatilis*, sea lamprey *Petromyzon marinus* and twaite shad *Alosa fallax* which are designated features of the SAC. These species together with salmon *Salmo salar*, sea trout *Salmo trutta*, eel *Anguilla anguilla* and allis shad *Alosa alosa* are also a designated feature of the Ramsar Site.

The wider assemblage of fish species, which includes the migratory species, estuarine specialists and the more typically marine and freshwater species, is a designated feature of the Ramsar Site and a component of the estuary feature of the SAC.

3.7.3 Supporting habitats

The estuary habitats, tidal stretches of the feeding rivers and saltmarsh morphological features such as drainage channels, known locally as “pills” and “rhines” (“reens” in Wales) provide important feeding, breeding and sheltered nursery areas for a wide range of fish.

3.7.4 Migratory fish

The river and sea lamprey are a primitive type of fish having a distinctive suckered mouth but no jaws. Although numbers of lamprey have declined over the last 100 years, the UK is still one of their strongholds. Sea and river lampreys spend their adult life in the sea or estuaries but spawn and spend the juvenile phase in rivers. They use the Severn Estuary as a migratory passage to and from their spawning and nursery grounds in the rivers.

Allis and twaite shad are the only two members of the herring family found in fresh water in the UK. Both look like large herring and were formerly eaten in this country before numbers declined and the fisheries collapsed. In the middle of the 19th Century, the value of shad rivalled that of salmon, and in the River Severn, shad made up about one-third of all catches. Three of the four confirmed UK spawning populations of twaite shad are in the rivers Severn, Usk and Wye respectively. The major part of the spawning population of Twaite shad consists of fish that have spawned and passed up and down through the estuary more than once. The shad enter estuaries in spring and move up into the rivers to spawn. The estuary serves as a nursery area for juvenile shad where they feed on plankton.

The Severn Estuary supports an important run of migratory salmon and sea trout which pass through the estuary on their way to and from their spawning grounds in the upper reaches of the rivers and the open sea. The Severn Estuary has the largest eel run in Great Britain.

3.7.5 Assemblage of fish species

The assemblage of fish species includes the migratory species (referred to in section 3.8.4 above), as well as the following:

- Estuarine species
 - Species typically occurring and breeding in estuaries (Bird, 2008)
 - Marine species occurring in large numbers in estuaries (Bird, 2008)
- Marine species
 - Predominantly marine species occurring infrequently in the Severn (Bird, 2008)
- Freshwater species
 - Species typically occurring and breeding in freshwater and recorded within the Severn cSAC (Bird, 2008)

Estuarine species

These species of fish rely on the estuary for some aspect of their life-cycle. As a result of this dependence, these species are often the most vulnerable to anthropogenic and environmental factors that could affect the habitat and ecology of the estuary. Marine species occurring in large numbers in estuaries are all marine species who spend the first few years of life in the sheltered waters of the estuary where suitable food is abundant and there are fewer predators. The Severn Estuary ranks as one of the top ten estuaries in the UK for the number of marine estuarine-opportunistic species it supports (Potts & Swaby 1993). Marine estuarine-opportunists can be present in the estuary in very large numbers at particular times of year. These include sprat, herring, whiting, bib, poor cod, bass and common goby (Bird, 2008).

There are a few species that spend their entire life-cycle within the estuary. These include common goby, black goby, sand smolt and 3- spined stickleback (Bird, 2008).

Marine species

These fish normally spend their entire life-cycle in the sea and only occasionally enter estuaries. Therefore, they have only a minor role to play in the estuarine ecosystem. Thus, only four species, the conger eel, Norway pout, red mullet and plaice; are ever caught in numbers exceeding about 10 per year in power station samples. They probably have little impact, either as prey or as predators on other estuarine species. While they add to the biodiversity of the fish assemblage, their main populations occur in the sea. (Bird, 2008)

Freshwater species

These species typically occur and breed in freshwater, but have occasionally been recorded within the Severn Estuary. The specimens recovered at Oldbury and/or Berkeley power stations are presumably fish that have inadvertently been swept downstream and entered brackish water. They include perch, three-spined stickleback, tench, roach and chub. The numbers of freshwater species recovered at Oldbury is always low, and usually related to increases in fresh water discharge in the spring and autumn months after heavy rain. The only exception to this generalisation concerns the three-spined stickleback which occurs in considerable numbers at Oldbury and can be regarded as both a freshwater and an estuarine species (Bird, 2008)

3.8 Birds

3.8.1 Introduction

Many estuaries in the UK are of great importance to migratory and wintering wildfowl and waders. The Severn Estuary forms part of the complex chain of estuary sites along the western coast of the UK that provide habitats for migratory waterfowl. The relatively mild winter weather conditions found here compared to continental Europe at similar latitudes can be of additional importance to the survival of wintering waterfowl during periods of severe weather. It is especially important when there is severe weather affecting other sites further north and on the east coast of Britain.

The Severn Estuary ranks amongst the top ten British estuaries for the size of visiting waterfowl populations that it supports over winter (Musgrove *et. al.*, 2001). Outside of this period, it is of particular importance as a staging area in autumn and spring for migratory waterfowl species as it lies on the East Atlantic Flyway route. Bird communities are highly mobile and exhibit patterns of activity related to tidal water movements and many other factors. Different bird species exploit different parts of a marine area and different prey species.

3.8.2 Bird features of the Severn Estuary European Marine Site

The migratory wintering and passage populations of birds in the Severn Estuary are designated features of the SPA (see section 2.2) and Ramsar Site (see section 2.3) which supports in excess of 70,000 birds in winter. These include internationally and nationally important populations of key bird species in winter for which the UK has particular importance in both Europe and the world. The bird assemblage is also part of the Estuaries feature of the SAC.

3.8.3 Low-tide distribution of waterbirds on the Severn Estuary SPA and Ramsar Site

Natural England and the CCW commissioned the British Trust for Ornithology (BTO) to organise, as part of the series of WeBS Low Tide Counts, a complete low tide survey of the Severn Estuary during the winter of 2002/03 (Burton *et al.*, 2003). The mean numbers and distribution of total waterbird species recorded on each count section on the Severn Estuary in the winters 1987/88 to 1991/92 and in 2002/03 from this BTO low-tide count data for various individual species and the bird assemblage are illustrated in Appendix 9. The Figures generally indicate that the waterfowl are distributed extensively across virtually the entire intertidal area with some obviously high concentrations in specific areas.

These maps are indicative only and several constraints on their use should be noted when attempting to interpret them. Firstly, it should be noted that in each winter only a maximum of four counts were made of each count section, one a month from November to February. Observation of the central areas of the estuary is also very difficult with all observations being made from land and it is possible that the numbers of birds using these areas were underestimated. Gulls were only recorded in the 2002/03 survey. However, even in that survey, coverage of these species was patchy. The Severn is a highly dynamic estuary and thus the location and extent of many of the intertidal areas may have changed since the Ordnance Survey maps used for this project were created. The movements of sediments may potentially also cause marked differences in the distributions of invertebrates and thus waterbirds between years. It should also be noted that the numbers of birds recorded on the Severn Estuary may vary annually due to weather conditions. In cold winters, the west coast of Britain may act as a refuge for many waterbirds that in milder winters would occur on the east coast or on the Continent. In cold winters, therefore, waterbirds may be more widely distributed across the estuary than they would in milder winters. Lastly, in assessing the importance of different intertidal mudflats, it is also essential to note that some species may use different areas during the night to those where they are recorded in the day.

3.8.4 Relationship between bird populations and supporting habitats

In recognition of the fact that bird populations on a site may change in response to wider national or international trends or events, this Regulation 33 advice addresses the habitat conditions on the site necessary to support the bird populations, as well as the bird populations themselves. “Supporting habitats” are

identified which describe the key habitats within the European Marine Site necessary to support the interest features i.e. the qualifying bird species (see Table 3 for the SPA and Tables 5 and 7 for the Ramsar Site. The Favourable Condition Tables (section 4.2; Table 15 for the SPA and Section 4.3 Table 20 for the Ramsar Site) contain further details on habitat conditions.

The key supporting habitats are the intertidal mudflats and sandflats, saltmarshes and hard substrate habitats (rocky shores). Reference should also be made to sections of this document that relate to the Severn Estuary SAC interest features which provides advice in respect of these habitats (section 4.1 and Tables 8, 10 and 11).

Bird communities are highly mobile and exhibit patterns of activity related to tidal water movements and many other factors. Different bird species exploit different parts of a marine area and different prey species. Changes in the habitat may therefore affect them differently. The most important factors related to this are:

- current extent and distribution of suitable feeding and roosting habitat (eg saltmarsh, mudflats, shingle and rocky shores);
- sufficient prey availability (eg crustaceans, small fish, molluscs, worms and seeds);
- levels of disturbance maintained at or below levels necessary to provide favourable conditions for birds' feeding and roosting areas;
- water quality necessary to maintain intertidal plant and animal communities; and
- fresh water quantity, tidal flows, salinity gradients and grazing necessary to maintain saltmarsh conditions suitable for bird feeding and roosting.

There are also a number of habitats, such as the wet coastal grazing marsh, improved grassland and open standing waters that support the qualifying bird species and occur within the SPA and Ramsar Site boundary. However, these habitats lie above highest astronomical tide and therefore are not within the European Marine Site. Objectives to maintain these aspects of bird interest in favourable condition are found within Natural England and CCW's conservation objectives for the relevant SSSI within the SPA and Ramsar site boundary and will be dealt with through relevant procedures outlined in the Conservation (Natural Habitats &c.) Regulations 1994.

Some species will also use areas of land and coastal waters outside the boundaries of both the European Marine Site, SPA and Ramsar Site. Relevant authorities need to have regard to such adjacent interests, as they might be affected by activities taking place within, or adjacent to the European Marine Site.

3.8.5 Bird count data and assessing condition of bird features and their habitats

Natural England and CCW's conservation objectives at the site level focus on maintaining both the populations of the qualifying species and the habitats used by them. Site management should therefore aim to avoid both damage to the supporting habitats and disturbance to the birds. In reporting on the conservation status, account will need to be taken of both habitat conditions and the status of the bird populations.

Accordingly, Natural England and CCW will use annual counts, in the context of five year peak means for qualifying species, together with available information on population and distribution trends, to assess whether an SPA is continuing to make an appropriate contribution to the Favourable Conservation Status of the species. Count information will be assessed in combination with information on habitat condition, at the appropriate time within the reporting cycle, in order to report to the European Union.

In addition to focusing on avoiding deterioration to the habitats of the qualifying species, the Habitats Directive also requires that actions be taken to avoid significant disturbance to the species for which the site was designated. Such disturbance may result in alterations in population trends and/or distribution patterns. Avoiding disturbance to species requirements is mentioned in the favourable condition table accompanying the conservation objectives for the SPA and Ramsar Site (Tables 16 and 21). In this context, five-year peak mean information on populations will be used as the basis for assessing whether disturbance is damaging.

Attention is also directed to the inclusion of disturbance in the advice on operations provided in Section 5. Where disturbance is highlighted in such advice, relevant authorities need to avoid damaging disturbance to qualifying species when exercising their functions under the Directive.

3.8.6 Description of the Severn Estuary bird features and their supporting habitats

3.8.6.1 Internationally important populations of waterfowl

This comprises:

- A. Internationally important populations of regularly occurring Annex 1 species : Bewick's Swan
- B. Internationally important populations of regularly occurring migratory species of the SPA
- C. Internationally important populations of waterfowl of the Ramsar Site

A. Annex 1 species of the SPA

Description of the Feature

The species listed in Annex 1 of the Birds Directive are the subject of special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution. Species listed on Annex 1 are in danger of extinction, rare or vulnerable. Annex 1 species that regularly occur at levels over 1% of the national population meet the SPA qualifying criteria. The Severn Estuary SPA supports internationally important populations of one Annex I species

- **Bewick's swan** *Cygnus columbianus bewickii*
(Note : this species is also part of C. internationally important populations of waterfowl of the Ramsar Site)

Key supporting habitats for Bewick's swan

Intertidal mudflats and sandflats - The focal area for the Bewick's swans is the upper Severn Estuary in the vicinity of the New Grounds, Slimbridge area. The mudflats and sandflats exposed as the tide falls where the estuary widens in the upper reaches of the site at Waveridge Sands, Frampton Sands and The Noose are used as a safe refuge areas when the birds are disturbed.

Saltmarsh communities - The birds feed on the saltmarsh and the transition from saltmarsh to coastal grazing marsh in front of the sea defences in the upper estuary at The Dumbles, where areas of the high marsh are mainly affected only by brackish water during tidal inundation. They favour areas that have unrestricted views for the early detection of predators.

Bewick's swan graze on a range of 'soft' meadow grasses such as *Agrostis stolonifera* and *Alopecurus geniculatus* found in wet meadows which are outwith the European Marine Site boundary.

- B. Internationally important populations of regularly occurring migratory species of the SPA and**
C. Internationally important populations of waterfowl of the Ramsar Site

Description of the features

Migratory species that regularly occur at levels of 1% or more of the total biogeographic population meet the SPA criteria and qualify for designation in their own right.

Wintering species that regularly occur at levels of 1% or more of the total biogeographic population meet the Ramsar criteria (3c) and qualify for designation in their own right.

The following qualifying species of both the SPA and Ramsar are:

- **European white-fronted goose** *Anser albifrons*
- **Dunlin** *Calidris alpina alpina*
- **Redshank** *Tringa totanus totanus*
- **Shelduck** *Tadorna tadorna*
- **Gadwall** *Anas strepera*

Note : previous Regulation 33 advice issued in respect of the Severn Estuary SPA in February 2005 excluded gadwall as they were considered not to make use of the European Marine Site to any significant degree but further recent evidence (2000/01 Low Tide Bird Counts) has demonstrated that this species does make use of the EMS and has consequently now been included.

Key supporting habitats

Intertidal mudflats and sandflats - The extensive mudflats and sandflats of the Severn Estuary provide undisturbed refuge and a rich resource of intertidal invertebrates as food for many species of migratory birds. The Severn supports massive populations of birds, many of which are highly mobile, feeding and roosting in different areas, depending on food availability and the state of the tide.

The European white-fronted geese roost at night on estuarine sandbanks and usually fly less than 10km to the daytime feeding grounds. Therefore conservation of traditional roosting sites is necessary to enable the population to exploit potential feeding habitats. The sandbanks adjacent to the New Grounds at Slimbridge are a long established, traditional wintering area for the European white-fronted geese (Owen *et al.*, 1986) where they use Waveridge Sand, Frampton Sand and the Noose. Only occasionally will small numbers occur at other localities within the Severn Estuary. Shelduck exploit the rich resources of invertebrates found in the intertidal mudflats where they forage for molluscs and other invertebrates such as the mudsnail *Hydrobia* spp, mussels *Mytilus edulis* and small crustaceans such as the common shore crab *Carcinus maenas*. They feed in groups, and are distributed widely throughout the estuary where there are extensive areas of intertidal flats, but there are major concentrations on Bridgwater Bay, around the mouth of the Rhymney river and, prior to construction of the Cardiff Barrage, in Cardiff Bay (Ferns, 1980a; Fox & Salmon, 1988a; Clarke, 1989; WWT Wetlands Advisory Service, April 2003). Bridgwater Bay is a long established traditional moulting area for shelduck during late summer and autumn (Eltringham & Boyd, 1960, 1963; Morley, 1966; Fox & Salmon, 1988a). It is the largest single moulting area in Europe away from Waddensea.

Redshank and dunlin are distributed widely and feed throughout the estuary on marine polychaete worms, crustaceans and molluscs such as the Baltic tellin *Macoma balthica*. They frequently feed along undisturbed strandlines throughout the estuary. They favour areas that have abundant invertebrate prey species and unrestricted views for the early detection of predators. The location of

feeding birds on the intertidal flats is a reflection of the invertebrate species found there which, in turn, are dependent on the sediment type. Dunlin and redshank mainly feed on invertebrates in the muddier finer sediments. Dunlin are found mostly on the mid shore whereas redshank are more thinly distributed and are often found in smaller groups in the creeks and sub-estuaries. The Severn has the third largest wintering population of Dunlin in Britain. Feeding flocks are widely distributed around the estuary particularly downstream of the first Severn Bridge, with particular concentrations at Rhymney/Peterstone, Uskmouth, Welsh Grounds, Undy, Clevedon and Bridgwater Bay (Ferns, 1977; Mudge, 1979; Ferns, 1980a; Clark, 1989). There are notable concentrations of redshank at the mouths of the Rhymney, Wye, Avon and Parrett rivers (Ferns, 1977, 1980a; Clark, 1989; WWT Wetlands Advisory Service, April 2003).

Gadwall are predominantly a freshwater species preferring the wetland habitats that occur within the SPA behind the flood defences and therefore outside the European Marine Site- most notably the freshwater wetlands at Slimbridge and Bridgwater bay. However, they do make use of the estuary but this is largely restricted to areas where freshwater flows come into the estuary, particularly larger rivers and ponds- most notably at Avonmouth, between the two Severn Bridges and at Woodspring and Weston Bays.

Saltmarsh - Upper and lower saltmarsh provide important feeding and roosting areas for the internationally important migratory birds throughout the estuary. The saltmarshes provide a rich feeding habitat for redshank and shelduck, which feed on invertebrate species in the sediments, such as the mudsnail *Hydrobia*. The European white-fronted geese graze on a range of saltmarsh grasses and herbs such as common saltmarsh grass *Puccinellia maritima* and sea barley *Hordeum marinum*. The birds feed on the saltmarsh and the transition to coastal grazing marsh in front of the sea defences in the upper estuary and particularly at the The Dumbles.

The saltmarshes also have an important function providing a safe haven from the tides that flood the mudflats twice a day. The low-growing dense vegetation provides a suitable roosting habitat for redshank and dunlin, which prefer to roost on areas of short vegetation ensuring good visibility. The saltmarshes throughout the estuary provide an important communal roosting site for redshank, dunlin and shelduck. Upper saltmarsh in particular makes ideal highwater roost sites and there are main high tide roosts in some areas with little human disturbance where waders congregate from their feeding areas.

Hard substrate habitats (rocky shores) - the shingle and rocks in the estuary provide feeding areas for dunlin and redshank and some limited foraging at high tide. It also provides important roost sites at high tide particularly for the dunlin and redshank. Many of the rocks are off shore and are therefore generally free from human disturbance. These include Guscar Rocks in the upper reaches, Blackstone Rocks at Clevedon and Stert Island in Bridgwater Bay.

Freshwater coastal grazing marsh, improved grassland and open standing waters – these supporting habitats lie outside the European Marine Site boundary but within the SPA. They provide key areas for feeding and roosting for all the migratory species particularly at high tide, and mainly on the English side of the Estuary.

3.8.6.2 Internationally important assemblage of waterfowl

Description of the feature

In addition to supporting internationally important populations of individual birds, the Severn Estuary also qualifies under Article 4.2 as a wetland of international importance by regularly supporting over 20,000 waterfowl (Cranswick *et al.*, 1999, JNCC website). A peak count of over 100,000 waterfowl was recorded in the winter season of 1992-93 (Waters *et al.*, 1993). The wintering waterfowl assemblage (consisting of over 68,000 birds) includes all regularly occurring waterfowl.

Species that qualify as a listed component of the assemblage include all the birds covered by section 3.8.6.1 and species present in nationally important numbers.

These species are:

- **Dunlin** (migratory passage populations)
- **Redshank** (migratory passage populations)
- **Wigeon**
- **Teal**
- **Pintail**
- **Pochard**
- **Tufted duck**
- **Ringed plover**
- **Grey plover**
- **Curlew**
- **Whimbrel**
- **Spotted redshank**

The JNCC website also lists lapwing, mallard and shoveler as qualifying for future inclusion as part of this assemblage (Stroud, DA, et al., 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough)

Key supporting habitats for the waterfowl assemblage

Since a number of species comprising the waterfowl assemblage are qualifying species in their own right, their habitat requirements are described in sections 3.4 and 3.5 above. This section therefore mainly deals with the habitat requirements of the other assemblage species which form part of the waterfowl assemblage.

Intertidal mudflats and sandflats - Many of the bird species found within the Severn Estuary are highly mobile, feeding and roosting in different areas, depending on food availability, weather and tides. They favour areas that have abundant prey species and unrestricted views for the early detection of predators. Some species of wader such as ringed plover and turnstone will feed on the rich invertebrate fauna associated with rotting seaweed occurring along undisturbed strandlines.

Pintail and Teal are widely distributed around the estuary with a notable concentration at the New Grounds. Pintail are also found at Peterstone/Rhymney. Pochard and tufted duck have a highly clumped daytime distribution mainly at New Grounds with most others at Peterstone and the mouth of the Rhymney. Large numbers of pochard move onto the estuary in periods of sustained cold weather. There is a large number of wintering ringed plover on the estuary and these numbers swell during the spring and autumn when there is a considerable passage of migrants through the Severn Estuary. There are major concentrations of curlew on the flats above the first Severn Bridge as well as Bridgwater Bay and the Welsh Grounds. The Severn Estuary is a particularly important staging post for whimbrel during autumn and spring passage periods where some birds feed on the mudflats. Spotted redshank are occasionally found on the Axe and Yeo estuaries.

Saltmarsh - Upper and lower saltmarsh provide important feeding and roosting areas for the internationally important assemblage of waterfowl throughout the estuary. The European white-fronted geese graze on a range of saltmarsh grasses and herbs. The birds feed on the saltmarsh and the transition to coastal grazing marsh in front of the sea defences in the upper estuary.

There are areas of well grazed saltmarsh with saltpans at the River Axe and in the upper reaches of the estuary, which are used by wigeon and other wildfowl. Pools in the higher marsh at Bridgwater Bay and in the saltmarsh above the Severn bridges are also attractive to waders and wildfowl, providing invertebrates and shelter. In the winter, ducks such as teal and pintail feed on seeds of saltmarsh plants such as *Salicornia* sp. and *Atriplex* sp. Probing waders such as curlew also feed on the saltmarsh.

The saltmarsh provides a safe haven for the feeding waders and wildfowl from the tides that flood the mudflats twice a day. Upper saltmarsh in particular makes ideal high water roost sites and there are main high tide roosts in some areas with little human disturbance where waders congregate from their feeding areas. Waders in particular, require very short vegetation to afford unrestricted views for the early detection of predators.

Hard substrate habitats (rocky shores) - The shingle and rocks in the estuary provide feeding areas for many wildfowl and waders and important roost sites at high tide. Many of the rocks are off shore and are therefore generally free from human disturbance. These include Guscar Rocks in the upper reaches, Blackstone Rocks at Clevedon and Stert Island in Bridgwater Bay. Whimbrel have major night roosts at Collister Pill and Stert Island and the Stert Island roost is the largest of its kind in Britain. Spotted redshank are also found around Stert Island. Some areas of hard substrate support eelgrass beds which provide a food source for grazing wildfowl species particularly European white-fronted goose and wigeon.

Freshwater coastal grazing marsh, improved grassland and open standing waters – these supporting habitats lie outside the European Marine Site boundary but within the SPA. They provide key areas for breeding, feeding and roosting for all the assemblage species particularly at high tide.

4. Conservation Objectives and Favourable Condition Tables For the European Marine Site

4.1 Conservation objectives for the Severn Estuary / Môr Hafren SAC

The protection and management of the SAC in accordance with Article 6 of the Habitats Directive, including in particular the consideration of plans and projects under Article 6(3) and 6(4), should be carried out in view of the conservation objectives in this section.

4.1.1 SAC interest feature 1: Estuaries

The conservation objective for the “estuaries” feature of the Severn Estuary SAC is to maintain the feature in favourable condition, as defined below:

The feature will be considered to be in favourable condition when, subject to natural processes¹, each of the following conditions are met

- i. the total extent of the estuary² is maintained;
- ii. the characteristic physical form (tidal prism/cross sectional area) and flow (tidal regime) of the estuary is maintained;
- iii. the characteristic range and relative proportions of sediment sizes and sediment budget³ within the site is maintained;
- iv. the extent, variety and spatial distribution⁴ of estuarine habitat communities⁵ within the site is maintained⁶;
- v. the extent, variety, spatial distribution⁴ and community composition of hard substrate habitats and their notable communities^{5(v)} is maintained;
- vi. the abundance of the notable estuarine species assemblages⁷ is maintained or increased;
- vii. the physico-chemical characteristics⁸ of the water column⁹ support the ecological objectives described above;
- viii. Toxic contaminants in water column⁹ and sediment are below levels which would pose a risk to the ecological objectives described above.
- ix. Airborne nutrient and contaminant loads are below levels which would pose a risk to the ecological objectives described above

The meaning of terms ¹⁻⁹ above is explained in **section 4.1.1.1**

Appendix 2 shows the extent of the “estuaries” feature within the Severn Estuary SAC European Marine Site.

4.1.1.1 Explanatory information for the “estuaries” conservation objective

¹ Natural processes in respect of the SAC

Each feature may be subject to both natural processes and human influence. Human influence on the interest features is acceptable provided that it is proved to be / can be established to be compatible with the achievement of the conditions set out under the definition of favourable condition for each interest feature. A failure to meet these conditions, which is entirely a result of natural process will not constitute unfavourable condition, but may trigger a review of the definition of favourable condition.

Dynamic physical process within estuaries can stem from variable weather conditions including one off storm events, and result in changes in wave exposure, riverine floods or tidal surges. These events can move large quantities of sediments and alter channel morphology, which affect current patterns and sediment transport within the estuary.

Where these processes occur without significant anthropogenic influence they fall under the umbrella of 'natural change'. Because estuaries are dynamic systems we can expect the amount and gross distribution of habitats to change in the future. In general estuarine communities and their supporting habitats are intrinsically more dynamic over short timescales when compared to other marine and terrestrial habitats. Some estuarine communities occur in cycles dependent upon the prevailing physical conditions. Features should not necessarily be considered in unfavourable condition caused by the short term disappearance of a particular community due to natural processes.

An important example of natural processes occurring over a longer timescale is that estuaries have a natural tendency to accumulate sediment, thereby changing their form from their original glacial morphology to a state where tidal energy is dissipated by sediment banks and other features such as saltmarsh. This, with other forces of natural change, will therefore cause the width and depth of the estuary to change over time, moving towards a state of dynamic equilibrium or 'most probable state'. As part of this process, the location and extent of saltmarshes and mudflats may change, provided there is capacity to accommodate readjustment. Future developments should aim to avoid impact on the future evolution of the system as where this process is constrained by human influence, the capacity of habitats to accommodate readjustment may be affected.

² Extent of the estuary

The landward limit of the estuary feature is the limit of highest astronomical tide or the site boundary where it is below highest astronomical tide, except where the landward limit is defined as straight lines across the mouths of rivers entering the estuary. The seaward limit is as shown in the map in Appendix 2. Where other Habitats Directive Annex I habitat types occur within the estuary, they also form part of the estuary feature. In addition, there are areas of the estuary which do not form part of other Annex I habitat types.

³ Sediment budget

The sediment budget refers to the total amount of sediment within the Severn Estuary taking into account the balance of sediment inputs and outputs.

⁴ Spatial distribution

Spatial distribution of estuarine communities refers to the macro spatial pattern in which communities are distributed around the estuary. This statement does not require micro-distribution of communities e.g. the exact mapped positions of specific communities to be maintained.

⁵ Estuarine habitat communities

Note: sections i – iv below list the habitat types which are also features of the Severn Estuary SAC in their own right as well as being 'sub-features' of the estuary feature. The detailed definitions of favourable conservation status for these features are provided under their respective conservation objectives.

- i. Subtidal sandbanks (*see section 4.1.2 for the conservation objective for this feature*)
 - Sublittoral Sands and Muddy Sands
 - Sublittoral cohesive mud and sandy mud communities
- ii. Intertidal mudflats and sandflats (*see section 4.1.3 for the conservation objective for this feature*)
 - Intertidal gravel and clean sands
 - Intertidal muddy sands
 - Intertidal muds

- iii. Atlantic saltmeadows (*see section 4.1.4 for the conservation objective for this feature*)
 - Low – mid marsh communities
 - Mid – upper marsh communities
 - Transitional high marsh communities
 - Pioneer marsh communities
- iv. Reefs of *Sabellaria alveolata* (*see section 4.1.5 for the conservation objective for this feature*)
 - *Sabellaria alveolata* on variable salinity sublittoral mixed sediment (subtidal)
 - *Sabellaria alveolata* reefs on sand-abraded eulittoral rock (contiguous subtidal and intertidal)
- v. Hard substrate habitat notable communities
 - *Sabellaria alveolata* reefs on sand-abraded eulittoral rock (MLR.Sab.Salv)
 - *Hydroids, ephemeral seaweeds and Littorina littorea* in shallow eulittoral mixed substrata pools. (LR.RkpH)
 - *Balanus crenatus* and *Tubularia indivisa* on extremely tide-swept circalittoral rock. (ECR.BS.BalTub)
 - *Fucus serratus* and piddocks on lower eulittoral soft rock (MLR.Fser.Pid)
 - *Mytilus edulis* and piddocks on eulittoral firm clay (MLR.MytPid)
 - *Balanus crenatus*, *Halichondria panacea* and *Alcyonidium diaphanum* on extremely tide-swept sheltered circalittoral rock (ECR.BalHpan)
 - *Sertularia cupressina* and *Hydrallmania falcate* on tide-swept sublittoral cobbles or pebbles in coarse sand (IGS.ScupHyd).
 - *Corrallina officinalis* and coralline crusts in shallow eulittoral rockpools (LR.Rkp.Cor)
 - Eel grass (*Zostera*) beds
 - Peat and clay exposures
 - Any other notable hard substrata communities that may be identified.

⁶Maintained

Since the late 1990s Natural England's condition assessment has identified that parts of the saltmarsh within the Severn Estuary appear to be exhibiting the effects of coastal squeeze. For this reason NE and CCW do not consider it sufficient simply to seek to maintain the existing saltmarsh resource, rather it is our advice that measures will be required which seek to recreate the approximate extent of saltmarsh habitat present within the estuary in 1995 (the year the Severn Estuary was first identified as a proposed SAC); whilst at all times working within the framework of seeking a sustainable estuary form. N.B. This is based upon a site specific consideration of the state of habitats within the Severn Estuary, and should not be extended to other sites on the basis of this advice.

⁷Notable estuarine species assemblages

- i. Assemblage of fish species:
 - Migratory species
 - River and Sea Lamprey and Twait shad (Annex 1 species) and Allis shad
 - Sea trout, salmon, eel,
 - Estuarine species
 - Species typically occurring and breeding in estuaries (Bird, 2008)
 - Marine species occurring in large numbers in estuaries (Bird, 2008)
 - Marine species
 - Predominantly marine species occurring infrequently in the Severn (Bird, 2008)
 - Freshwater species
 - Species typically occurring and breeding in freshwater and recorded within the Severn cSAC (Bird, 2008)

- ii Assemblage of waterfowl species (refer also sections 4.2 and 4.3 on the SPA and Ramsar Site):
 - Regularly occurring Annex 1 species - Bewicks' swan
 - Regularly occurring migratory species - European white-fronted goose, dunlin, redshank, shelduck, gadwall
 - Nationally important bird populations - wigeon, teal, pintail, pochard, tufted duck, ringed plover, grey plover, curlew, whimbrel and spotted redshank
- iii. Assemblage of vascular plant species:
 - Salt marsh species (refer to notes 5 and 6 in section 4.1.4.1 - explanatory information on the conservation objective for the Atlantic salt meadows feature)
 - Eel grass (*Zostera*) species.

⁸ Physico-chemical characteristics

These include nutrients, oxygen, turbidity, pH, temperature and salinity.

⁹ Water column

Water column should be read to include contributory water flows into the estuary including surface flows over mudflats and saltmarsh.

4.1.2 SAC interest feature 2: Subtidal sandbanks which are covered by sea water all the time (subtidal sandbanks)

The conservation objective for the “subtidal sandbanks” feature of the Severn Estuary SAC is to maintain the feature in favourable condition, as defined below:

The feature will be considered to be in favourable condition when, subject to natural processes¹, each of the following conditions are met:

- i. the total extent of the subtidal sandbanks² within the site is maintained;
- ii. the extent and distribution³ of the individual subtidal sandbank communities⁴ within the site is maintained;
- iii. the community composition⁵ of the subtidal sandbank feature within the site is maintained;
- iv. the variety and distribution³ of sediment types across the subtidal sandbank feature is maintained;
- v. the gross morphology (depth, distribution and profile) of the subtidal sandbank feature within the site is maintained.

The meaning of terms ¹⁻⁵ above is explained in **section 4.1.2.1**

Appendix 3 shows the extent of the “subtidal sandbanks” feature within the Severn Estuary SAC European Marine Site.

4.1.2.1 Explanatory information for the “subtidal sandbanks” conservation objective

¹ Natural processes in respect of the SAC

The meaning of ‘natural processes’ is explained in **section 4.1.1.1**

² Extent of subtidal sandbanks

The subtidal sandbanks in the Severn Estuary change their shape over time and many are ephemeral in nature, although some are relatively stable and long established. The extent of the Annex 1 habitat is considered to include both the actual sandbanks and their associated sediments. Areas of associated sediments have been defined by using the sediment environments of the Bristol Channel Marine Aggregates Resources and Constraints project, commissioned by the National Assembly for Wales (Posford Duvivier and ABP, 2000) Associated sediments have been defined as any area of of subtidal sand-sized sediment within the same sediment environment as a subtidal sandbank. Mobile sediments that form temporary sandbanks are considered to be associated sediments that should be retained in the system, but their location may change. Areas of holocene valley infill (relict sediment) are not mobile under present day estuarine conditions. Therefore, where Holocene infill is exposed, it is not considered to form part of the associated sediments. However, any mobile sand deposited over the infill does contribute to the associated sediments.

³ Distribution

Distribution of sandbank communities and sediments refers to the macro spatial pattern in which these are distributed around the estuary. This statement does not require micro-distribution of communities or sediments e.g. the exact mapped positions of specific communities or sediments to be maintained.

The sand banks of the Middle and Welsh Grounds are relatively permanent sandbank features in the Severn Estuary, along with other long established sandbank features at Cardiff Grounds and in Bridgwater Bay. The tops of these banks are intertidal, and the permanently submerged parts of the banks are considered to contribute to the subtidal sandbanks habitat.

There are other areas of subtidal sandbank habitat within the Estuary, again sometimes the top of the bank may be exposed at low tide, with the submerged sections contributing to the subtidal sandbanks habitat. These banks are more ephemeral in nature, but are still considered part of the feature, and reflect the dynamic nature of the Severn Estuary. The areas where ephemeral subtidal sandbanks are known to occur include areas offshore from Avonmouth and at English Grounds (near Clevedon).

The macro-scale distribution of the subtidal sandbanks should be maintained, and there should be continued presence of ephemeral subtidal sandbanks in the Estuary.

⁴ Subtidal sandbank communities

There are two groups of communities comprising the ‘sub-features’ of the subtidal sandbanks feature:

- Sublittoral Sands and Muddy Sands:
 - i. Infralittoral mobile sand in variable salinity (estuaries)
 - ii. Infralittoral mobile clean sand with sparse fauna
 - iii. *Nephtys cirrosa* and *Macoma balthica* in variable salinity infralittoral mobile sand
 - iv. *Neomysis integer* and *Gammarus* spp. in fluctuating low salinity infralittoral mobile sand
- Sublittoral cohesive mud and sandy mud communities:
 - i. *Capitella capitata* in enriched sublittoral muddy sediments
 - ii. *Nephtys hombergii* and *Tubificoides* spp. in variable salinity infralittoral soft mud
 - iii. *Capitella capitata* and *Tubificoides* spp. in reduced salinity infralittoral muddy sediment*
 - iv. *Nephtys hombergii* and *Macoma balthica* in infralittoral sandy mud*

(* these records have a lower degree of confidence than the other communities listed, i.e. the biotope assessor was uncertain regarding precisely which biotope should be recorded).

⁵ Community composition

Species typical of the subtidal sandbank communities:

Aricidea minuta
Capitella capitata
Diastylis rathkei typica
Eurydice pulchra
Gammarus salinus
Harpinia pectinata
Mediomastus fragilis
Nephtys cirrosa
Nephtys hombergii
Oligochaeta
Pygospio elegans
Pontocrates arenarius
Pseudocuma longicornis
Retusa obtusa
Tubificoides amplivasatus

4.1.3 SAC interest feature 3 : Mudflats and sandflats not covered by seawater at low tide (mudflats and sandflats)

The conservation objective for “mudflats and sandflats” feature of the Severn Estuary SAC is to maintain the feature in favourable condition, as defined below:

The feature will be considered to be in favourable condition when, subject to natural processes¹, each of the following conditions are met:

- i. The total extent of the mudflats and sandflats feature² is maintained;
- ii. the variety and extent of individual mudflats and sandflats communities³ within the site is maintained;
- iii. the distribution⁴ of individual mudflats and sandflats communities³ within the site is maintained;
- iv. the community composition⁵ of the mudflats and sandflats feature within the site is maintained;
- v. the topography of the intertidal flats and the morphology (dynamic processes of sediment movement and channel migration across the flats) are maintained.

The meaning of terms ¹⁻⁵ above is explained in **section 4.1.3.1**.

Appendix 4 shows the extent of the “mudflats and sandflats” feature within the Severn Estuary SAC European Marine Site.

4.1.3.1 Explanatory information for the “mudflats and sandflats” conservation objective

¹ Natural processes in respect of the SAC

The meaning of ‘natural processes’ is explained in **section 4.1.1.1**.

²Extent of the intertidal mudflats and sandflats

The extent of the feature is defined using intertidal Phase 1 survey information, which gives the seaward limit of the feature as the low water mark of spring tides (MLWS) because that is in practice the lower limit to which Phase 1 survey is possible. The feature does not include other intertidal habitats which are not mudflats and sandflats, such as intertidal reefs and rocky shores. This is the basis on which the feature is shown in the map in Figure 4, the total extent being 20,271 ha. However in addition there will be some areas of intertidal mudflat and sandflat seaward of MLWS and down to Lowest Astronomical Tide, which is the absolute seaward limit of this habitat type.

³Mudflat and sandflat communities

There are three groups of communities comprising the “sub-features” of the “Mudflats and sandflats not covered by seawater at low tide” feature:

- Intertidal gravel and clean sand communities

- i. Barren coarse sand shores; **LGS.S.BarSnd**
- ii. Burrowing amphipods and *Eurydice pulchra* in well drained clean sand shores; **LGS.S.AEur**
- iii. Burrowing amphipods and polychaetes in clean sand shores. **LGS.S.AP**
- iv. Talitrid amphipods in decomposing seaweed on the strandline **LGS.S.Tal**
- v. Dense *Lanice conchilega* in tide-swept lower shore sand **LGS.S.Lan**
- vi. Barren shingle or gravel shores **LGS.Sh.BarSh**

• Intertidal muddy sand communities :

- i. Polychaetes and *Cerastoderma edule* in fine sand or muddy sand shores **LMS.MS.PCer**
- ii. *Bathyporeia pilosa* and *Corophium spp.* in upper shore slightly muddy fine sand shores **LMS.MS.BatCor**
- iii. *Macoma balthica* and *Arenicola marina* in muddy sand shores. **LMS.MS.MacAre**

• Intertidal mud communities:

- i. *Hediste diversicolor* and *Macoma balthica* in sandy mud shores: **LMU.SMu.HedMac**
- ii. *Hediste diversicolor*, *Macoma balthica* and *Arenicola marina* in muddy sand or sandy mud shores **LMU.SMu.HedMacAre**
- iii. *Hediste diversicolor* and *Scrobicularia plana* in reduced salinity mud shores **LMU.Mu.HedScr**
- iv. *Hediste diversicolor* and oligochaetes in low salinity mud shores **LMU.Mu.HedOl**
- v. *Hediste diversicolor* and *Streblospio shrubsolii* in sandy mud or soft mud shores **LMU.Mu Hed Str**

Appendix 4a shows the extent of the “mudflats and sandflats” subfeatures within the Severn Estuary SAC European Marine Site.

⁴ Distribution

The distribution of mudflats and sandflats communities refers to the macro spatial pattern in which these communities are distributed around the estuary. This statement does not require micro-distribution of communities e.g. the exact mapped positions of specific communities to be maintained.

⁵ Community composition

Species typical of the mudflat and sandflat communities:

Aphelocheata marioni
Arenicola marina
Bathyporeia pelagica
Corophium volutator
Enchytraeidae
Eurydice pulchra
Hediste diversicolor
Hydrobia ulvae
Macoma balthica
Nephtys cirrosa
Nephtys hombergii
Oligochaeta indet.
Pygospio elegans
Scoloplos armiger
Scrobicularia plana
Streblospio shrubsolii
Tubificoides benedii

4.1.4 SAC interest feature 4: Atlantic salt meadow

The conservation objective for the “Atlantic salt meadow” feature of the Severn Estuary SAC is to maintain the feature in favourable condition, as defined below:

The feature will be considered to be in favourable condition when, subject to natural processes¹, each of the following conditions are met:

- i. the total extent of Atlantic salt meadow and associated transitional vegetation communities² within the site is maintained³;
- ii. the extent and distribution⁴ of the individual Atlantic salt meadow and associated transitional vegetation communities² within the site is maintained;
- iii. the zonation of Atlantic salt meadow vegetation communities and their associated transitions² to other estuary habitats is maintained;
- iv. the relative abundance of the typical species⁵ of the Atlantic salt meadow and associated transitional vegetation communities² is maintained;
- v. the abundance of the notable species⁶ of the Atlantic salt meadow and associated transitional vegetation communities² is maintained.
- vi. the structural variation of the salt marsh sward (resulting from grazing) is maintained within limits sufficient to satisfy the requirements of conditions iv and v above and the requirements of the Ramsar and SPA features⁷
- vii. the characteristic stepped morphology of the salt marshes and associated creeks, pills, drainage ditches and pans, and the estuarine processes that enable their development, is maintained.
- viii. Any areas of *Spartina anglica* salt marsh (SM6) are capable of developing naturally into other saltmarsh communities.⁸

The meaning of terms ¹⁻⁸ above is explained in **section 4.1.4.1**.

Appendix 5 shows the extent of Atlantic salt meadow and its associated transitional vegetation communities within the Severn Estuary SAC European Marine Site.

4.1.4.1 Explanatory information for the “Atlantic salt meadow” conservation objective

¹ Natural processes in respect of the SAC

The meaning of ‘natural processes’ is explained in **section 4.1.1.1**.

² Atlantic salt meadow and associated transitional vegetation communities

The vegetation communities comprising the Atlantic Salt Meadow feature can be grouped into four ‘sub-features’, namely:

- (a) low to mid marsh communities
- (b) mid to upper marsh communities
- (c) transitional high marsh communities
- (d) pioneer saltmarsh communities

The communities in each of these sub-features are listed below.

Sub-features (a) and (b) contain the National Vegetation Classification (NVC) communities which fall within the definition of Atlantic Salt Meadow in the EU Interpretation Manual. The extent of these two sub-features within the SAC is currently estimated at 656 ha. The communities in (c) and (d) do not fall within the Atlantic Salt Meadow definition, but are considered to be important components of this feature as they represent its landward and seaward transitions to other habitat types, namely non-saline vegetation and pioneer salt marsh respectively. Atlantic salt meadow is a naturally dynamic habitat and these transitional communities are considered to be an integral part of the Atlantic Salt Meadow feature and essential elements of its structure and function. The total extent of all four of the above sub-features in the SAC is estimated to be 1400 ha, distributed in the SAC as shown in Appendix 5a.

(a) Low to mid marsh communities:

- i. Transitional low saltmarsh with *Puccinellia maritima*, annual *Salicornia* sp. and *Suaeda maritima* SM10
- ii. *Aster tripolium* (rayed) saltmarsh SM12
- iii. *Puccinellia maritima* saltmarsh SM13
 - o *Puccinellia maritima* sub-community SM13a
 - o *Glaux maritima* sub-community SM13b
 - o *Limonium vulgare* - *Armeria maritima* sub-community SM13c
 - o *Plantago maritima* - *Armeria maritima* sub-community SM13d
 - o *Plantago maritima*-*Triglochin maritima* sub-community SM13x (provisional)
 - o *Spartina anglica* sub-community SM13y (provisional)
- iv. *Atriplex portulacoides* saltmarsh SM14
 - o *Atriplex portulacoides* sub-community SM14a
- v. *Juncus maritimus* - *Triglochin maritima* saltmarsh SM15

(b) Mid to upper marsh communities:

- i. *Festuca rubra* salt-marsh SM16
 - o *Puccinellia maritima* sub-community SM16a
 - o *Juncus gerardii* sub-community SM16b
 - o *Glaux maritima* sub-community SM16c
 - o *Festuca rubra* sub-community SM16d
 - o *Leontodon autumnalis* sub-community SM16e
 - o *Aster tripolium* sub-community SM16x (provisional)
- ii. *Artemisia maritima* saltmarsh SM17
- iii. *Juncus maritimus* salt-marsh SM18
 - o *Festuca arundinacea* sub-community SM18c

(c) Transitional high marsh communities:

- i. *Spergularia marina* - *Puccinellia distans* saltmarsh SM23
 - ii. *Elytrigia atherica* saltmarsh SM24
 - iii. *Elytrigia repens* saltmarsh SM28
 - iv. *Festuca rubra* - *Agrostis stolonifera* - *Potentilla anserina* inundation grassland MG11
 - v. *Festuca arundinacea* coarse grassland MG12
 - vi. *Agrostis stolonifera* - *Alopecurus geniculatus* inundation grassland MG13
 - vii. *Phragmites australis* reedbed S4
 - o *Phragmites australis* sub-community S4a
 - xiii. *Bolboschoenus maritimus* swamp S21
 - o *B. maritimus* sub-community S21a
- Agrostis stolonifera* sub-community S21c

(d) Pioneer saltmarsh communities:

- i. *Spartina anglica* saltmarsh SM6
- ii. Annual *Salicornia* saltmarsh SM8
- iii. *Suaeda maritima* saltmarsh SM9

³Maintained

Since the late 1990s Natural England's condition assessment has identified that parts of the saltmarsh within the Severn Estuary appear to be exhibiting the effects of coastal squeeze. For this reason NE and CCW do not consider it sufficient simply to seek to maintain the existing saltmarsh resource, rather it is our advice that measures will be required which seek to recreate the approximate extent of saltmarsh habitat present within the estuary in 1995 (the year the Severn Estuary was first identified as a proposed SAC); whilst at all times working within the framework of seeking a sustainable estuary form. N.B. This is based upon a site specific consideration of the state of habitats within the Severn Estuary, and should not be extended to other sites on the basis of this advice.

⁴Distribution

The distribution Atlantic salt meadow communities refers to the macro spatial pattern in which these are distributed around the estuary. This statement does not require micro-distribution of communities e.g. the exact mapped positions of specific communities to be maintained.

⁵Typical species of the Atlantic salt meadow

Festuca arundinacea
Festuca rubra
Juncus gerardii
Triglochin maritimum
Carex extensa
Agrostis stolonifera
Juncus maritimus
Oenanthe lachenalii
Puccinellia maritima,
Salicornia spp.
Suaeda maritima
Aster tripolium
Glaux maritima
Plantago maritima
Armeria maritima
Elytrigia atherica
Atriplex prostrata
Phragmites australis
Spartina anglica
Spergularia media
Puccinellia distans
Cochlearia anglica
Cochlearia officinalis
Limonium vulgare
Atriplex portulacoides
Seriphidium maritimum
Plantago coronopus
Beta vulgaris maritima

⁶Notable Atlantic salt meadow vegetation species

Alopecurus bulbosus
Althaea officinalis
Bupleurum tenuissimum
Hordeum marinum
Puccinellia rupestris
Trifolium squamosum
Lepidium latifolium

Allium oleraceum

Petroselinum segetum

⁷ **Severn Estuary SPA and Severn Estuary Ramsar Site Conservation Objectives**

Refer to sections 4.2 and 4.3 of this document

⁸ ***Spartina anglica* SM6**

Spartina in the Severn is considered to be an invasive species and these conservation objectives do not seek the maintenance of the extent or condition of this habitat type. However, SM6 is considered to be a transitional salt marsh community and the conservation objectives seek to protect the ability of areas of *Spartina* to develop into other Atlantic Salt Meadow or transitional communities.

4.1.5 SAC interest feature 5 : Reefs

The conservation objective for the “reefs” feature of the Severn Estuary SAC is to maintain the feature in a favourable condition, as defined below:

The feature will be considered to be in favourable condition when, subject to natural processes¹, each of the following conditions are met:

- i. the total extent and distribution² of *Sabellaria* reef³ is maintained;
- ii. the community composition⁴ of the *Sabellaria* reef is maintained;
- iii. the full range of different age structures of *Sabellaria* reef are present;
- iv. the physical⁵ and ecological processes⁶ necessary to support *Sabellaria* reef are maintained.

The meaning of terms ¹⁻⁶ above is explained in section 4.1.5.1 below.

Appendix 6 shows the extent of the “reef” feature within the Severn Estuary SAC European Marine Site.

4.1.5.1 Explanatory information for the “reefs” conservation objective

¹ Natural processes in respect of the SAC

The meaning of ‘natural processes’ is explained in section 4.1.1.1

² Distribution

The distribution of reefs refers to the macro spatial pattern in which the reefs are distributed around the estuary. This statement does not require micro-distribution of the reefs e.g. the exact mapped positions of specific reefs to be maintained.

³ *Sabellaria* reef

Little is known about the nature of the *Sabellaria alveolata* reef in the Severn Estuary, especially in the subtidal. However, at other sites *S. alveolata* is known to have a very variable recruitment and the cover in any one area may vary greatly over a number of years. *S. alveolata* reefs also cycle through different phases, from newly settled worms through vigorous fast growing reef to older hummocks. It is likely that subtidal *S. alveolata* reef in the Severn Estuary will exhibit reduced growth forms (lower elevation) in comparison to the intertidal reef habitat. The easiest of these phases to identify is the fast growing reef and for the purposes of these conservation objectives this is defined as a dense aggregation of worms (over 1000 per m², as a rough guide), generally forming a thick (2 cm or more) crust of tubes. The area covered by the habitat would generally exceed 25 m² although there could be patchiness within this area. The other phases of growth are also important and are encompassed in point iii of the objective.

The *S. alveolata* reef biotopes recorded in the Severn Estuary are SS.SBR.PoR.SalvMx *Sabellaria alveolata* on variable salinity sublittoral mixed sediment and LS.LBR.Sab.Salv *Sabellaria alveolata* reefs on sand-abraded eulittoral rock.

⁴ Community composition

Species associated with dense aggregations of *Sabellaria alveolata* in the Severn estuary:

Subtidal

Sabellaria alveolata
Eulalia tripunctata

Mediomastus fragilis
Typosyllis armillaris
Ampharete grubei
Harpinia pectinata
Melinna cristata
Pygospio elegans
Scoloplos armiger
Nemertea
Nucula nitidosa
Nucula nucleus
Tubificoides amplivasatus
Golfingia vulgaris vulgaris
Gammarus salinus
Tubificoides
Arenicola marina
Sphenia binghami
Eumida sanguinea
Nephtys hombergii
Autolytus prolifera
Harmothoe impar
Nematoda
Polycirrus
Dodecaceria concharum
Harmothoe
Syllidae
Enchytraeidae

Intertidal

Sabellaria alveolata,
Actinia equina
Cancer pagurus
Elminius modestus
Littorina saxatilis
L.littorea
L.obtusata
Pholas dactylus
Pomatocerus lamarcki
Porcellana platycheles
Semibalanus balanoides
Halichondrea sp
Corallina officinalis
Enteromorpha sp.
Fucus serratus
Fucus vesiculosus
Pelvetia canaliculata
Porphyra sp
Ulva sp

⁵Physical processes

- abundance of suitable coarse sediments to support reef growth (tube building)
- the availability of suitable substrates where *Sabellaria* has been known to occur in the past

⁶Ecological Processes

- supply of *Sabellaria* larvae (within the water column)
- abundance of food (suspended detritus material) within the water column to support feeding

4.1.6 SAC interest feature 6 : River lamprey *Lampetra fluviatilis*

The conservation objective for the river lamprey *Lampetra fluviatilis* feature of the Severn Estuary SAC is to maintain the feature in a favourable condition, as defined below:

The feature will be considered to be in favourable condition when, subject to natural processes¹, each of the following conditions are met:

- i. the migratory passage of both adult and juvenile river lamprey through the Severn Estuary between the Bristol Channel and any of their spawning rivers is not obstructed or impeded by physical barriers, changes in flows, or poor water quality;
- ii. the size of the river lamprey population in the Severn Estuary and the rivers which drain into it, is at least maintained and is at a level that is sustainable in the long term;
- iii. the abundance of prey species² forming the river lamprey's food resource within the estuary, is maintained.
- iv. Toxic contaminants in the water column³ and sediment are below levels which would pose a risk to the ecological objectives described above.

The meaning of terms ¹⁻³ above is explained in **section 4.1.6.1**.

Note : The river lamprey population of the Severn depends on habitat in the adjacent River Usk SAC, River Wye SAC and River Severn. The habitats in these rivers, including spawning and nursery areas, are essential for the fulfilment of the species' lifecycle and therefore the Severn Estuary river lamprey feature can only be in favourable condition if the conservation objectives pertaining to the River Usk SAC and River Wye SAC river lamprey feature are also met in full and there is a continued recorded presence of this species in the River Severn.

4.1.6.1 Explanatory information for the river lamprey *Lampetra fluviatilis* conservation objective

¹ Natural processes in respect of the SAC fish features

River lamprey population:

The size of the population is subject to non anthropogenic factors relating to natural fluctuations of external factors such as food / host availability in the Bristol Channel and more widely and breeding success in the River Severn and other rivers draining into the Severn Estuary.

Supporting habitats

The general meaning of 'natural processes' with respect to the supporting habitats of river lamprey within the estuary is explained in **section 4.1.1.1**

² Prey species

Sea trout *Salmo trutta*, shad *Alosa fallax/Alosa alosa*, herring *Clupea harengus*, sprat *Sprattus sprattus*, flounder *Platichthys flesus* and small gadoids such as whiting *Merlangius merlangus* and pout *Trisopterus luscus* are all potential prey species for the river lamprey found within the Severn Estuary (Bird 2008).

³Water column

Water column should be read to include contributory water flows into the estuary including surface flows over mudflats and saltmarsh.

4.1.7 SAC interest feature 7: The conservation objective for sea lamprey *Petromyzon marinus*

The conservation objective for the sea lamprey *Petromyzon marinus* feature of the Severn Estuary SAC is to maintain the feature in a favourable condition, as defined below:

The feature will be considered to be in favourable condition when, subject to natural processes¹, each of the following conditions are met:

- i. the migratory passage of both adult and juvenile sea lamprey through the Severn Estuary between the Bristol Channel and any of their spawning rivers is not obstructed or impeded by physical barriers, changes in flows, or poor water quality;
- ii. the size of the sea lamprey population in the Severn Estuary and the rivers which drain into it, is at least maintained as is at a level that is sustainable in the long term;
- iii. the abundance of prey species² forming the sea lamprey's food resource within the estuary, is maintained.
- vi. Toxic contaminants in the water column³ and sediment are below levels which would pose a risk to the ecological objectives described above.

The meaning of terms ¹⁻³ above is explained in **section 4.1.7.1**.

Note : The sea lamprey population of the Severn depends on habitat in the adjacent River Usk SAC, River Wye SAC and River Severn. The habitats in these rivers, including spawning and nursery areas, are essential for the fulfilment of the species' lifecycle and therefore the Severn Estuary sea lamprey feature can only be in favourable condition if the conservation objectives pertaining to the River Usk SAC and River Wye SAC sea lamprey shad feature are also met in full and there is a continued recorded presence of this species in the River Severn.

4.1.7.1 Explanatory information for the sea lamprey *Petromyzon marinus* conservation objective

¹ Natural processes in respect of the SAC fish features

Sea lamprey population:

The size of the population is subject to non anthropogenic factors relating to natural fluctuations of external factors such as food / host availability in the Bristol Channel and more widely and breeding success in the River Severn and other rivers draining into the Severn Estuary.

Supporting habitats:

The general meaning of 'natural processes' with respect to the supporting habitats of sea lamprey within the estuary is explained in **section 4.1.1.1**.

²Prey species

Eel *Anguilla anguilla*, cod *Gadus morhua*, and haddock *Melanogrammus aeglefinus* are all potential prey species for the sea lamprey found within the Severn Estuary (Bird 2008)

³Water column

Water column should be read to include contributory water flows into the estuary including surface flows over mudflats and saltmarsh.

4.1.8 SAC interest feature 8: The conservation objective for twaite shad *Alosa fallax*

The conservation objective for the twaite Shad *Alosa fallax* feature of the Severn Estuary SAC is to maintain the feature in a favourable condition, as defined below:

The feature will be considered to be in favourable condition when, subject to natural processes¹, each of the following conditions are met:

- i. the migratory passage of both adult and juvenile twaite shad through the Severn Estuary between the Bristol Channel and their spawning rivers is not obstructed or impeded by physical barriers, changes in flows or poor water quality;
- ii. the size of the twaite shad population within the Severn Estuary and the rivers draining into it is at least maintained and is at a level that is sustainable in the long term.
- iii. the abundance of prey species² forming the twaite shad's food resource within the estuary, in particular at the salt wedge³, is maintained.
- iv. Toxic contaminants in the water column⁴ and sediment are below levels which would pose a risk to the ecological objectives described above.

The meaning of terms¹⁻⁴ above is explained in **section 4.1.8.1**.

Note : The twaite shad population of the Severn depends on habitat in the adjacent River Usk SAC, River Wye SAC and River Severn. The habitats in these rivers, including spawning and nursery areas, are essential for the fulfilment of the species' lifecycle and therefore the Severn Estuary twaite shad feature can only be in favourable condition if the conservation objectives pertaining to the River Usk SAC and River Wye SAC twaite shad feature are also met in full and there is a continued recorded presence of this species in the River Severn.

4.1.8.1 Explanatory information for the Twaite shad *Alosa fallax* conservation objective

¹ Natural processes in respect of the SAC fish features

Twaite shad population:

The size of the population is subject to non anthropogenic factors relating to natural fluctuations of external factors such as food availability in the Bristol Channel and more widely and breeding success in the River Severn and other rivers draining into the Severn Estuary.

Supporting habitats:

The general meaning of 'natural processes' with respect to the supporting habitats of twaite shad within the estuary is explained in **section 4.1.1.1**.

² Prey species

Small crustaceans, especially mysids and copepods, small fish, especially sprats and anchovies, and fish eggs (Maitland, P.S. & Hatton-Ellis 2003).

³ Salt wedge

This the area within the estuary where fresh and saline water meet and where the abundance of prey species is particularly important to the twaite shad population. The actual position varies according to the state of the tide and volume of freshwater input to the estuary.

⁴Water column

Water column should be read to include contributory water flows into the estuary including surface flows over mudflats and saltmarsh.

4.1.9 Favourable Condition Tables for the SAC interest features of the Severn Estuary European Marine Site

Background information on the role of favourable condition tables and the information provided in each column is provided in Section 1.8 of this document, and a concise glossary of terms used is provided in Section 7.

The favourable condition table is intended to supplement the conservation objectives, including with respect to the management of established and ongoing activities, future requirements of monitoring and reporting on the condition of the features of the site and, together with the conservation objectives, informs the scope and nature of any appropriate assessment that may be needed. The table **does not by itself** provide a comprehensive basis on which to assess plans and projects as required under the Habitats Regulations. It should be noted that appropriate assessments are a separate activity to condition monitoring, requiring consideration of issues specific to individual plans or projects.

These tables set out all the attributes that **may** be used to monitor the condition of the features of the SAC. Where possible we will seek available information from others which can inform our assessment process.

It will be possible to monitor many of the attributes at the same time or during the same survey. The frequency of sampling for many attributes may need to be greater during the first reporting cycle in order to characterise the site and establish the baseline. Where relevant, abbreviations of National Vegetation Classification (NVC) codes are used for simplicity (Rodwell, 2000).

Comprising :

Table 8 – Favourable condition table for the “estuaries” feature of the Severn Estuary SAC and (in part) for the Ramsar Site (refer to section 4.3.1)

Table 9 – Favourable condition table for the “subtidal sandbanks” feature of the Severn Estuary SAC

Table 10 – Favourable condition table for the “intertidal mudflats and sandflats” feature of the Severn Estuary SAC

Table 11 – Favourable condition table for the “Atlantic salt meadows” feature of the Severn Estuary SAC

Table 12 – Favourable condition table for the “reefs” feature of the Severn Estuary SAC

Table 13 – Favourable condition table for the “river lamprey” and “sea lamprey” features of the Severn Estuary SAC

Table 14 – Favourable condition table for the “twait shad” feature of the Severn Estuary SAC

Table 8 – Favourable condition table for the “estuaries” feature of the Severn Estuary SAC and (in part) for the Ramsar Site (refer to section 4.3.1)

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
A1	SAC interest feature 1: Estuaries		Extent <i>(Total extent of the estuaries feature - section 4.1.1.i of the conservation objectives)</i>	Total area (ha) of estuary feature	No decrease in extent due to man induced changes from the established baseline <i>The baseline is the extent of all areas subject to tidal influence within the boundary of the designation of the pSAC in 2000 - see also map in Appendix 2</i>	Extent is an attribute on which reporting is required by the Habitats Directive.
A2		All sub-features	Morphology <i>(Characteristic physical form and flow - section 4.1.1.ii of the conservation objectives)</i>	Intra and inter-estuarine Tidal Prism/Cross Section ratio (TP/CS ratio) measured during the reporting cycle using remote sensing (frequency to be determined).	The intra- and inter- estuarine TP/CS relationship should not deviate significantly from an established baseline subject to natural processes (* includes recognition of fixed hard geology formations) <i>Baseline to be established :- Data to be used is Hydrological Office bathymetry data (intertidal and subtidal) and Environment Agency LIDAR survey</i>	TP = Tidal Prism = total volume of water crossing a given cross section during the flood tide (m ³). CS = Area of a given cross section at high water springs (m ²). The relationship between TP & CS provides a measure of the way the estuary has adjusted to tidal energy. Substantial departures from this characteristic relationship (determined on a regional basis) may indicate the influence of anthropogenic factors and this would trigger more detailed evaluation of potential problems. The identification of a suitable baseline for TP/CS relationship will need to take account of the highly dynamic nature of the Severn and potential impacts of natural processes (including sea level rise) in altering the profile of the estuary – with a view to maintaining or promoting the movement of the estuary towards “dynamic equilibrium”. *The hard geology formations (headlands, cliffs and rock platforms) have a major role in influencing the characteristic physical form and flow of the estuary (many are protected in their own right as geological SSSI).

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
A3	SAC interest feature 1: Estuaries		Tidal regime and flows (saline water and freshwater contributions) <i>(characteristic physical form and flow - section 4.1.1.ii of the conservation objectives)</i>	Tidal range, measured from tide gauges at specified locations, and flows measured from current estuary and river meters . Locations and frequency to be determined	No decrease in tidal range subject to natural processes. Tidal currents should not deviate significantly from an established baseline subject to natural processes Riverine flows (Rivers Wye, Usk and Severn) and estuarine flows must be sufficient to ensure Water Framework Directive target of Good Ecological Status (GES) is met. <i>Baseline to be established :- Data to be used is existing tide gauge and current meter data from EA ca 2000, and agreed WFD monitoring measures.</i>	

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
A4			Sediment budget <i>(characteristic range and relative proportions of sediment sizes and sediment budget - section 4.1.1.iii of the conservation objectives)</i>	Evaluation of the sediment fluxes, sources and sinks, using a variety of measures including bathymetry, suspended sediment concentrations, fluvial and marine influx/efflux, man-made changes (e.g. navigational dredging/marine minerals extraction), cliff erosion etc)	No decrease in sediment budget from the established baseline <i>Baseline to be established :- Data to be used is Severn Estuary Coastal Habitat Management Plan (CHaMP) Part F- Sediment Budget Analysis</i>	<p>A sediment budget is a balance of the sediment volume entering and exiting a particular section of the coast or an estuary. Sediment budget analysis consists of the evaluation of sediment fluxes, sources and sinks from different processes that give rise to additions and subtractions within a control volume (e.g. a section of coast or an estuary) in order to gain a better understanding of the estuary system.</p> <p>An estuary provides a readily defined control volume, where point sources and sinks exist in the form of rivers, other terrestrial outfalls and the open sea. Line sources and sinks may be defined in terms of erosion from cliffs and transfers to or from saltmarshes, wetlands or other intertidal areas. The subtidal beds also needs consideration as an important source/sink as does material stored in suspension within the volume of water that moves back and forth under tidal action within the estuary.</p> <p>Identification and quantification of all the mechanisms giving rise to sediment transfers can be difficult, and for the most part are approximate estimates of sediment exchange between sources and sinks.</p> <p>Reference ; ABPmer and HR Wallingford (2007).</p>
A5	SAC interest feature 1: Estuaries		Sediment size, range and distribution <i>(characteristic range and proportions of sediment sizes and sediment budget - section 4.1.1.iii of the conservation objectives)</i>	Sediment size distribution characterised and measured by particle size analysis (PSA) at a series of locations across the estuary during the reporting cycle (locations and frequency to be determined)	Sediment size distribution should not deviate from an established baseline. <i>Baseline to be established :- Data to be used is BGS seabed sediment data and other relevant datasets ?</i>	PSA measures parameters including percentage sand/silt/gravel, mean and median grain size and sorting co-efficient, used to characterise sediment type. Sediment character is key to the structure of the features and reflects the physical processes acting on it – it may vary across the estuary and can be used to indicate the spatial distribution of sediment types reflecting the stability of the features and the processes supporting it..
A6		Subtidal sandbanks	Extent, variety and spatial distribution of estuarine habitat communities <i>(section 4.1.1.iv of the conservation objectives)</i>	<i>For information on the attributes of the subtidal sandbank communities sub-feature see the sections of this table which relate to the subtidal sandbanks which are covered by seawater all the time feature, see Table 9</i>		

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
A7		Intertidal mudflat and sandflat communities	Extent, variety and spatial distribution of estuarine habitat communities (section 4.1.1.iv of the conservation objectives)			<i>For information on the attributes of the intertidal mudflat & sandflat communities sub-feature see the sections of this table which relate to the intertidal mudflats and sandflats not covered by seawater at low tide feature, see Table 10</i>
A8		Atlantic salt meadow (and associated transition habitats)	Extent, variety and spatial distribution of estuarine habitat communities (section 4.1.1.iv of the conservation objectives)			<i>For information on the attributes of the Atlantic salt meadow communities sub-feature see the sections of this table which relate to Atlantic salt meadow feature, see Table 11</i>
A9		Reefs of <i>Sabellaria alveolata</i>	Extent, variety and spatial distribution of estuarine habitat communities (section 4.1.1.iv of the conservation objectives)			<i>For information on the attributes of the Reef sub-feature see the sections of this table which relate to the Reef feature, see Table 12</i>

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
A10	SAC interest feature 1: Estuaries	Hard substrate habitats and their notable communities	Extent & variety <i>(extent, variety, spatial distribution and community composition of hard substrate habitats and their notable communities - section 4.1.1.v of the conservation objectives)</i>	Area (ha) and range of types of hard substrate habitats and their notable communities, measured periodically during the reporting cycle along sampling transects or grids (frequency to be determined).	No decrease in extent or range of types of hard substrate habitats and their notable communities from the established baseline subject to natural processes. <i>Baseline is the CCW and English Nature Intertidal Biotope Surveys 2006.</i>	Loss of hard substrate habitats and their notable communities is likely to be detrimental to the structure of the interest feature, e.g. associated with a change in estuary processes and may indicate long term changes in the physical conditions of the estuaries interest feature. Notable communities of the Severn Estuary comprise the following <ul style="list-style-type: none"> • <i>Sabellaria alveolata</i> reefs on sand-abraded eulittoral rock (MLR.Sab.Salv) • <i>Hydroids, ephemeral seaweeds and Littorina littorea</i> in shallow eulittoral mixed substrata pools. (LR.RkpH) • <i>Balanus crenatus</i> and <i>Tubularia indivisa</i> on extremely tide-swept circalittoral rock.(ECR.BS.BalTub) • <i>Fucus serratus</i> and piddocks on lower eulittoral soft rock (MLR.Fser.Pid) • <i>Mytilus edulis</i> and piddocks on eulittoral firm clay (MLR.MytPid) • <i>Balanus crenatus</i>, <i>Halichondrea panicea</i> and <i>Alcyonidium diaphanum</i> on extremely tide-swept sheltered circalittoral rock (ECR.BalHpan) • <i>Sertularia cupressina</i> and <i>Hydrallmania falcate</i> on tide-swept sublittoral cobbles or pebbles in coarse sand (IGS.ScupHyd). • <i>Corralina officinalis</i> and coralline crusts in shallow eulittoral rockpools (LR.rkp.Cor) • Eel grass (<i>Zostera</i>) beds • Any other notable hard substrata communities that may be identified.
A11			Spatial distribution <i>(extent, variety, spatial distribution and community composition of notable communities - section 4.1.1.v of the conservation objectives)</i>	Spatial distribution of notable communities measured periodically during the reporting cycle using a combination of remote sensing and ground truthing using GPS (frequency to be determined).	Macroscale distribution of notable communities should not deviate significantly from the established baselines, subject to natural processes. <i>Baseline is the CCW and English Nature Intertidal Biotope Surveys 2006.</i>	Changes in the variety or distribution of notable estuarine communities may indicate long term changes in the physical conditions of the estuary interest feature or individual subfeatures.

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
A12	SAC interest feature 1: Estuaries	Hard substrate habitats and their notable communities	Community composition <i>(extent, variety, spatial distribution and community composition of notable communities - section 4.1.1.v of the conservation objectives)</i>	Assessment of community quality through survey of species composition (presence of typical species) within the notable communities measured periodically	No decline in community quality due to changes in species composition or loss of typical species from an established baseline <i>Baseline to be established : Data to be used : CCW and English Nature Intertidal Biotope Surveys 2006 and future surveys</i>	Different associations of plants, animals and their habitat are an important structural and functional aspect of the feature. Changes in the communities present within an area of a particular type may indicate long-term changes in physical conditions at the site. Typical species of the notable communities to be determined.
A13		Notable estuarine species assemblages : Assemblage of fish species	Abundance <i>(abundance of notable estuarine species assemblages - section 4.1.1.vi of the conservation objectives)</i>	Numbers of species and population estimates	No significant reduction in overall diversity of species or in individual populations against an established baseline <i>Baseline to be established : Data to be used : Environment Agency and relevant Sea Fisheries Committee data</i>	Loss of notable communities may indicate long term changes in the physical conditions of the estuaries interest feature or individual subfeatures. Assemblage of fish species: (Refer to section 4.1.1 note 7) • Migratory species (see also section of this table which relates to the river lamprey, sea lamprey and twaite shad features) • Estuarine species • Marine species • Freshwater species Refer also to section 4.3.2 in relation to the assemblage of migratory fish species of the Ramsar Site.
A14		Notable estuarine species assemblages : Assemblage of waterfowl species	Abundance <i>(abundance of notable estuarine species assemblages - section 4.1.1.vi of the conservation objectives)</i>	Numbers of species and individual population sizes	No significant reduction in overall diversity of species or in individual populations against an established baseline <i>Baselines are identified in the SPA section of this advice – see section 4.2</i>	Loss of notable communities may indicate long term changes in the physical conditions of the estuaries interest feature or individual subfeatures. Refer also to section 4.2.7 in relation to the Internationally important assemblage of waterfowl of the Severn Estuary SPA and section 4.3.9 in relation to the Internationally important assemblage of waterfowl of the Severn Estuary Ramsar Site
A15		Notable estuarine species assemblages : Assemblage of vascular plant species	Abundance of saltmarsh species <i>(abundance of notable estuarine species assemblages - section 4.1.1.vi of the conservation objectives)</i>	Number of species and population sizes	No significant reduction in overall diversity of species or in individual populations against an established baseline <i>Baselines to be established: Data to be used is 1998 NVC Scarce plant survey, county botanical records and CCW/NE site records</i>	Loss of notable communities may indicate long term changes in the physical conditions of the estuaries interest feature or individual subfeatures. Assemblage of vascular plant species includes: • Salt marsh species Note : maintaining the conditions necessary for these species are covered by the Atlantic salt meadows table attributes Table 11

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
A16	SAC interest feature 1: Estuaries	Notable estuarine species assemblages : Assemblage of vascular plant species	Abundance of Eel grass	Extent and density of Eel grass species	No significant reduction in overall extent and density against as established baseline <i>Baseline is CCW and English Nature Intertidal Biotope Surveys 2006 plus Severn Second Crossing monitoring data 1989-95/6</i>	Assemblage of vascular plant species includes: • Eel grass (<i>Zostera</i>) species.
A17		All sub-features	Water quality – physico-chemical parameters (Including temperature, salinity, oxygen, nutrients, pH and turbidity etc) <i>(physico chemical characteristics of the water column - section 4.1.1.vii of the conservation objectives)</i>	Physico-chemical parameters measured periodically throughout the reporting cycle (frequency to be determined).	Physico-chemical parameters should not pose a risk to the ecology* of the habitats and species of the SAC, SPA or Ramsar Site. Levels should comply with targets established under the EA Review of Consents and the Water Framework Directive.	Changes in any of the physico-chemical parameters in the water column can impact on the quality of the estuary habitat and hence could lead to changes in the presence and distribution of species (along with recruitment processes and spawning behaviour) and those at the edge of their geographic ranges and non-natives. *ie does not compromise the quality, extent, distribution or species composition of habitats or their ability to support species features (eg feeding, breeding, resting) – the outcome sought is the healthy functioning of the estuary.
A18			Phytoplankton <i>(physico chemical characteristics of the water column - section 4.1.1.vii of the conservation objectives)</i>	Average phytoplankton biomass and characteristic species in summer, measured periodically during the reporting cycle.	Growth of phytoplankton does not cause an undesirable disturbance to the estuary habitats and species Levels should comply with targets established under the EA Review of Consents and the Water Framework Directive.	
A19			Macroalgae	Average macroalgal cover and density in summer, measured periodically during the reporting cycle.	Average macroalgal cover and density should not compromise the ecology * of the estuary habitats and species Levels should comply with targets established under the EA Review of Consents and the Water Framework Directive.	*ie does not compromise the quality, extent, distribution or species composition of habitats or their ability to support species features (eg feeding, breeding, resting) – the outcome sought is the healthy functioning of the estuary.

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
A20	SAC interest feature 1: Estuaries		Toxic contaminants <i>(toxic contaminants in water column and sediment - section 4.1.1.viii of the conservation objectives)</i>	Toxic contaminants measured periodically throughout the reporting cycle (frequency to be determined).	Toxic contaminants in water column and sediment should be below levels which would pose a risk to the ecology* of the estuary habitats and species Levels should comply with targets established under the EA Review of Consents and the Water Framework Directive	Elevated concentrations of toxic contaminants in the water column and sediment have the potential to cause lethal or sub-lethal harm to any features and sub-features. *ie does not compromise the quality, extent, distribution or species composition of habitats or their ability to support species features (eg feeding, breeding, resting) – the outcome sought is the healthy functioning of the estuary.
A21			Airborne nutrient and contaminants <i>(airborne contaminants - section 4.1.1.ix of the conservation objectives)</i>	Airborne contaminants measured periodically throughout the reporting cycle (frequency to be determined)	No exceedence of critical loads for: Sulphur dioxide - 20µg/m ³ Nitrous Oxides - 30µg/m ³ Ozone - 3000 ppb Ammonia - 3µg/m ³ Nutrient Nitrogen - 30-40 kg/ha/yr.	Critical loads have been defined where possible (www.apis.ac.uk) for the conservation features of the European site. Where the critical load is exceeded features are at risk. As more in depth studies are undertaken critical loads will be altered to reflect best available scientific knowledge. The impacts of air pollution on the vegetation need further investigation. If particularly damaging, point sources (or groups of point sources) can be identified, then emissions should be regulated to reduce the impacts. It will also be very important for wider measures to be taken, at Government and international levels, to reduce air pollution. There is currently insufficient knowledge to make a judgment of the impacts on specific species. Decisions should be made at a site specific level."

Table 9 – Favourable condition table for the “subtidal sandbanks” feature of the Severn Estuary SAC

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
B1	SAC interest feature 2: Subtidal Sandbanks	All sub-features	Extent of feature <i>(total extent of subtidal sandbanks - section 4.1.2.i of the conservation objectives)</i>	Total extent assessed periodically against baseline map (using bathymetry data, and other geophysical techniques (e.g. sidescan sonar), and sediment grain-size data)	No decrease in extent of subtidal sandbanks features from an established baseline, subject to natural processes. <i>Baseline is taken from 1994 admiralty charts, BGS seabed sediment data and sediment environments defined in the Bristol Channel Marine Aggregates Study (Posford Duvivier and ABP Research Consultancy, 2000).</i> <i>Refer also to Map in Appendix 3</i>	Extent is an attribute on which reporting is required by the Habitats Directive. Within the Severn the subtidal sandbanks feature includes both relatively permanent and stable banks (shown in Appendix XX as subtidal sandbanks) and more ephemeral banks which contribute sediment to the sandbanks (shown in Appendix XX as associated sediments) and which are therefore considered to be an integral part of the feature In the long term loss of subtidal sandbank feature communities is likely to be detrimental to the structure of this interest feature and the intertidal mudflats and sandflats features, e.g. associated with a change in sediment budget or geomorphological regime, and may indicate long term changes in the physical conditions of the estuaries interest feature.
B2		All sub-features	Extent of the subtidal sandbank communities <i>(extent of subtidal sandbank communities -section 4.1.2.ii of the conservation objectives)</i>	Extent of subtidal sandbank communities within the site assessed periodically (method and frequency to be determined).	No decrease in extent of the communities from an established baseline subject to natural processes. <i>Baseline is data held on Marine Recorder</i>	The subtidal sandbanks feature comprises two sub-features Sublittoral sands and muddy sand : This sub-feature comprises the following four communities: <ul style="list-style-type: none">• Infralittoral mobile sand in variable salinity• Infralittoral mobile clean sands with sparse fauna• Nephtys cirrosa and Macoma balthica in variable salinity infralittoral mobile sand• Neomysis integer and Gammarus spp in fluctuating low salinity infralittoral mobile sand Sublittoral cohesive mud and sandy mud communities This sub-feature comprises the following four communities: <ul style="list-style-type: none">• Capitella capitata in enriched sublittoral muddy sediments• Nephtys hombergii and Tubificiodes spp. In variable salinity infralittoral soft mud• Capitella capitata and Tubificiodes spp. In reduced salinity infralittoral muddy sediment• Nephtys hombergii and Macoma balthica in infralittoral sandy mud

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
B3	SAC interest feature 2: Subtidal Sandbanks		Distribution of subtidal sandbank communities <i>(extent of subtidal sandbank communities -section 4.1.2.ii of the conservation objectives)</i>	Spatial distribution of subtidal sandbank communities measured periodically (frequency to be determined).	No significant change in the macro scale distribution of the communities from an established baseline subject to natural processes <i>Baseline is data held on Marine Recorder</i>	Some biotopes occur in a natural cycle linked to the dynamism of the prevailing conditions, and these may naturally appear and disappear over time. The feature should not be considered in unfavourable condition due to the short-term disappearance of such ephemeral biotopes
B4			Community composition <i>(community composition of the subtidal sandbank communities -section 4.1.2.iii of the conservation objectives)</i>	Assessment of community quality through survey of species composition within the subtidal sandbank feature measured periodically	No decline in community quality due to changes in species composition or loss of typical species from an established baseline subject to natural processes <i>Baseline is data held on Marine Recorder and EA WFD benthic sampling data</i>	Different associations of plants, animals and their habitat are an important structural and functional aspect of the feature. Changes in the communities present within an area of a particular type of sediment may indicate long-term changes in physical conditions at the site. Typical species of the subtidal sandbanks communities include: <i>Aricidea minuta</i> , <i>Capitella capitata</i> , <i>Diastylis rathkei</i> typical, <i>Eurydice pulchra</i> , <i>Gammarus salinus</i> , <i>Harpinia pectinata</i> , <i>Mediomastus fragilis</i> , <i>Nephtys cirrosa</i> , <i>Nephtys hombergii</i> , <i>Oligochaeta</i> , <i>Pygospio elegans</i> , <i>Pontocrates arenarius</i> , <i>Pseudocuma longicornis</i> , <i>Retusa obtusa</i> , <i>Tubificoides amplivasatus</i>
B5		All sub-features	Sediment character <i>(variety & distribution of sediment types - section 4.1.2.iv of the conservation objectives)</i>	Distribution of sediment types/grain sizes assessed across the site	No major change in composition of sediment type across the feature against an established baseline subject to natural processes <i>Baseline to be established Data to be used is BGS seabed sediment data and other relevant datasets</i>	

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
B6	SAC interest feature 2: Subtidal Sandbanks	All sub-features	Topography <i>(gross morphology – depth distribution and profile of subtidal sandbank feature - section 4.1.2.v of the conservation objectives)</i>	Depth distribution/profile of the sandbank feature measured across the site	No major alteration of topography of the subtidal sandbank feature against an established baseline <i>Baseline to be established Data to be used is Hydrographic Office bathymetric data and other relevant bathymetric datasets</i>	

Table 10 – Favourable condition table for the “intertidal mudflats and sandflats” feature of the Severn Estuary SAC

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
C1	SAC interest feature 3: Mudflats and sandflats	All sub-features	Extent of the feature <i>(total extent of the mudflats and sandflats feature - section 4.1.3.i of the conservation objectives)</i>	Total area (ha) of the intertidal mudflat and sandflat feature measured periodically during the reporting cycle using a combination of remote sensing and ground truthing of boundaries between communities using GPS (frequency to be determined).	No decrease in extent of intertidal mudflats and sandflats from an established baseline, subject to natural processes. <i>Baseline is aerial photography dated 1999 and CCW/English Nature Intertidal Biotope Surveys 2006. (Note air photo coverage from 1988 gives data for assessing trends in change of this attribute.) Refer also to maps in Appendix 4</i>	Extent is an attribute on which reporting is required by the Habitats Directive. In the long term loss of intertidal mudflat / sandflat communities is likely to be detrimental to the structure of the interest feature, e.g. associated with a change in sediment budget or geomorphological regime, and may indicate long term changes in the physical conditions of the estuaries interest feature. Some fluctuations in extent may occur which are directly attributable to natural coastal processes. These include reduced extent following storms or due to a change to another feature habitat such as saltmarsh. Such types of change in extent would form under the umbrella of ‘natural change’
C2		All sub-features	Extent and variety of the mudflats and sandflats communities comprising each sub-feature <i>(variety and extent of the mudflat and sandflats communities – section 4.1.3.ii of the conservation objectives)</i>	Extent and range of types of intertidal mudflat and sandflat communities assessed along a sampling transect or grid and rapid phase 1 survey techniques using GPS (frequency to be determined).	No decrease in the extent or range of types of intertidal mudflat and sandflat communities from an established baseline, subject to natural processes <i>Baseline is CCW/English Nature Intertidal Biotope Surveys 2006.</i>	Intertidal mudflat and sand flat feature comprises three sub-features: Intertidal gravel and clean sand communities <ul style="list-style-type: none"> • Barren coarse sand shores; • Burrowing amphipods and <i>Eurydice pulchra</i> in well drained clean sand shores; • Burrowing amphipods and polychaetes in clean sand shores. • Talitrid amphipods in decomposing seaweed on the strandline • Dense <i>Janice conchilega</i> in tide-swept lower shore sand • Barren shingle or gravel shores Intertidal muddy sand communities <ul style="list-style-type: none"> • Polychaetes and <i>Cerastoderma edule</i> in fine sand or muddy sand shores • <i>Bathyporeia pilosa</i> and <i>Corophium</i> spp. in upper shore slightly muddy fine sand shores • <i>Macoma balthica</i> and <i>Arenicola marina</i> in muddy sand shores. • <i>Arenicola marina</i>, <i>Macoma balthica</i> and <i>Mya arenaria</i> in muddy sand shores. • <i>Echinocardium cordatum</i> and <i>Ensis</i> sp. in lower shore or shallow sublittoral muddy fine sand Intertidal mud communities <ul style="list-style-type: none"> • <i>Hediste diversicolor</i> and <i>Macoma balthica</i> in sandy mud shores • <i>Hediste diversicolor</i>, <i>Macoma balthica</i> and <i>Arenicola marina</i> in muddy sand or sandy mud shores • <i>Hediste diversicolor</i>, <i>Macoma balthica</i> and <i>Mya arenaria</i> in sandy mud shores • <i>Hediste diversicolor</i> and <i>Scrobicularia plana</i> in reduced salinity mud shores • <i>Hediste diversicolor</i> and oligochaetes in low salinity mud shores

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
C3	SAC interest feature 3: Mudflats and sandflats	All subfeatures	Distribution of mudflats and sandflats communities (distribution of communities - section 4.1.3.iii of the conservation objectives)	Spatial distribution of mudflat and sandflat communities assessed along a sampling transect or grid and rapid phase 1 survey techniques using GPS (frequency to be determined).	Macro scale distribution of communities should not deviate significantly from an established baseline, subject to natural processes. <i>Baseline is CCW/English Nature Intertidal Biotope Surveys 2006.</i>	Changes in the spatial distribution of biotopes within an area of a particular type of sediment may provide the first indications of long-term changes in physical conditions at the site. Some biotopes occur in a natural cycle linked to the dynamism of the prevailing conditions, and these may naturally appear and disappear over time. The feature should not be considered in unfavourable condition due to the short-term disappearance of such ephemeral biotopes.
C4		All subfeatures	Community composition (community composition of the feature - section 4.1.3.iv of the conservation objectives)	Assessment of community quality through survey of species composition (presence of typical species) within the intertidal mudflats and sandflats feature measured periodically	No decline in community quality due to changes in species composition or loss of typical species from an established baseline, subject to natural processes. <i>Baseline is CCW/English Nature Intertidal Biotope Surveys 2006.</i>	Different associations of plants, animals and their habitat are an important structural and functional aspect of the feature. Changes in the communities present within an area of a particular type of sediment may indicate long-term changes in physical conditions at the site. Typical species of the intertidal mudflats and sandflats communities include: <i>Aphelocheata marioni</i> , <i>Arenicola marina</i> , <i>Bathyporeia pelagica</i> , <i>Corophium volutator</i> , <i>Enchytraeidae</i> , <i>Eurydice pulchra</i> , <i>Hediste diversicolor</i> , <i>Hydrobia ulvae</i> , <i>Macoma balthica</i> , <i>Nephtys cirrosa</i> , <i>Nephtys hombergii</i> , <i>Oligochaeta indet</i> , <i>Pygospio elegans</i> , <i>Scoloplos armiger</i> , <i>Scrobicularia plana</i> , <i>Streblospio shrubsolii</i> , <i>Tubificoides benedii</i>
C5			Topography (Topography and morphology of the intertidal flats -section 4.1.3v of the conservation objectives)	Tidal elevation and intertidal slope, measured along a series of transects across the estuary periodically during the reporting cycle using remote sensing or traditional surveying techniques (transect locations and survey frequency to be determined).	Intertidal profile should not deviate significantly from an established baseline, subject to natural processes. <i>Baseline to be established: Data to be used is Environment Agency LIDAR survey</i>	In the intertidal zone topography reflects the energy conditions and stability of the sediment, which is key to the structure of the interest feature. Topography is a major influence on the distribution of communities throughout the intertidal flats. Assessing topography also provides information on the position of channels through the interest feature.
C6			Sediment character	Particle size analysis (PSA). measured at a series of locations across the estuary. Locations and frequency to be determined	Average PSA parameters should not deviate significantly from an established baseline. <i>Baseline to be established Data to be used CCW/English Nature Intertidal Biotope Surveys 2006, BGS seabed sediment data and other relevant data sources</i>	Parameters include percentage sand / silt / gravel, mean and median grain size, and sorting coefficient, used to characterise sediment type Sediment character defined by particle size analysis is key to the structure of the feature, and reflects all of the physical processes acting on it. Particle size composition varies across the feature and can be used to indicate spatial distribution of sediment types thus reflecting the stability of the feature and the processes supporting it.

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
C7	<i>SAC interest feature 3: Mudflats and sandflats</i>			Sediment penetrability (degree of sinking) measured at a series of locations across the estuary (methodology, locations and frequency to be determined).	Average measure should not deviate significantly from an established baseline. <i>Baseline to be established by future survey</i>	Penetrability is an indicator of sediment stability and degree of compaction; it indicates the shear strength of the sediment and thus the susceptibility of that sediment type to erosion. Compaction of the sediment influences the biological community within the sediment. Penetrability of the sediment is determined by a combination of grain size and water content, which may provide a surrogate index of the penetrability of the sediments.
C8				Sediment organic content (% carbon) measured at a series of locations across the estuary (sampling locations and frequency to be determined).	Average organic carbon content should not deviate significantly from an established baseline. <i>Baseline to be established by future survey</i>	Organic content critically influences the infaunal community and can cause deoxygenation of the feature, which can be detrimental to the biota. However, a balance needs to be struck as organic content provides a measure of the material available to detritivores. A reduction in organic content could lead to a reduction in detritivores, with subsequent knock on effects throughout the food chain.
C9				Oxidation - reduction potential (depth of black anoxic layer) measured at a series of locations across the estuary (sampling locations and frequency to be determined).	Average black layer depth should not deviate significantly from an established baseline. <i>Baseline to be established by future survey</i>	Degree of oxidation / reduction, reflecting oxygen availability within the sediment, critically influences the infaunal community and the mobility of chemical compounds. It is an indicator of the structure of the feature.

Table 11 – Favourable condition table for the “Atlantic salt meadows” feature of the Severn Estuary SAC

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
D1	SAC interest feature 4: Atlantic salt meadows	All sub-features	Extent of Atlantic salt meadow (and transitional habitats) feature <i>(extent of Atlantic salt meadow (and transitional habitats) feature - section 4.1.4.i of the conservation objectives)</i>	Total area (ha) of the Atlantic salt meadow feature (and associated transitional habitats) within the site measured periodically during the reporting cycle using a combination of remote sensing and ground truthing of boundaries between communities using GPS (frequency to be determined).	No decrease in total extent of Atlantic salt meadow and associated transitional habitats from the established baseline. <i>Baseline is the CCW/English Nature Saltmarsh NVC survey by Dargie 1998</i> <i>Refer also to maps in Appendix 5</i>	Extent is an attribute on which reporting is required by the Habitats Directive. Monitoring will need to take account of the dynamic nature of these habitats and seasonal and periodic random variations in vegetation types. Coastal squeeze may result in the replacement of Atlantic salt meadows with pioneer saltmarsh. A reduction in extent could be further evaluated by a ground survey to assess for signs of erosion such as toppled vegetation blocks, signs of roots in intertidal mud, signs of stress/damage to plants. Extent needs to be measured at low tide.
D2		All sub-features	Extent of the Atlantic salt meadow communities and associated transitional vegetation communities <i>(extent and distribution of atlantic salt meadow and associated transitional vegetation communities - section 4.1.4.ii of the conservation objectives)</i>	Area (ha) of Atlantic salt meadow and associated transitional vegetation communities within the site measured periodically during the reporting cycle using a combination of remote sensing and ground truthing of boundaries between communities using GPS (frequency to be determined).	No decrease in extent of Atlantic salt meadow and associated transitional vegetation communities from the established baseline subject to natural processes <i>Baseline is the CCW/English Nature Saltmarsh NVC survey by Dargie 1998</i>	Assessment against this target will take account of the effects of the natural process of cyclical development and breakdown of saltmarshes within the Severn which results in the natural succession of saltmarsh communities over time ie the continued presence of all types in proportions reflecting the natural processes operating. Some individual salt marsh communities occur in a natural cycle linked to the dynamism of the prevailing conditions, and these may naturally appear and disappear over time. The feature should not be considered in unfavourable condition due to the short-term disappearance of transient communities. The outcome sought is the maintenance of the general character of the saltmarshes of the Severn in terms of the continued presence, abundance and variation of communities with local differences reflected – it is not to seek the retention of saltmarsh types in situ but to allow them to shift and evolve in line with natural processes The Atlantic salt meadow feature comprises four sub-features: Low to mid marsh communities NVC communities: SM10, SM12, SM13a, SM13b, SM13c, SM13d, SM13x, SM13y, SM14a, SM15. Mid to upper marsh communities NVC communities: SM16a, SM16b, SM16c, SM16d, SM16e, SM16x, SM17, SM18c. Transitional high marsh communities NVC communities: SM23, SM24, SM28, MG11, MG12, MG13, S4a, S21a, S21c. Pioneer saltmarsh communities NVC communities: SM6, SM8, SM9

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
D3	SAC interest feature 4: Atlantic salt meadows	All sub-features	Distribution of the Atlantic salt meadow communities and associated transitional vegetation communities <i>(extent and distribution of atlantic salt meadow and associated transitional vegetation communities - section 4.1.4.ii of the conservation objectives)</i>	Spatial distribution of Atlantic saltmeadow and associated transitional vegetation communities measured along a series of fixed transects (or other suitable method to be agreed) periodically during the reporting cycle using GPS (transect locations and frequency of survey to be determined).	<p>The macro scale distribution of communities should not deviate significantly from an established baseline subject to natural processes.</p> <p><i>Baseline is the CCW/English Nature Saltmarsh NVC survey by Dargie 1998</i></p>	<p>The distribution of the Atlantic salt meadow communities refers to the macro spatial pattern in which these are distributed around the estuary. This statement does not require micro-distribution of communities (i.e. the exact mapped positions of specific communities to be maintained) but does require the distribution of some saltmarsh types which reflect the differences in estuary structure and function (eg in outer versus inner parts of the estuary, or the influence of freshwater inputs from the rivers) be taken into account.</p> <p>Consideration of this attribute needs to take account of the wider scale and long-term changes and development of saltmarshes in the Severn Estuary which shows a pattern of episodic erosion and accretion evident in a series of saltmarsh terraces. This attribute is also linked with attributes covering zonation and morphology below.</p>
D4		All sub-features	Extent of <i>Spartina anglica</i> <i>(areas of <i>Spartina anglica</i> - section 4.1.4.viii of the conservation objectives)</i>	Total extent of <i>Spartina anglica</i> measured along a series of transects (or other suitable method to be agreed) around the estuary, periodically during the reporting cycle, using a combination of remote sensing and ground survey (transect locations and frequency of survey to be determined).	<p>No increase in total extent of more than 10% over monitoring period;</p> <p><i>Baseline is the CCW/English Nature Saltmarsh NVC survey by Dargie 1998</i></p>	<p><i>Spartina anglica</i> acts as a pioneer species in the Severn and can undergo succession to other saltmarsh habitats over time. As a consequence, although it may be colonising new areas in one part of the estuary, in others it may be developing into more mixed saltmarsh communities. There will be differences in the density, height and cover of the vegetation depending on where it is in the succession. These changes will need to be monitored to establish a baseline and rates of any gross change. An increase in <i>Spartina</i> at the expense of other saltmarsh could indicate changes in the sediment regime and/or tidal levels both in response to natural or anthropogenic processes. Monitoring will only focus on areas of gross expansion of <i>Spartina</i> into intertidal mudflat and saltmarsh communities.</p>
D5		All sub-features	Zonation of vegetation <i>(zonation of Atlantic salt meadow communities - section 4.1.4.iii of the conservation objectives)</i>	Width of pioneer, low-mid marsh, mid-upper marsh, and transitional high marsh saltmarsh zones, measured along a series of transects (or other suitable method to be agreed) around the estuary, periodically during the reporting cycle, using a combination of remote sensing and ground survey (transect locations and frequency of survey to be determined).	<p>The range of variation of zonation of saltmarsh communities around the estuary should not deviate significantly from an established baseline, subject to natural processes.</p> <p><i>Baseline is CCW/English Nature Saltmarsh NVC survey by Dargie 1998 (and English Nature condition assessment data collected in 2002 for Gloucestershire section of the estuary).</i></p>	<p>Assessment against this target will take account of the effects of the natural process of cyclical development and breakdown of saltmarshes within the Severn which results in the natural succession of saltmarsh communities and changes to the zonation over time . ie the continued presence of all zones in proportions reflecting the natural processes operating.</p> <p>The outcome sought is the maintenance of the general character of the saltmarshes of the Severn in terms of the continued presence and variation of the saltmarsh zones with local differences reflected – it is not to seek the retention of zones in situ but to allow them to shift and evolve in line with natural processes</p>

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
D6	SAC interest feature 4: Atlantic salt meadows	Low to mid marsh communities	Species composition <i>(abundance of typical species - section 4.1.4.iv of the conservation objectives)</i>	Frequency of typical species to be measured using methodology to be agreed (e.g. transects, plots etc) once during reporting cycle	Frequency of typical species of characteristic low to mid marsh communities should not deviate significantly from an established baseline. <i>Baseline is CCW/English Nature Saltmarsh NVC survey by Dargie 1998</i>	The typical species for these communities include: <i>Puccinellia maritima, Salicornia spp., Suaeda maritima, Aster tripolium, Spergularia marginata, Glaux maritima, Plantago maritima, Atriplex glabriuscula, Atriplex prostrata, Triglochin maritima, Limonium vulgare, Armeria maritima and Juncus maritimus</i> *This target should not however prevent the enhancement of the diversity of swards where possible eg through the encouragement of a wider range of herbs through relaxation of grazing pressure in heavily grazed areas.
D7		Mid to upper marsh communities	Species composition <i>(abundance of typical species - section 4.1.4.iv of the conservation objectives)</i>	Frequency of typical species to be measured using methodology to be agreed (e.g. transects, plots etc) once during reporting cycle	Frequency of typical species of characteristic mid to upper marsh communities should not deviate significantly from an established baseline. <i>Baseline is CCW/English Nature Saltmarsh NVC survey by Dargie 1998</i>	The typical species for these communities include : <i>Puccinellia maritima, Aster tripolium, Glaux maritima, Plantago maritima, Festuca rubra, Juncus gerardii, Triglochin maritima, , Agrostis stolonifera, Juncus maritimus, , Spergularia marginata, Parapholis strigosa, Elymus pycnanthus,, Hordeum secalinum, Trifolium fragiferum and Atriplex glabriuscula,</i> *(see note above)
D8		Transitional high marsh communities	Species composition <i>(abundance of typical species - section 4.1.4.iv of the conservation objectives)</i>	Frequency of typical species to be measured using methodology to be agreed (e.g. transects, plots etc) once during reporting cycle	Frequency of typical species of characteristic high marsh communities should not deviate significantly from an established baseline. <i>Baseline is CCW/English Nature Saltmarsh NVC survey by Dargie 1998</i>	The typical species for these communities include: <i>Puccinellia distans, Puccinellia maritima, Puccinellia rupestris, Plantago coronopus, Parapholis strigosa, Atriplex glabriuscula, Spergularia marina, Festuca rubra, Agrostis stolonifera, Aster tripolium, Hordeum secalinum, Elymus pycnanthus, Elymus repens, Potentilla anserina, Lolium perenne, Alopecurus geniculatus, Phragmites australis, Bolboschoenus maritimus, Festuca arundinacea,</i> *(see note above)
D9		Pioneer saltmarsh communities	Species composition <i>(abundance of typical species - section 4.1.4.iv of the conservation objectives)</i>	Frequency of typical species to be measured using methodology to be agreed (e.g. transects, plots etc) once during reporting cycle	Frequency of typical species of characteristic pioneer marsh communities should not deviate significantly from an established baseline. <i>Baseline is CCW/English Nature Saltmarsh NVC survey by Dargie 1998</i>	The typical species for these communities include : <i>Spartina anglica, Salicornia sp, Suaeda maritima</i>

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
D10	SAC interest feature 4: Atlantic salt meadows		Abundance of locally occurring scarce and notable plant species <i>(abundance of notable species - section 4.1.4v of the conservation objectives)</i>	Number of discrete locations within the estuary where scarce and notable species are found and their abundance at each location.	No decrease in abundance of scarce and notable species from an established baseline. <i>Baseline : CCW/English Nature saltmarsh rare/scarce plant survey by Dargie 1998</i> <i>Individual county based records from plant recorders/record centres</i>	Nationally scarce and notable species within the Atlantic salt meadow and associated transitional vegetation communities comprise: Nationally scarce species: <i>Alopecurus bulbosus, Althaea officinalis, Bupleurum tenuissimum, Hordeum marinum, Trifolium squamosum, Puccinellia rupestris, Polygonum raii.</i> Other notable species occurring: <i>Allium oleraceum, Lepidium latifolium, Petroselinum segetum</i> Note that some of the nationally scarce and notable plants require levels of ground disturbance (resulting in openings in the sward) to establish. Localised tight grazing and /or poaching may provide sward openings for such species as well as the wider range of herbs and unless widespread and persistent should not necessarily regarded as a problem.
D11		All sub-features	Sward structure <i>(structural variation of the salt marsh sward - section 4.1.4 vi of the conservation objectives)</i>	Sward height of Atlantic salt meadow communities measured periodically during the reporting cycle in late summer using a combination of remote sensing and field visits.	The extent and distribution of vegetation communities exhibiting different sward heights should not deviate significantly from an established set of limits. The limits will be defined to ensure that the requirements of the typical and notable plants species and birds species designated within the Severn Estuary SPA and Ramsar, can be met <i>Baselines are to be established from Nature Conservancy Council SSSI owner/occupier consent records dating from 1988 Severn Estuary SSSI notification (and subsequent consent reviews)</i> <i>CCW and EN/NE site monitoring records</i>	Vegetation structure is largely affected by the impact of grazing (of wild or domesticated herbivores) interacting with different vegetation communities and ground hydrological conditions. Not all Atlantic salt meadow within the Severn Estuary is grazed, but it is a widespread and long established practice and stocking levels need to be appropriate to the interest of the site. Over grazing can lead to a loss of structural diversity of rare plant species and affect bird use of these habitats while under grazing can lead to a loss of plant diversity by competitive exclusion. Introduction of grazing to previously ungrazed sites can result in deleterious changes to plant community composition and its value for wider conservation interests such as invertebrates. Note that some of the nationally scarce and notable plants require levels of ground disturbance (resulting in openings in the sward) to establish. Localised tight grazing and /or poaching may provide sward openings for such species as well as the wider range of herbs and unless widespread and persistent should not necessarily regarded as a problem. Disturbance is also provided in areas where natural tidal debris accumulates scattered across the salt marsh and in driftlines (often at the base and on the seaward slope of the floodbank). As well as providing seed establishment points for scarce plants the debris also plays a role in creating variation in sward structure particularly in the mid/upper and transition high marsh zones and in supporting important populations of invertebrates (notable deadwood beetles). The continued presence of tidal debris and driftlines in some locations is therefore a desirable aspect of the saltmarsh management which delivers this attribute . They may also be of value for the bird populations which roost and feed on saltmarshes of the SPA and Ramsar Site. (see sections 4.2 and 4.3)

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
D12	SAC interest feature 4: Atlantic salt meadows		Morphology <i>(characteristic stepped morphology and associated structural features - section 4.1.4.vii of the conservation objectives)</i>	Location and extent of established morphological features (saltmarsh terracing, creeks, pills, drainage ditches and pans) measured during the reporting cycle using remote sensing and field survey	No anthropogenic alteration of established morphological features from an established baseline. <i>Baselines is taken from 1999 air photos , CCW/English Nature Saltmarsh NVC survey by Dargie 1998 and English Nature condition assessment data collected in 2002 for Gloucestershire section of the estuary.</i>	This target relates to features which have developed naturally as a result of the evolution of the saltmarshes or the presence of freshwater drainage systems entering the estuary and which have established conservation value (eg pill sides of value botanically, pills used for shelter, feeding and roosting by birds). The baseline dataset will establish the location and extent of these features and identify man made features which do not need to meet this target.

Table 12 – Favourable condition table for the “reefs” feature of the Severn Estuary SAC

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
E1	SAC interest feature 4: Reefs		(Total) Extent and distribution <i>(total extent and distribution of reef - section 4.1.5.i of the conservation objectives)</i>	<p>Measurement of the extent and distribution of the purely subtidal part of this feature in the Severn Estuary is challenging. Remote sensing methods (such as side scan sonar) and drop down video are unreliable in these conditions. Therefore limited grab sampling may be required.</p> <p>Measurement of the subtidal component at the subtidal/intertidal interface may be possible by direct observation at very low tides.</p> <p>Extent and distribution of the intertidal <i>Sabellaria</i> reef measured using Phase 1 mapping survey techniques</p>	<p>No reduction in the extent and distribution of the reef from an established baseline</p> <p><i>Baseline is comprised of grab sampling surveys by Mettam 1988 supplemented by Environment Agency data 1999 and data from Warwick et al.2001 which provide subtidal reef records.</i></p> <p><i>CCW/English Nature Intertidal Biotope Surveys 2006 identify the distribution of intertidal Sabellaria alveolata and indication of locations for further survey for subtidal Sabellaria contiguous with these intertidal areas.</i></p>	<p>Known occurrences of subtidal and subtidal contiguous with intertidal reefs are largely limited to the outer parts of the estuary (area seaward of a line drawn between Portishead and Newport). See appendix 6. Samples show that reef formation is not continuous within this area and is in varying stages of growth. Further work is required to establish the distribution of this feature particularly with respect to the subtidal and the intertidal/subtidal interface.</p> <p>A further upstream zone of intertidal <i>Sabellaria</i> populations is recorded up to the old Severn Bridge (Beachley to Aust). While not part of the reef feature the extent of solely intertidal <i>Sabellaria</i> is relevant as these areas will also contribute larvae to the estuary wide populations of this species.</p> <p>The populations of <i>Sabellaria</i> within the Severn (subtidal, and intertidal) should be regarded as a metapopulation.</p> <p>New technologies that may allow the measurement of <i>Sabellaria</i> reef in a non destructive way should be investigated if they present themselves.</p>
E2			Community composition <i>(community composition - section 4.1.5.ii of the conservation objectives)-</i>	<p>Measurement of the community composition of this feature in the Severn Estuary is challenging. Remote sensing methods (such as side scan sonar) and drop down video are difficult. Therefore limited grab sampling may be required.</p>	<p>New samples of reef show no significant decline in community composition from baseline records</p> <p><i>Baseline is survey by Mettam 1988 supplemented by Environment Agency data 1999 and data from Warwick et al.2001</i></p>	<p>The reefs feature comprise two communities :</p> <p><i>Sabellaria alveolata</i> on variable salinity sublittoral mixed sediment SS.SBR.PoR.SalvMx</p> <p><i>Sabellaria alveolata</i> reefs on sand-abraded eulittoral rock. LS.LBR.Sab.Salv</p> <p>The typical species associated with subtidal and intertidal reefs in the Severn Estuary, derived from known samples, are listed in section 4.15.1 note 4</p>

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
E3	SAC interest feature 4: Reefs		Age structure <i>(full range of age structures - section 4.1.5.iii of the conservation objectives)</i>	Measurement of the community composition of this feature in the Severn Estuary is challenging. Remote sensing methods (such as drop down video) are difficult. Therefore limited grab sampling may be required.	Different phases from newly settled worms through vigorous fast growing reef to older hummocks are present <i>Baseline yet to be established.</i>	<i>Sabellaria alveolata</i> reefs cycle through different phases from newly settled worms through vigorous fast-growing reef to older hummocks. In a stable or increasing population all age phases are likely to be present . The presence of areas of variable stages of growth is important in ensuring larval supply and also enhances the species diversity of the reef
E4			Physical & ecological processes <i>(physical and ecological processes - section 4.1.5.iv of the conservation objectives)</i>	Abundance of coarse sediments Presence of suitable sediment grades in subtidal and intertidal sediments within the defined reefs zone (see comment on extent and distribution above) measured periodically.	No change in the abundance of suitable sediment grades within the defined reefs zone against an established baseline <i>Baseline yet to be established.</i>	An abundance of suitable coarse sediments (0.5-1mm sand) are required to support reef growth (tube building)
E5				Availability of suitable substrates Extent of available suitable (hard or long-term consolidated) substrates within the defined reef zone measured periodically	No change in overall extent of available suitable substrates within the defined reefs zone against an established baseline <i>Baseline yet to be established – data from the BGS and the CCW/English Nature intertidal biotope survey 2006 may assist</i>	Within the Severn reefs have been recorded both on solid geology and on smaller rocks and cobbles.
E6				Supply of larvae Abundance of <i>Sabellaria</i> larvae within the water column measured through plankton sampling	No decrease in the abundance of <i>Sabellaria</i> larvae against an established baseline <i>Baseline yet to be established – data may be available from existing plankton sampling surveys</i>	Area of sampling for this attribute should include both the reef zone and areas where intertidal populations are known as all areas supporting <i>Sabellaria alveolata</i> formations will be supplying larvae to the water column and hence may seed the reef feature. Recruitment is likely to be variable between years.

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
E7				Abundance of food in water column Methods to be determined .	No decrease in the abundance of suspended detritus within the water column of the defined reef zone against an established baseline <i>Baseline yet to be established</i>	Area of sampling of the water column should include both the reef zone and intertidal populations (the estuary-wide metapopulation of <i>Sabellaria alveolata</i>)

Table 13 – Favourable condition table for the “river lamprey” and “sea lamprey” features of the Severn Estuary SAC

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
F1	SAC interest feature 5: River lamprey <i>Lampetra fluviatilis</i> and SAC interest feature 6: Sea lamprey <i>Petromyzon marinus</i>		Migratory access (Barriers to migration) (migratory passage not impeded - sections 4.1.6.i and 4.1.7.i of the conservation objectives)	Water quality measured regularly throughout the reporting cycle in the Bristol Channel, Severn Estuary, River Wye SAC, River Usk SAC and River Severn. (see also Table 8, lines A17-20 relating to general water quality requirements for the estuary feature (and dependant sub features))	Water quality is sufficient to support migratory passage. Levels (for temperature, salinity, turbidity, pH, and dissolved oxygen) should comply with targets established under the EA Review of Consents and the Water Framework Directive. Baseline is water quality sampling data collected by the Environment Agency	Significant variation in these physico-chemical parameters may act as barriers to migration. For example, the timing, duration and consistency of their upstream migration are believed to be closely related to temperature changes as well as pheromone triggers from the juveniles during periods of high water flow. Peak migration usually coincides with river temperatures that remain above 10°C and continues until temperatures reach 18°C. Dissolved oxygen can also be significantly reduced in stretches receiving significant BOD inputs, or through the re-suspension of organic rich sediments. Toxic contaminants may act as a barrier to migration. Environmental Quality Standards (EQSs) are set for dangerous substances as defined under the Dangerous Substances Directive or Government Policy for freshwater and marine environments
F2				Water flows measured regularly throughout the reporting cycle (frequency to be determined) in the River Wye SAC, River Usk SAC and River Severn (see also Table 8 line A3 relating to general tidal and water flow requirements for the estuary feature (and dependant sub features))	Flows from the river into the estuary must be sufficient to allow migration. Baseline is water flow sampling data collected by the Environment Agency provides a baseline. Severe low flow conditions that affect these species yet to be defined	
F3				Physical barriers Mapping and quantification of potential obstructions in relation to height, type and water depth below obstruction once during the reporting cycle.	No artificial barriers significantly impairing, adults from reaching existing and historical spawning grounds, or juveniles from moving downstream. Baseline is the Environment Agency data on structures and flood defences	Dams, navigation and other weirs may prevent lamprey from reaching their spawning grounds. In particular, sea lamprey is known to be poor at ascending obstacles.

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
F4	SAC interest feature 5: River lamprey <i>Lampetra fluviatilis</i> and SAC interest feature 6: Sea lamprey <i>Petromyzon marinus</i>		Population size (returning adults) (size of populations - sections 4.1.6.ii and 4.1.7.ii of the conservation objectives)	Number of returning adults measured using fish counters on the feeding rivers (Wye, Usk and Severn) during the migratory period.	No decline in number of returning adults from established baseline. <i>Baseline is yet to be established - fish counter data may be able to provide a baseline in future years.</i>	(Note that this attribute will not be able to be measured until the technological solutions are developed.) Fish counter technology is being developed to monitor adult lampreys but is not yet installed on the feeding rivers of the Severn Estuary. Fish counter technology should be further developed to monitor migrating adult river and sea lamprey.
F5			Ammocoete population in tributary rivers (size of populations - sections 4.1.6.ii and 4.1.7.ii of the conservation objectives)	Electrofishing surveys in 1m ² quadrats at a series of locations in the Rivers Usk, Wye (and Severn)	River population targets for the Usk and Wye must be met <i>Baseline is the survey of ammocoete abundance and distribution in the Rivers Usk and Wye commissioned by CCW in 2005 (Harvey et al. 2007).</i>	(Note that this attribute will not be able to be measured until the technological solutions are developed.) During the electrofishing survey all ammocoetes should be identified as <i>Lampetra</i> or <i>Petromyzon</i> and measured (mm). Surveys should be undertaken at the earliest in July but preferably between August and October. The rivers fauna CSM state three targets which must be met for the population attribute. These are; 1. Ammocoete population age structure For samples of 50 ammocoetes or less, at least 2 distinct size classes should normally be present. If more than 50 ammocoetes are collected, at least 3 size classes should be present. 2. Ammocoete distribution within catchment Lampreys should be present at not less than 2/3 of sites surveyed. 3. Ammocoete density; a. For <i>lampetra</i> ; Optimal habitat >10m ⁻² Overall catchment mean >5m ⁻² b. For sea lamprey - Ammocoetes should be present in at least sampling sites each not less than 5km apart

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
F6			Prey species <i>(abundance of prey species - sections 4.1.6.iii and 4.1.7.iii of the conservation objectives))</i>	The abundance of key prey species measured periodically	No significant reduction in abundance of key prey species against an established baseline <i>Baseline is yet to be established Data to be used is EA monitoring of river and fish populations and future surveys</i>	River and sea lamprey require a variety of other fish species to act as hosts throughout their lifecycle. Their principal host species are part of the estuarine fish assemblage which has measures and targets included within the “estuaries” feature – Table 8

Table 14 – Favourable condition table for the “twait shad” feature of the Severn Estuary SAC

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
G1	SAC interest feature 7: Twait shad (<i>Alosa fallax</i>)		Migratory access (Barriers to migration) (migratory passage not impeded - section 4.1.8.i of the conservation objectives)	Water quality measured regularly throughout the reporting cycle in the Bristol Channel, Severn Estuary, River Wye SAC, River Usk SAC and River Severn. (see also Table 8 line A 17-20 relating to general water quality requirements for the estuary feature (and dependant sub features))	Water quality is sufficient to support migratory passage. Levels (for temperature, salinity, turbidity, pH, and dissolved oxygen) should comply with targets established under the EA Review of Consents and the Water Framework Directive. <i>Baseline is water quality sampling data collected by the Environment Agency</i>	Significant variation in these physico-chemical parameters may act as barriers to migration. For example, the timing, duration and consistency of their upstream migration are believed to be closely related to temperature changes . Peak migration usually coincides with river temperatures that remain above 10°C and continues until temperatures reach 18°C. Dissolved oxygen can also be significantly reduced in stretches receiving significant BOD inputs, or through the resuspension of organic rich sediments. Toxic contaminants may act as a barrier to migration. Environmental Quality Standards (EQSs) are set for dangerous substances as defined under the Dangerous Substances Directive or Government Policy for freshwater and marine environments.
G2				Water flows measured regularly throughout the reporting cycle (frequency to be determined) in the River Wye SAC, River Usk SAC and River Severn (see also Table 8 line A3 relating to general tidal and water flow requirements for the estuary feature (and dependant sub features))	Flows from the river into the estuary must be sufficient to allow migration <i>Baseline is water flow sampling data collected by the Environment Agency provides a baseline. Severe low flow conditions that affect these species yet to be defined</i>	
G3				Physical barriers Mapping and quantification of potential obstructions in relation to height, type and water depth below obstruction once during the reporting cycle.	No artificial barriers significantly impairing, adults from reaching existing and historical spawning grounds, or juveniles from moving downstream. <i>Baseline is Environment Agency data on structures and flood defences</i>	Dams, navigation and other weirs may prevent shad reaching their spawning grounds. In particular, shad are known to be poor at ascending obstacles.

Ref	SAC Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
G4	SAC interest feature 7: Twaite shad (<i>Alosa fallax</i>)		Population size (returning adults) (size of populations - section 4.1.8.ii of the conservation objectives)	Number of returning adults measured using fish counters on the Usk and Wye rivers during the migratory period.	No drop in the annual run size greater than would be expected from variations in natural mortality alone. <i>Baseline is yet to be established - fish counter data may be able to provide a baseline in future years. Noble et al. (2007) provides historical information on returning adults for the River Wye.</i>	(Note that this attribute will not be able to be measured until the technological solutions are developed.) Fish counter technology is being developed to monitor adult shad but is not yet installed on the feeding rivers of the Severn Estuary. Fish counter technology should be further developed to monitor migrating adult shad.
G5			River population (size of populations - section 4.1.8.ii of the conservation objectives)	Seine netting for juveniles in the lower rivers and upper estuaries and monitoring of shad eggs by kick sampling	River population targets for the Usk and Wye must be met <i>Baseline yet to be established. Noble et al. (2007) provides some information on juvenile densities.</i>	(Note that this attribute will not be able to be measured until the technological solutions are developed.) Seine netting should occur in lower rivers and upper estuaries. Netting should be carried out in late summer early autumn (July-October). For each river, juvenile densities should exceed a specified minimum target at least two years in six. The extent of spawning should be monitored by kick sampling for eggs at a proportion of known spawning sites. A reduction in the spawning distribution of more than 50 % compared with the baseline will indicate an adverse change. Kick sampling should occur during May and June.
G6			Prey species (abundance of prey species – section 4.1.8.iii of the conservation objectives))	The abundance of key prey species measured by EA in their routine monitoring of the rivers and estuary	No significant reduction in abundance of key prey species against an established baseline <i>Baseline is yet to be established through fish surveys in estuary and rivers</i>	Twaite shad require a variety of invertebrates including crustacean, mysids and copepods, small fish and fish eggs particularly in that section of the estuary where saline and freshwaters meet.

4.2 Conservation objectives for SPA European Marine Site interest features

The protection and management of the SPA in accordance with Article 6 of the Habitats Directive, including in particular the consideration of plans and projects under Article 6(3) and 6(4), should be carried out in view of the conservation objectives in this section.

Note : The conservation objectives for areas of the SPA which lie outside the European Marine Site boundary are provided in separate documents by CCW and Natural England which are currently in preparation and will soon be available on request.

4.2.1 SPA Interest feature 1: Internationally important population of regularly occurring Annex 1 species : Bewick's swan

The conservation objective is to maintain the Bewick's swan population and its supporting habitats¹ in **favourable condition**, as defined below

The interest feature Bewick's swan will be considered to be in favourable condition when, subject to natural processes², each of the following conditions are met:

- (i) the 5 year peak mean population size for the Bewick's swan population is no less than 289 individuals (ie the 5 year peak mean between 1988/9 - 1992/3);
- (ii) the extent of saltmarsh at the Dumbles (Appendix 8: Map 1) is maintained;
- (iii) the extent of intertidal mudflats and sandflats at Frampton Sands, Waveridge Sands and the Noose (Appendix 8: Map 1) is maintained;
- (iv) the extent of vegetation with an effective field size of >6 ha and with unrestricted bird sightlines > 500m at feeding, roosting and refuge sites (Appendix III) are maintained;
- (v) greater than 25% cover of suitable soft leaved herbs and grasses³ in winter season throughout the transitional saltmarsh at the Dumbles (Appendix 8: Map 1) is maintained;
- (vi) aggregations of Bewick's swan at feeding, roosting and refuge sites are not subject to significant disturbance.

4.2.1.1 Explanatory information for the Bewick's swan conservation objective

¹ Key supporting habitats for the Annex I species

- Intertidal mudflats and sandflats
- Saltmarsh

² Natural processes in respect of the SPA

Each interest feature is subject to both natural processes and human influences. Human influence on the interest features is acceptable provided that it is compatible with the achievement of the conditions set out under the definition of favourable condition for each interest feature. A failure to meet these conditions which is entirely a result of natural processes will not constitute unfavourable condition, but will trigger a review of the definition of favourable condition. This qualification is necessary because:

- (a) the bird populations themselves are subject to natural factors, many of which arise outside the SPA, such as breeding success and winter temperatures;

(b) the supporting habitats of the birds are influenced by the evolution of the estuary. Natural adjustments within estuaries can take many forms. One important example is the tendency of estuaries to accumulate sediment, thereby changing their form from their original Holocene morphology to a state where tidal energy is dissipated by subtidal and intertidal sediment banks or features. This, with other natural processes, will therefore cause the width and depth of the estuary to change over time, moving towards a state of dynamic equilibrium or 'most probable state'. As part of this process, the location and extent of saltmarshes and mudflats may change, provided there is capacity to accommodate readjustment. However, where this process is constrained, the capacity of habitats to accommodate readjustment may be affected.

³Key food plants of Bewick's swan

eg *Agrostis stolonifera*, *Alopecurus geniculatus*, *Glyceria geniculatus*. (This list contains examples and is not exhaustive)

4.2.2 SPA interest feature 2: Internationally important population of regularly occurring migratory species: wintering European white-fronted goose

The conservation objective is to maintain the European white-fronted goose population and its supporting habitats¹ in **favourable condition**, as defined below.

The interest feature European white-fronted goose will be considered to be in favourable condition² when, subject to natural processes², each of the following conditions are met:

- (i) the 5 year peak mean population size for the wintering European white fronted goose population is no less than 3,002 individuals (ie the 5 year peak mean between 1988/9-1992/3);
- (ii) the extent of saltmarsh at the Dumbles (Appendix 8: Map 1) is maintained;
- (iii) the extent of intertidal mudflats and sandflats at Frampton Sands, Waveridge Sands and the Noose (Appendix 8: Map 1) is maintained;
- (iv) greater than 25% cover of suitable soft-leaved herbs and grasses³ is maintained during the winter on saltmarsh areas (Appendix 8: Map 1);
- (v) unrestricted bird sightlines of >200m at feeding and roosting sites are maintained;
- (vi) aggregations of European white-fronted goose at feeding or roosting sites are not subject to significant disturbance.

4.2.2.1 Explanatory information for the wintering European white-fronted goose objective

¹Key supporting habitats for the migratory bird species

- Intertidal mudflats and sandflats
- Saltmarsh

²Natural processes in respect of the SPA

The meaning of 'natural processes' is explained in **section 4.2.1.1**.

³Key food plants of European white-fronted goose

eg *Alopecurus bulbosus*, *Festuca rubra*, *Hordeum marinum*, *Lolium perenne*; *Puccinellia maritima*.
(This list contains examples and is not exhaustive)

4.2.3 SPA interest feature 3: Internationally important population of regularly occurring migratory species: wintering dunlin

The conservation objective is to maintain the dunlin population and its supporting habitats¹ in **favourable condition**, as defined below:

The interest feature dunlin will be considered to be in favourable condition when, subject to natural processes², each of the following conditions are met:

- (i) the 5 year peak mean population size for the wintering dunlin population is no less than 41,683 individuals (ie the 5 year peak mean between 1988/9 - 1992/3);
- (ii) the extent of saltmarsh (Appendix 8) and associated strandlines is maintained;
- (iii) the extent of intertidal mudflats and sandflats (Appendix 8) is maintained;
- (iv) the extent of hard substrate habitats (Appendix 8) is maintained;
- (v) the extent of vegetation with a sward height of <10cm is maintained throughout the saltmarsh (Appendix 8);
- (vi) the abundance and macro-distribution of suitable invertebrates³ in intertidal mudflats and sandflats (Appendix 8) is maintained;
- (vii) the abundance and macro-distribution of suitable invertebrates³ in hard substrate habitats (Appendix 8) is maintained;
- (viii) unrestricted bird sightlines of >200m at feeding and roosting sites are maintained;
- (ix) aggregations of dunlin at feeding or roosting sites are not subject to significant disturbance.

4.2.3.1 Explanatory information for the wintering dunlin objective

¹Key supporting habitats for the migratory bird species

- Intertidal mudflats and sandflats
- Saltmarsh
- Hard substrate habitats (rocky shores)

²Natural processes in respect of the SPA

The meaning of 'natural processes' is explained in **section 4.2.1.1**.

³Key intertidal invertebrate prey species of dunlin

eg *Carcinus*, *Crangon*, *Hydrobia*, *Macoma*, *Hediste*, and *Talitrus* spp.
(This list contains examples and is not exhaustive)

4.2.4 SPA interest feature 4: Internationally important population of regularly occurring migratory species: wintering redshank

The conservation objective is to maintain the redshank population and its supporting habitats¹ in **favourable condition**, as defined below

The interest feature redshank will be considered to be in favourable condition when, subject to natural processes² each of the following conditions are met:

- (i) the 5 year peak mean population size for the wintering redshank population is no less than 2,013 individuals (ie the 5 year peak mean between 1988/9 - 1992/3);
- (ii) the extent of saltmarsh (Appendix 8) and associated strandlines is maintained;
- (iii) the extent of intertidal mudflats and sandflats (Appendix 8) is maintained;
- (iv) the extent of hard substrate habitats (Appendix IV) is maintained;
- (v) the extent of vegetation with a sward height of <10cm throughout the saltmarsh (Appendix 8) is maintained;
- (vi) the abundance and macro-distribution of suitable invertebrates³ in intertidal mudflats and sandflats (Appendix 8) is maintained;
- (vii) the abundance and macro-distribution of suitable invertebrates³ in hard substrate habitats (Appendix 8) is maintained;
- (viii) unrestricted bird sightlines of >200m at feeding and roosting sites are maintained;
- (ix) aggregations of redshank at feeding or roosting sites are not subject to significant disturbance.

4.2.4.1 Explanatory information for the wintering redshank objective

¹Key supporting habitats for the migratory bird species

- **Intertidal mudflats and sandflats**
- **Saltmarsh**
- **Hard substrate habitats (rocky shores)**

²Natural processes in respect of the SPA

The meaning of 'natural processes' is explained in **section 4.2.1.1**.

³Key intertidal invertebrate prey species of redshank

eg *Carcinus*, *Crangon*, *Hydrobia*, *Macoma*, *Hediste*, and *Talitrus* spp.
(This list contains examples and is not exhaustive)

4.2.5 SPA interest feature 5: Internationally important population of regularly occurring migratory species: wintering shelduck

The conservation objective is to maintain the shelduck population and its supporting habitats¹ in **favourable condition**, as defined below:

The interest feature shelduck will be considered to be in favourable condition when, subject to natural processes², each of the following conditions are met:

- (i) the 5 year peak mean population size for the wintering shelduck population is no less than 2,892 individuals (ie the 5 year peak mean between 1988/9 - 1992/3);
- (ii) the extent of saltmarsh (Appendix 8) is maintained;
- (iii) the extent of intertidal mudflats and sandflats (Appendix 8) is maintained;
- (iv) the extent of hard substrate habitats (Appendix 8) is maintained;
- (v) the abundance and macro-distribution of suitable invertebrates³ in intertidal mudflats and sandflats (Appendix 8) is maintained;
- (vi) unrestricted bird sightlines of >200m at feeding and roosting sites are maintained;
- (vii) aggregations of shelduck at feeding or roosting sites are not subject to significant disturbance.

4.2.5.1 Explanatory information for the wintering shelduck objective

¹Key supporting habitats for the migratory bird species

- Intertidal mudflats and sandflats
- Saltmarsh
- Hard substrate habitats (rocky shores)

²Natural processes in respect of the SPA

The meaning of 'natural processes' is explained in **section 4.2.1.1**.

³Key intertidal invertebrate prey species of shelduck

eg *Carcinus*, *Corophium*, *Hydrobia*, *Macoma*, *Mytilus*, and *Hediste* spp
(This list contains examples and is not exhaustive)

4.2.6 SPA interest feature 6: Internationally important population of regularly occurring migratory species: wintering gadwall

The conservation objective is to maintain the gadwall population and its supporting habitats¹ in **favourable condition**, as defined below:

The interest feature gadwall will be considered to be in favourable condition when, subject to natural processes², each of the following conditions are met:

- (i) the 5 year peak mean population size for the wintering gadwall population is no less than 330 (ie the 5 year peak mean between 1988/9 - 1992/3);
- (ii) the extent of intertidal mudflats and sandflats (Appendix 8) is maintained;
- (iii) unrestricted bird sightlines of >200m at feeding and roosting sites are maintained;
- (iv) aggregations of gadwall at feeding or roosting sites are not subject to significant disturbance.

4.2.6.1 Explanatory information for the wintering gadwall objective

¹Key supporting habitats for the migratory bird species

- **Intertidal mudflats and sandflats**

Note : It is currently unclear what use this species is making of the estuary – they are clearly present in intertidal areas particularly around areas freshwater streams and pills enter the estuary. Although primarily freshwater plant feeders they do also take animal material including insects, molluscs, annelids and even small fish and small amphibians – it is possible that they are feeding on such matter in the freshwater influenced mud and sands. Recent evidence indicates this species is changing its general habits as it extends its range westwards. As a result the conservation objective for this species does not include a condition in respect of the key food sources as for other species at this time.

²Natural processes in respect of the SPA

The meaning of ‘natural processes’ is explained in **section 4.2.1.1**.

4.2.7 SPA interest feature 7: Internationally important assemblage of waterfowl

The conservation objective is to maintain the waterfowl assemblage and its supporting habitats¹ in **favourable condition**, as defined below:

The interest feature waterfowl assemblage will be considered to be in favourable condition when, subject to natural processes², each of the following conditions are met:

- (i) the 5 year peak mean population size for the waterfowl assemblage is no less than 68,026 individuals (ie the 5 year peak mean between 1988/9 - 1992/3);
- (ii) the extent of saltmarsh (Appendix 8) and their associated strandlines is maintained;
- (iii) the extent of intertidal mudflats and sandflats (Appendix 8) is maintained;
- (iv) the extent of hard substrate habitats (Appendix 8) is maintained;
- (v) extent of vegetation of <10cm throughout the saltmarsh (Appendix 8) is maintained;
- (vi) the abundance and macroscale distribution of suitable invertebrates³ in intertidal mudflats and sandflats (Appendix 8) is maintained;
- (vii) the abundance and macroscale distribution of suitable invertebrates³ in hard substrate habitats (Appendix IV) is maintained;
- (viii) greater than 25% cover of suitable soft leaved herbs and grasses⁴ during the winter on saltmarsh areas (Appendix 8) is maintained;
- (ix) unrestricted bird sightlines of >500m at feeding and roosting sites are maintained;
- (x) waterfowl aggregations at feeding or roosting sites are not subject to significant disturbance.

4.2.7.1 Explanatory information for the internationally important assemblage of waterfowl

¹Key supporting habitats for the waterfowl assemblage¹

- **Intertidal mudflats and sandflats**
- **Saltmarsh**
- **Hard substrate habitats (rocky shores)**

²Natural processes in respect of the SPA

The meaning of 'natural processes' is explained in **section 4.1.1**.

³Key intertidal invertebrate prey species of the waterfowl assemblage

eg *Arenicola*, *Carcinus*, *Corophium*, *Crangon*, *Gammarus*, *Hydrobia*, *Macoma*, *Hediste*, *Notomastus* and *Talitrus* spp. - these lists are examples and are not exhaustive

⁴Key saltmarsh food plants

eg *Puccinellia maritima*, *Salicornia* spp., *Agrostis stolonifera*, *Atriplex* spp., *Hordeum marinum*, *Festuca rubra*, *Alopecurus bulbosus*, *Lolium perenne* - these lists are examples and are not exhaustive

4.2.8 Favourable Condition Tables for SPA interest features of the Severn Estuary European Marine Site

Background information on the role of favourable condition tables and the information provided in each column is provided in section 1.8 of this document, and a concise glossary of terms used is provided in Section 7.

The favourable condition table is intended to supplement the conservation objectives, including with respect to the management of established and ongoing activities, future requirements of monitoring and reporting on the condition of the features of the site and, together with the conservation objectives, informs the scope and nature of any appropriate assessment that may be needed. The table **does not by itself** provide a comprehensive basis on which to assess plans and projects as required under the Habitats Regulations. It should be noted that appropriate assessments are a separate activity to condition monitoring, requiring consideration of issues specific to individual plans or projects.

These tables set out all the attributes that **may** be used to monitor the condition of the features of the SPA. Where possible we will seek available information from others which can inform our assessment process.

It will be possible to monitor many of the attributes at the same time or during the same survey. The frequency of sampling for many attributes may need to be greater during the initial monitoring events in order to characterise the site and establish the baselines. Extreme events (such as storms reducing or increasing salinities, exceptionally cold winters or warm summers) also need to be recorded as they may be critical in influencing ecological issues in the Severn Estuary and may well be missed by routine monitoring.

Comprising :

Table 15 – Favourable condition table for the supporting habitats of the bird interest features in the Severn Estuary SPA

Table 16 – Favourable condition table for the qualifying bird features of the Severn Estuary SPA

Reference should also be made to Tables 8,10 and 11 - Favourable Condition Tables for the SAC habitat features relevant to the supporting habitats (intertidal mudflats and sandflats, saltmarsh and hard substrate habitats (rocky shores)) .

Table 15 Favourable Condition Table for the supporting habitats of the bird interest features in the Severn Estuary SPA European Marine Site (information on the populations of bird species using these habitats are given in Table 4)

SPA interest feature	Supporting Habitat	Attribute	Measure	Target	Comments
<i>SPA interest feature 1:</i> Internationally important Annex 1 species: Bewick's swan	Saltmarsh	Habitat extent	Area (ha) measured once per reporting cycle.	At The Dumbles, no decrease in extent from 76 ha.	Saltmarsh provides an important feeding and roosting habitat for Bewick's swans on The Dumbles - saltmarsh/transition wet grassland in front of sea defences.
		Vegetation characteristics	Abundance of suitable soft leaved herbs and grasses - % cover (frequency to be determined)	Greater than 25% cover during the winter season.	Bewick's swans graze on soft wet meadow grasses such as <i>Agrostis stolonifera</i> , <i>Glyceria fluitans</i> and <i>Alopecurus geniculatus</i> which are found in the transition of saltmarsh to grassland.
		Unimpeded sightlines at feeding and roosting sites	Openness of terrain unrestricted by obstructions	No increase in obstructions to existing bird sightlines. Areas of vegetation with an effective field size of >6ha	Bewick's swan require unrestricted views >500m to allow early detection of predators when feeding and roosting.
	Intertidal mudflats and sandflats	Habitat extent	Area (ha), measured once per reporting cycle.	At Frampton Sands, Waveridge Sands and the Noose, no decrease in extent from 980 ha.	The intertidal mudflats and sandflats at The Noose, Frampton Sand and Waveridge Sand are used as disturbance refuge for Bewick's swan. The extent and distribution of this sub-feature are important to maintain the population in favourable condition.
		Unimpeded sightlines at feeding and roosting sites	Openness of terrain unrestricted by obstructions	No increase in obstructions to existing bird sightlines.	Bewick's swan require unrestricted views >500m to allow early detection of predators when feeding and roosting.

Table 15 - continued

SPA interest feature	Supporting Habitat	Attribute	Measure	Target	Comments
<p><i>SPA interest features 2 - 6:</i> Internationally important populations of regularly occurring migratory species</p> <p>and</p> <p><i>SPA interest feature 7:</i> Internationally important assemblage of waterfowl</p>	Saltmarsh	Habitat extent	Area (ha), measured once per reporting cycle.	<p>No decrease in extent from 1,400 ha.</p> <p>At The Dumbles, no decrease in extent from 76 ha.</p>	Saltmarsh and their communities are important habitats as they provide both roosting and feeding areas.
		Food availability	Presence and abundance of suitable saltmarsh food plants measured periodically (frequency to be determined).	Presence and abundance of suitable saltmarsh food plants should not deviate significantly from an established baseline ¹	European white-fronted geese graze on a range of saltmarsh grasses and herbs. Wigeon feed on well-grazed saltmarsh with <i>Puccinella maritiae</i> , <i>Salicornia</i> and <i>Agrostis</i> . Teal and pintail feed on seeds from <i>Salicornia</i> and <i>Atriplex</i> .
		Vegetation characteristics	Range of vegetation heights measured periodically (frequency to be determined).	Sward height and density throughout areas used for roosting should not deviate significantly from an established baseline ¹ .	Vegetation of <10 cm is required throughout areas used by roosting waders. This is managed by grazing.
		Unimpeded sightlines at feeding and roosting sites	Openness of terrain unrestricted by obstructions	No increase in obstructions to existing bird sightlines.	Waterfowl require unrestricted views >500m to allow early detection of predators when feeding and roosting.

Table 15 - continued

SPA interest feature	Supporting Habitat	Attribute	Measure	Target	Comments
<p><i>SPA interest features 2 - 6:</i> Internationally important populations of regularly occurring migratory species</p> <p>and</p> <p><i>SPA interest feature 7:</i> Internationally important assemblage of waterfowl</p>	Intertidal mudflats and sandflats	Habitat extent	Area (ha), measured once per reporting cycle.	No decrease in extent from 15,000 ha. At Frampton Sands, Waveridge Sands and The Noose no decrease in extent from 980 ha.	Intertidal mudflats and sandflats and their communities are important habitats as they provide both roosting and feeding areas.
		Food availability	Presence and abundance of suitable prey species measured periodically (frequency to be determined).	Presence and abundance of suitable prey species should not deviate significantly from an established baseline. ¹	Most of the waders and waterfowl within the assemblage including the internationally important regularly occurring migratory birds feed on invertebrates within and on the sediments. Diet includes <i>Arenicola</i> , <i>Crangon</i> , <i>Hydrobia</i> , <i>Hediste</i> , <i>Corophium</i> , <i>Macoma</i> , <i>Gammarus</i> , small molluscs and strandline plankton and seeds.
		Unimpeded sightlines at feeding and roosting sites	Openness of terrain unrestricted by obstructions	No increase in obstructions to existing bird sightlines.	Waterfowl require unrestricted views >500m to allow early detection of predators when feeding and roosting.
	Shingle and rocky shores	Habitat extent	Area (ha), measured once per reporting cycle.	No decrease in extent from 1,500 ha.	This habitat is used for feeding and roosting, particularly by waders.
		Food availability	Presence and abundance of suitable intertidal invertebrates, measured periodically (frequency to be determined).	Presence and abundance of suitable food species should not deviate significantly from an established baseline ¹	Waders feed on worms, crustaceans and molluscs.
		Unimpeded sightlines at feeding and roosting sites	Openness of terrain unrestricted by obstructions	No increase in obstructions to existing bird sightlines.	Waterfowl require unrestricted views >500m to allow early detection of predators when feeding and roosting.

¹ Baselines to be established

Table 16 Favourable Condition Table for the qualifying bird features in the Severn Estuary European Marine Site

SPA interest feature	Supporting Habitat	Attribute	Measure	Target	Comments
<i>SPA interest feature 1:</i> Internationally important Annex 1 species: Bewick's swan		Population size	5 year peak mean number of individuals	No less than 289 individuals [ie the 5 year peak mean between 1988/9 - 1992/3]	Mainly found in the Upper Severn Estuary at Slimbridge
		Proportion of biogeographic population	% of NW European population	1 % of NW European population	WeBS counts provide this information
		Distribution	Number and location of sectors occupied at low tide	No decrease in use of the number of sectors and their distribution established as baseline ¹	WeBS low tide counts display distribution information by sector (not annual counts) Birds use certain sectors to a greater or lesser degree from year to year
		Disturbance in feeding and roosting areas	Reduction or displacement of wintering birds	No significant reduction in numbers or displacement of wintering birds attributable to disturbance from an established baseline ¹	Significant disturbance attributable to human activities can result in reduced food intake and/or increased energy expenditure. Five year peak mean information on populations will be used as the basis for assessing whether disturbance is damaging.
<i>SPA interest features 2 - 6:</i> Internationally important populations of regularly occurring migratory species and <i>SPA interest feature 7:</i> Internationally important assemblage of waterfowl		Population size	5 year peak mean number of individuals	No less than 68,026 individuals in the assemblage [ie the 5 year peak mean between 1988/9 - 1992/3] For individual species - no less than the 5 year peak mean between 1988/9 - 1992/3 detailed in Table 4	Figures derived from WeBS counts. The 5 year peak means for this period for each of the internationally important populations and species with nationally important populations which make up the internationally important assemblage are detailed in Table 4
		Distribution	Number and location of sectors occupied at low tide	No decrease in use of the number of sectors and their distribution established as baseline ¹	In some years birds use certain sectors to a greater or lesser degree. WeBS low tide counts display distribution information by sector (not annual counts).

SPA interest feature	Supporting Habitat	Attribute	Measure	Target	Comments
		Disturbance in feeding and roosting areas.	Reduction or displacement of wintering birds	No significant reduction in numbers or displacement of wintering birds attributable to disturbance from an established baseline ¹ .	Significant disturbance attributable to human activities can result in reduced food intake and/or increased energy expenditure. Five year peak mean information on populations will be used as the basis for assessing whether disturbance is damaging.

¹ Baselines to be established

4.3 Conservation objectives for the Severn Estuary / Môr Hafren Ramsar Site

The protection and management of the Ramsar in accordance with Article 6 of the Habitats Directive, including in particular the consideration of plans and projects under Article 6(3) and 6(4), should be carried out in view of the conservation objectives in this section.

4.3.1 Ramsar interest feature 1: Estuaries

The conservation objective for the “estuaries” feature of the Severn Estuary Ramsar Site is to maintain the feature in favourable condition, as defined by the conservation objective for the SAC “estuaries” feature” (refer to section 4.1.1 and Table 8 of this document), in so far as these objectives are applicable to the area designated as Ramsar Site and as defined below.

4.3.1.1 Explanatory information for the Ramsar Site “estuaries” conservation objective

The area of the estuarine ecosystem designated as Ramsar Site is smaller than that of the SAC as it is restricted to the terrestrial and intertidal areas and excludes all subtidal areas. There are therefore aspects of the SAC “estuaries” conservation objective that are not applicable to the Ramsar Site “estuaries” feature. The following Table 17 identifies the limits and restrictions, if any, that apply in respect of the Ramsar Site. The table layout follows the numbering of the SAC “estuaries” objective conditions given in section 4.1.1.

Table 17 - Limits of the Ramsar “estuaries” feature

SAC “estuaries” objective conditions to be met	Limits, if any, of the Ramsar
i. the total extent of the estuary is maintained;	Limited to the lesser area of the Ramsar Site – excludes all subtidal areas - refer also to Appendix 2
ii. the characteristic physical form (tidal prism/cross sectional area) and flow (tidal regime) of the estuary is maintained;	These requirements are related to the estuary regime, structure and function at a whole ecosystem level
iii. the characteristic range and relative proportions of sediment sizes and sediment budget ³ within the site is maintained;	
iv. the extent, variety and spatial distribution of estuarine habitat communities within the site is maintained;	Within the Ramsar Site this is limited to the habitats listed as Ramsar “estuarine habitats communities” ¹ below
v. the extent, variety, spatial distribution and community composition of hard substrate habitats and their notable communities is maintained;	Within the Ramsar Site this is limited to the habitats listed as Ramsar “hard substrate communities” ² below
vi. the abundance of the notable estuarine species assemblages is maintained or increased;	Within the Ramsar Site this is limited to the species listed as Ramsar “notable estuarine species assemblages” ³ below
vii. the physico-chemical characteristics of the water column support the ecological objectives described above;	These requirements apply estuary wide at a whole ecosystem level
viii. Toxic contaminants in water column and sediment are below levels which would pose a risk to the ecological objectives described above.	

¹Ramsar “estuarine habitat communities”

- a. Intertidal mudflats and sandflats (refer also to maps in Appendices 4 and 4a)
 - Intertidal gravel and clean sands
 - Intertidal muddy sands
 - Intertidal muds

- b. Saltmarshes (equivalent to the Atlantic saltmeadows feature of the SAC) (refer also to maps in Appendices 5 and 5a)
- Low – mid marsh communities
 - Mid – upper marsh communities
 - Transitional high marsh communities
 - Pioneer marsh communities

²Ramsar “hard substrate communities”

These include all hard substrate (rocky shore) communities within the Ramsar Site boundary shown in the map in Appendix 7 which includes the following notable communities:

- *Sabellaria alveolata* reefs on sand-abraded eulittoral rock (MLR.Sab Salv) *
- *Hydroids, ephemeral seaweeds and Littorina littorea* in shallow eulittoral mixed substrata pools. (LR.RkpH)
- *Balanus crenatus* and *Tubularia indivisa* on extremely tide-swept circalittoral rock ECR.BS.BalTub)
- *Fucus serratus* and piddocks on lower eulittoral soft rock (MLR.Fser.Pid)
- *Mytilus edulis* and piddocks on eulittoral firm clay (MLR.MytPid)
- *Balanus crenatus*, *Halichondrea panicea* and *Alcyonidium diaphanum* on extremely tide-swept sheltered circalittoral rock (ECR.BalHpan) .
- *Sertularia cupressina* and *Hydrallmania falcate* on tide-swept sublittoral cobbles or pebbles in coarse sand (IGS.ScupHyd).
- *Corralina officinalis* and coralline crusts in shallow eulittoral rockpools (LR.Rkp.Cor)
- Eel grass (*Zostera*) beds
- Any other notable hard substrata communities that may be identified.

*Note : where this community is contiguous with the occurrence of subtidal *Sabellaria alveolata* reefs it forms part of the SAC reefs feature. Within the Ramsar it is regarded as a component of the hard substrates subfeature of the Ramsar estuaries feature .

³Ramsar “notable estuarine species assemblages”

- i. Assemblage of fish species:
- Migratory species
 - River and Sea Lamprey and Twaité shad and Allis shad
 - Sea trout, salmon, eel,
 - Estuarine species
 - Species typically occurring and breeding in estuaries (Bird, 2008)
 - Marine species occurring in large numbers in estuaries (Bird, 2008)
 - Marine species
 - Predominantly marine species occurring infrequently in the Severn (Bird, 2008)
 - Freshwater species
 - Species typically occurring and breeding in freshwater and recorded within the Severn (Bird, 2008)

- ii Assemblage of waterfowl species (refer also to section 4.3.9)

Internationally important populations of waterfowl comprising :

- Regularly occurring Annex 1 species - Bewick's swan
- Regularly occurring migratory species - European white-fronted goose, dunlin, redshank, shelduck, and gadwall

Internationally important assemblage of waterfowl comprising above species plus the following :

- Nationally important bird populations - wigeon, teal, pintail, pochard, tufted duck, ringed plover, grey plover, curlew, whimbrel and spotted redshank, lesser black-backed gull

- iii. Assemblage of vascular plant species:

- Salt marsh species (refer to notes 5 and 6 in section 4.1.4.1 - explanatory information on the conservation objective for the Atlantic salt meadows feature)
- Eel grass (*Zostera*) species.

4.3.2 Ramsar interest feature 2: Assemblage of migratory fish species¹

The conservation objective for the “assemblage of migratory fish species” feature of the Severn Estuary Ramsar Site is to maintain the feature in favourable condition, as defined below:

The feature will be considered to be in favourable condition when, subject to natural processes², each of the following conditions are met:

- i. the migratory passage of both adults and juveniles of the assemblage of migratory fish species through the Severn Estuary between the Bristol Channel and any of their spawning rivers is not obstructed or impeded by physical barriers, changes in flows, or poor water quality;
- ii. the size of the populations of the assemblage species in the Severn Estuary and the rivers which drain into it, is at least maintained and is at a level that is sustainable in the long term;
- iii. the abundance of prey species³ forming the principle food resources for the assemblage species within the estuary, is maintained.
- iv. Toxic contaminants in the water column⁴ and sediment are below levels which would pose a risk to the ecological objectives described above.

The meaning of terms ¹⁻⁴ above is explained in **section 4.3.2.1**

Note : The populations of three of the assemblage species (river lamprey, sea lamprey and twaite shad) are designated as features of the SAC for which separate specific objectives have been written (refer to sections 4.1.6 to 4.1.8 of this document). The populations of these species depend on habitat in the adjacent River Usk SAC, River Wye SAC and River Severn. The habitats in these rivers, including spawning and nursery areas, are essential for the fulfilment of the species’ lifecycle and therefore these features can only be in favourable condition if the conservation objectives pertaining to the River Usk SAC and River Wye SAC are also met in full and there is a continued recorded presence of these species in the River Severn.

4.3.2.1 Explanatory information for the assemblage of migratory fish species conservation objective

¹ Assemblage of migratory fish species

Species which are designated features of the SAC and for which individual conservation objectives have been written (refer to sections 4.1.6, 4.1.7 and 4.1.8)

Sea lamprey *Petromyzon marinus*
River lamprey *Lampetra fluviatilis*
Twaite shad *Alosa fallax*

Other migratory species in the assemblage

Allis shad *Alosa alosa*
Salmon *Salmo salar*
Sea trout *S. trutta*
Eel *Anguilla anguilla*.

²Natural processes in respect of the Ramsar fish features

Assemblage populations :

The size of the populations is subject to non anthropogenic factors relating to natural fluctuations of external factors such as food / host availability in the Bristol Channel and more widely and breeding success in the River Severn and other rivers draining into the Severn Estuary.

Supporting habitats

The general meaning of ‘natural processes’ with respect to the supporting habitats of the migratory fish assemblage within the estuary is explained in **section 4.1.1.1**.

³Prey species

Assemblage Species	Key prey species
Sea lamprey	Eel <i>Anguilla anguilla</i> , cod <i>Gadus morhua</i> , and haddock <i>Melanogrammus aeglefinus</i> are all potential prey species for the sea lamprey found within the Severn Estuary (Bird 2008)
River lamprey	Sea trout <i>Salmo trutta</i> , shad <i>Alosa fallax/Alosa alosa</i> , herring <i>Clupea harengus</i> , sprat <i>Sprattus sprattus</i> , flounder <i>Platichthys flesus</i> and small gadoids such as whiting <i>Merlangius merlangus</i> and pout <i>Trisopterus luscus</i> are all potential prey species for the river lamprey found within the Severn Estuary (Bird 2008).
Twaite shad	Small crustaceans, especially mysids and copepods, small fish, especially sprats and anchovies, and fish eggs (Maitland, P.S. & Hatton-Ellis 2003).
Allis shad	Small crustaceans, especially mysids and copepods, small fish, especially sprats and anchovies, and fish eggs (Maitland, P.S. & Hatton-Ellis 2003).
Salmon	While at sea, salmon feed on a variety of fish (e.g. herring, sprat, sand eel, mackerel, and various gadoids) and crustaceans (e.g. euphausiid shrimps, prawns, gammarid amphipods and various crabs). (Bird, 2008)
Sea trout	The diet of this species at sea has not been much studied but is believed to include a range of fish species including sprat, young herring and sand eels as well as crustaceans such amphipods (e.g. Corophium), gammarids, decapods such as Crangon and mysid shrimps. Many of these prey items also occur in estuaries where sea trout are known to feed extensively. (Bird, 2008)
Eel	A range of benthic organisms that include crustaceans and small fish. (Bird, 2008)

⁴Water column

Water column should be read to include contributory water flows into the estuary including surface flows over mudflats and saltmarsh.

4.3.3 Ramsar interest feature 3: Internationally important populations of waterfowl : Bewick's swan

The conservation objective for the “Bewick's swan” feature of the Severn Estuary Ramsar Site is to maintain the feature in favourable condition, as defined by the conservation objective for the SPA “Bewick's swan ” feature (refer to section 4.2.1)

4.3.4 Ramsar interest feature 4 : Internationally important populations of waterfowl : European white-fronted goose

The conservation objective for the “European white-fronted goose” feature of the Severn Estuary Ramsar Site is to maintain the feature in favourable condition, as defined by the conservation objective for the SPA “wintering European white-fronted goose” feature (refer to section 4.2.2)

4.3.5 Ramsar interest feature 5: Internationally important populations of waterfowl : dunlin

The conservation objective for the “dunlin” feature of the Severn Estuary Ramsar Site is to maintain the feature in favourable condition, as defined by the conservation objective for the SPA “wintering dunlin ” feature (refer to section 4.2.3)

4.3.6 Ramsar interest feature 6: Internationally important populations of waterfowl : redshank

The conservation objective for the “redshank” feature of the Severn Estuary Ramsar Site is to maintain the feature in favourable condition, as defined by the conservation objective for the SPA “wintering redshank” feature (refer to section sections 4.2.4)

4.3.7 Ramsar interest feature 7: Internationally important populations of waterfowl :shelduck

The conservation objective for the “shelduck” feature of the Severn Estuary Ramsar Site is to maintain the feature in favourable condition, as defined by the conservation objective for the SPA “wintering shelduck” feature (refer to section 4.2.5)

4.3.8 Ramsar interest feature 8: Internationally important populations of waterfowl : gadwall

The conservation objective for the “gadwall” feature of the Severn Estuary Ramsar Site is to maintain the feature in favourable condition, as defined by the conservation objective for the SPA “wintering gadwall” feature (refer to section sections 4.2.6)

4.3.9 Ramsar interest feature 9: Internationally important assemblage of waterfowl

The conservation objective for the “internationally important assemblage of waterfowl” feature of the Severn Estuary Ramsar Site is to maintain the feature in favourable condition, as defined by the conservation objective for the SPA “internationally important assemblage of waterfowl” feature (refer to section sections 4.2.7) – with special reference to the individual species listed and their population figures given in Table 6

Note : This Ramsar Site feature incorporates both wintering and passage populations of some birds and hence some species are included more than once in lists given in Table 6

4.3.10 Favourable Condition Tables for the Ramsar Site interest features of the Severn Estuary European Marine Site

Background information on the role of favourable condition tables and the information provided in each column is provided in section 1.8 of this document, and a concise glossary of terms used is provided in Section 7.

The favourable condition table is intended to supplement the conservation objectives, including with respect to the management of established and ongoing activities, future requirements of monitoring and reporting on the condition of the features of the site and, together with the conservation objectives, informs the scope and nature of any appropriate assessment that may be needed. The table **does not by itself** provide a comprehensive basis on which to assess plans and projects as required under the Habitats Regulations. It should be noted that appropriate assessments are a separate activity to condition monitoring, requiring consideration of issues specific to individual plans or projects.

These tables set out all the attributes that **may** be used to monitor the condition of the features of the Ramsar Site. Where possible we will seek available information from others which can inform our assessment process.

It will be possible to monitor many of the attributes at the same time or during the same survey. The frequency of sampling for many attributes may need to be greater during the initial monitoring events in order to characterise the site and establish the baselines. Extreme events (such as storms reducing or increasing salinities, exceptionally cold winters or warm summers) also need to be recorded as they may be critical in influencing ecological issues in the Severn Estuary and may well be missed by routine monitoring.

Comprising :

Table 18 – Favourable condition table for the “estuaries” feature of the Severn Estuary Ramsar Site

Table 19 – Favourable condition table for the migratory fish assemblage of the Severn Estuary Ramsar Site

Table 20 – Favourable condition table for the supporting habitats of the bird interest features (Ramsar features 3 to 9) in the Severn Estuary Ramsar Site

Table 21 – Favourable condition table for the qualifying bird interest features in the Severn Estuary Ramsar Site

Favourable condition table for the “estuaries” feature of the Severn Estuary Ramsar Site

Reference should also be made to Tables 8,10 and 11 - Favourable Condition Tables for the SAC habitat features relevant to the supporting habitats (intertidal mudflats and sandflats, saltmarsh and hard substrate habitats (rocky shores)) .

Table 18 Favourable Condition Table for the “estuaries” feature of the Severn Estuary Ramsar Site

Ramsar interest feature	Comments
<p><i>Ramsar Interest feature 1: Estuaries</i></p>	<p>The Favourable Condition Table for the “estuaries” feature of the Severn Estuary Ramsar Site is largely the same as that for the Severn Estuary SAC “estuaries” feature (see section 4.1 : Table 8).</p> <p>However the area of the estuarine ecosystem designated as Ramsar Site is smaller than that of the SAC as it is restricted to the terrestrial and intertidal areas and excludes all subtidal areas. Table 17 identifies the limits and restrictions that apply in respect of the Ramsar Site Conservation Objective.</p> <p>There are therefore aspects of the SAC “estuaries” Favourable Condition Table that are not applicable to the Ramsar Site “estuaries” feature as follows :</p> <ul style="list-style-type: none"> • All attributes other than those referred to below - apply only in respect of the area within the Ramsar Boundary (as shown in Appendix 2) • Line A6 - which relates to the subtidal sandbanks subfeature of the estuaries feature - this does not apply as these habitats lie outside the boundary of the Ramsar Site • Line A9 - which relates to the reefs subfeature of the estuaries feature - this only applies in respect of areas where intertidal <i>Sabellaria alveolata</i> occurs contiguously with the subtidal reefs (yet to be fully defined).

Table 19 Favourable Condition Table for the Migratory fish assemblage feature of the Severn Estuary Ramsar Site

Ramsar interest feature	Sub-feature	Attribute	Measure	Target	Comments
Ramsar Interest feature 2 : Migratory fish assemblage		Migratory access (Barriers to migration) (migratory passage not impeded - sections 4.6.i and 4.7.i of the conservation objectives)	Water quality measured regularly throughout the reporting cycle in the Bristol Channel, Severn Estuary, River Wye SAC, River Usk SAC and River Severn. (see also lines A17- A20 of Table 8 relating to general water quality requirements for the estuary feature (and dependant sub features)	Water quality is sufficient to support migratory passage. Levels (for temperature, salinity, turbidity and pH, and dissolved oxygen) should comply with targets established under the EA Review of Consents and the Water Framework Directive. Baseline is water quality sampling data collected by the Environment Agency	Significant variation in these physio-chemical parameters may act as barriers to migration. For example, the timing, duration and consistency of their upstream migration are believed to be closely related to temperature changes as well as pheromone triggers from the juveniles during periods of high water flow. Peak migration usually coincides with river temperatures that remain above 10°C and continues until temperatures reach 18°C. Dissolved oxygen can also be significantly reduced in stretches receiving significant BOD inputs, or through the re-suspension of organic rich sediments. Toxic contaminants may act as a barrier to migration.
			Water flows measured regularly throughout the reporting cycle (frequency to be determined) in the River Wye SAC, River Usk SAC and River Severn (see also line A3 of Table 8 relating to general tidal and water flow requirements for the estuary feature (and dependant sub features)	Flows from the rivers into the estuary must be sufficient to allow migration Baseline is water flow sampling data collected by the Environment Agency provides a baseline. Severe low flow conditions that affect these species yet to be defined	
			Physical barriers Mapping and quantification of potential obstructions in relation to height, type and water depth below obstruction once during the reporting cycle.	No artificial barriers significantly impairing, adults from reaching existing and historical spawning grounds, or juveniles from moving downstream. Baseline is the Environment Agency data on structures and flood defences	Dams, navigation and other weirs may prevent fish from reaching their spawning grounds. In particular, sea lamprey is known to be poor at ascending obstacles.

Ramsar interest feature	Sub-feature	Attribute	Measure	Target	Comments
		Population sizes (returning adults) <i>(size of populations - sections 4.6.ii and 4.7.ii of the conservation objectives)</i>	Number of returning adults measured using fish counters on the feeding rivers (Wye, Usk and Severn) during the migratory period.	No decline in number of returning adults from established baseline. <i>Baseline is yet to be established - fish counter data may be able to provide a baseline in future years.</i>	(Note that this attribute will not be able to be measured until the technological solutions for monitoring some species (notably lampreys and shad) are developed.)
		River populations <i>(size of populations - sections 4.6.ii and 4.7.ii of the conservation objectives)</i>	Survey through various methods (Electrofishing, seine netting, line fishing records, licencing returns) at a series of locations in the Rivers Wye, Usk and Severn	No decline in populations of the Rivers Wye and Usk <i>Baseline is yet to be established - fish counter data may be able to provide a baseline in future years.</i>	Details of methods for river and sea lamprey are outlined in section 4.1.9, Table 13 and for Twaite shad in Table 14 - the individual FCT for these species within the SAC section of this document
		Prey species <i>(abundance of prey species - sections 4.6.iii and 4.7.iii of the conservation objectives)</i>	The abundance of key prey species measured by EA in their routine monitoring of the rivers and estuary	No significant reduction in abundance of key prey species against an established baseline <i>Baseline is yet to be established through fish surveys in estuary and rivers</i>	<p>River and sea lamprey require a variety of other fish species to act as hosts throughout their lifecycle. Their principal host species are part of the estuarine fish assemblage which has measures and targets included within Table 8.</p> <p>Twaite shad require a variety of invertebrates including crustacean, mysids and copepods, small fish and fish eggs particularly in that section of the estuary where saline and freshwaters meet.</p> <p>While at sea, salmon feed on a variety of fish (e.g. herring, sprat, sand eel, mackerel, and various gadoids) and crustaceans (e.g. euphausiid shrimps, prawns, gammarid amphipods and various crabs). (Bird, 2008)</p> <p>The diet of sea trout at sea is believed to include a range of fish species including sprat, young herring and sand eels as well as crustaceans such as amphipods (e.g. Corophium), gammarids, decapods such as Crangon and mysid shrimps.</p> <p>Eels feed on a range of benthic organisms that include crustaceans and small fish. (Bird, 2008)</p>

Table 20 Favourable Condition Table for the supporting habitats of the bird interest features (Ramsar interest features 3 to 9) in the Severn Estuary Ramsar Site (Numbers of bird species using these habitats are given in Table 6)

Ramsar interest features	Supporting Habitat	Attribute	Measure	Target	Comments
Ramsar Interest features 3-8 : Internationally important populations of waterfowl and Ramsar Interest feature 9 : Internationally important assemblage of waterfowl	Saltmarsh	Habitat extent	Area (ha) measured once per reporting cycle.	No decrease in extent from 1,400 ha. At The Dumbles, no decrease in extent from 76 ha.	Saltmarsh and their communities are important habitats as they provide both roosting and feeding areas.
		Food availability	Presence and abundance of suitable saltmarsh food plants measured periodically (frequency to be determined).	Presence and abundance of suitable saltmarsh food plants should not deviate significantly from an established baseline ¹ .	European white-fronted geese graze on a range of saltmarsh grasses and herbs. Wigeon feed on well-grazed saltmarsh with <i>Puccinella maritiae</i> , <i>Salicornia</i> and <i>Agrostis</i> . Teal and pintail feed on seeds from <i>Salicornia</i> and <i>Atriplex</i> .
		Vegetation characteristics	Abundance of suitable soft leaved herbs and grasses - % cover (frequency to be determined)	Greater than 25% cover during the winter season.	Bewick's swans graze on soft wet meadow grasses such as <i>Agrostis stolonifera</i> , <i>Glyceria fluitans</i> and <i>Alopecurus geniculatus</i> which are found in the transition of saltmarsh to grassland.
		Vegetation characteristics	Range of vegetation heights measured periodically (frequency to be determined).	Sward height and density throughout areas used for roosting should not deviate significantly from an established baseline ¹ .	Vegetation of <10 cm is required throughout areas used by roosting waders. This is managed by grazing.
		Unimpeded sightlines at feeding and roosting sites	Openness of terrain unrestricted by obstructions	No increase in obstructions to existing bird sightlines. Areas of vegetation with an effective field size of >6ha at the Dumbles (Bewicks swan)	Waterfowl require unrestricted views >500m to allow early detection of predators when feeding and roosting.

Table 20 continued

Ramsar interest features	Supporting Habitat	Attribute	Measure	Target	Comments
Ramsar Interest features 3-8 : Internationally important populations of waterfowl and Ramsar Interest feature 9 : Internationally important assemblage of waterfowl	Intertidal mudflats and sandflats	Habitat extent	Area (ha), measured once per reporting cycle.	No decrease in extent from 15,000 ha. At Frampton Sands, Waveridge Sands and The Noose no decrease in extent from 980 ha.	Intertidal mudflats and sandflats and their communities are important habitats as they provide both roosting and feeding areas. The intertidal mudflats and sandflats at The Noose, Frampton Sand and Waveridge Sand are used as disturbance refuge for Bewick's swan. The extent and distribution of this sub-feature are important to maintain the population in favourable condition.
		Food availability	Presence and abundance of suitable prey species measured periodically (frequency to be determined).	Presence and abundance of suitable prey species should not deviate significantly from an established baseline ¹ .	Most of the waders and waterfowl within the assemblage including the internationally important population of waterfowl feed on invertebrates within and on the sediments. Diet includes <i>Arenicola</i> , <i>Crangon</i> , <i>Hydrobia</i> , <i>Hediste</i> , <i>Corophium</i> , <i>Macoma</i> , <i>Gammarus</i> , small molluscs and strandline plankton and seeds.
		Unimpeded sightlines at feeding and roosting sites	Openness of terrain unrestricted by obstructions	No increase in obstructions to existing bird sightlines.	Waterfowl require unrestricted views >500m to allow early detection of predators when feeding and roosting.
	Shingle and rocky shores	Habitat extent	Area (ha), measured once per reporting cycle.	No decrease in extent from 1,500 ha.	This habitat is used for feeding and roosting, particularly by waders.
		Food availability	Presence and abundance of suitable intertidal invertebrates, measured periodically (frequency to be determined).	Presence and abundance of suitable food species should not deviate significantly from an established baseline ¹ .	Waders feed on worms, crustaceans and molluscs.
		Unimpeded sightlines at feeding and roosting sites	Openness of terrain unrestricted by obstructions	No increase in obstructions to existing bird sightlines.	Waterfowl require unrestricted views >500m to allow early detection of predators when feeding and roosting.

¹ Baselines to be established

Table 21 Favourable Condition Table for the qualifying bird features in the Severn Estuary Ramsar Site

Ramsar interest features	Supporting Habitat	Attribute	Measure	Target	Comments
<i>Ramsar Interest features 3-8 :</i> Internationally important populations of waterfowl and <i>Ramsar Interest feature 9 :</i> Internationally important assemblage of waterfowl		Population size	5 year peak mean number of individuals	No less than 68,026 individuals in the assemblage [ie the 5 year peak mean between 1988/9 - 1992/3] For individual species - no less than the 5 year peak mean between 1988/9 - 1992/3 detailed in Table 6	Figures derived from WeBS counts. The 5 year peak means for this period for each of the internationally important populations and species with nationally important populations which make up the internationally important assemblage are detailed in Table 6
		Distribution	Number and location of sectors occupied at low tide	No decrease in use of the number of sectors and their distribution established as baseline ¹ .	WeBS low tide counts display distribution information by sector (not annual counts) Birds use certain sectors to a greater or lesser degree from year to year
		Disturbance in feeding and roosting areas.	Reduction or displacement of wintering birds	No significant reduction in numbers or displacement of wintering birds attributable to disturbance from an established baseline ¹ .	Significant disturbance attributable to human activities can result in reduced food intake and/or increased energy expenditure. Five year peak mean information on populations will be used as the basis for assessing whether disturbance is damaging.

¹ Baselines to be established

5. Advice on Operations

CCW and Natural England have a duty under Regulation 33(2)(b) of The Conservation (Natural Habitats &c.) Regulations 1994 to advise other relevant authorities as to any operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species, for which the site has been designated. Information on how CCW and Natural England have developed this advice is given in section 5.2, and on how it may be reviewed and updated in the future in section 5.3.

The Advice on Operations concerning the SAC are provided in detail in Table 22 and section 5.6. The Advice on Operations concerning the SPA is provided in Table 23 and section 5.7. These include recommendations regarding specific interest features and their supporting habitats. The Advice on Operations concerning the Ramsar Site is provided by cross reference to the subsections of the advice for the SAC and SPA which are relevant to the Ramsar Site interest features.

5.1. Purpose of advice

The aim of this advice is to provide CCW and Natural England's Advice on Operations as required by Regulation 33 (2)(b) for the Severn Estuary European Marine Site and thereby enable all relevant authorities to direct and prioritise their work on the management of activities that pose the greatest potential threat to the favourable condition of interest features on the Severn Estuary European Marine Site. The advice should be read in conjunction with the Conservation Objectives for the SAC, SPA and Ramsar Sites interest features given in sections 4.1, 4.2 and 4.3 respectively and it is intended to provide the basis for detailed discussions to formulate and agree a management scheme for the European Marine Sites.

General advice on sensitivity, exposure (and therefore vulnerability) contained within this document is presented against broad categories of operation which may cause the deterioration of natural habitats or the habitats of species, or the disturbance of species (refer to section 5.2). It reflects activities and plans and projects. Generic examples of some of the types of operation that are covered under the broad category headings are given for illustration.

The advice is based on best available information at the time of preparation of the Regulation 33 advice for the Severn Estuary in 2008/09. For a current assessment of levels of disturbance of specific types of activity across the Severn Estuary (relevant solely to the SPA interest features), reference should be made to the SPA Scheme of Management, available at the ASERA website (<http://www.severnestuary.net/asera/>). It should be noted, however, that the frequency, intensity, effects and level of risk to the SPA features that certain activities may have are still being investigated under the existing Severn Estuary Scheme of Management.

5.2 Methods for assessment

The advice provided here is within six broad categories of operation which may cause the deterioration of natural habitats or the habitats of species, or the disturbance of species. These categories are:

- Physical loss
- Physical damage
- Non-physical disturbance
- Toxic contamination
- Non-toxic contamination
- Biological disturbance

Within these categories are environmental impacts that may result from operations. Example sources of activities are provided in the MarLIN *Maritime and coastal activities to environmental factors matrix* (see Appendix 10), although these are by no means inclusive of all potentially damaging activities.

Given current knowledge of the nature and extent of activities taking place within the Severn Estuary European Marine Site, this approach therefore:

- enables links to be made between human activities and the ecological requirements of the habitats or species, as required under Article 6 of the Habitats Directive;
- provides a consistent framework to enable relevant authorities in England and Wales to assess the effects of activities and identify priorities for management within their areas of responsibility; and
- is appropriately robust to take into account the development of novel activities or operations which may cause deterioration or disturbance to the interest features of the site and should have sufficient stability to need only infrequent review and updating by the CCW and Natural England.

These broad categories provide a clear framework against which relevant authorities can assess activities or operations under their responsibility. The more detailed information in Tables 22 and 23 (covering both the SAC and SPA) provides competent authorities with a context against which to consider an assessment of ‘significant effect’ of any plans or projects which may affect the site and a basis to inform on the scope and nature of appropriate assessments required in relation to plans and projects. It is important to note that this advice is only a starting point for assessing impacts. It does not remove the need for the relevant or competent authorities to consult CCW or Natural England formally over individual plans and projects where required to do so under the Regulations.

This Advice on Operations for the site is based on a three-step process involving:

- an assessment of the **sensitivity** of the interest features or their component supporting habitats to operations;
- an assessment of the **current exposure** of each interest feature or their component supporting habitats to operations; and
- a final assessment of **current vulnerability** of interest features or their component supporting habitats to operations.

Note that in respect of the SPA, sensitivity, exposure and vulnerability have been assessed largely in relation to the use of habitats by birds, but may also take into account direct effects on the bird species themselves (such as ‘shooting’ or ‘disturbance’).

This three-step process builds up a level of information necessary to manage activities in and around the European Marine Site in an effective manner and to identify to competent and relevant authorities those operations which pose the most immediate threats to the favourable condition of the interest features of the European Marine Site.

The assessment of relative sensitivity, exposure and vulnerability is derived using best available scientific information and informed scientific interpretation and judgement. The process uses sufficiently coarse categorisation to minimise uncertainty in information, reflecting the current state of knowledge and understanding of the marine environment. Where possible, the sensitivity, exposure and vulnerability are assessed on a three-point scale of ‘Low’, ‘Moderate’ or ‘High’. To assist with interpretation, these levels have been colour-coded in Tables 22 & 23.

5.2.1 Sensitivity assessment

The sensitivity assessment used is an assessment of the relative sensitivity of the interest features or the component supporting habitats of the Severn Estuary European Marine Site to the effects of six broad categories of human activities. In relation to this assessment, **sensitivity** has been defined as ‘**the intolerance of a habitat, community or individual (or individual colony) of a species to damage, or death, from an external factor and the time taken for its subsequent recovery**’ (MarLIN, 2003). For

example, a very sensitive species or habitat is one that is very adversely affected by an external factor arising from human activities or natural events (killed/destroyed, 'high' intolerance) and is expected to recover over a very long period of time, i.e. >10 or up to 25 years ('low' recoverability).

The sensitivity assessments are based on current information but may develop with improvements in scientific knowledge and understanding. The sensitivity of interest features (and scientific understanding of sensitivity) may change over time; hence an operation which is not currently considered to have a negative effect, may do so in the future.

English Nature (now Natural England) and Scottish Natural Heritage commissioned the Marine Biological Association of the UK, through its Marine Life Information Network (MarLIN) to provide detailed sensitivity information to underpin this advice. Detailed sensitivity information at a biotope or species level is available via MarLIN's website (www.marlin.ac.uk). The sensitivity assessments are indicative qualitative judgements based on the best available scientific information. They represent the most likely (probable) result of a given change in a factor. The sensitivity assessments of the interest features or their component supporting habitats of the Severn Estuary SAC, SPA and Ramsar Site are based upon MarLIN sensitivity assessments for biotopes (components of the Annex I habitats) and species supplemented by local knowledge and professional judgement to provide a site specific assessment that reflect the unusual and extreme character of the Severn Estuary.

The sensitivities of each of the SAC Annex I habitat features have been assessed on the component biotopes represented within each of the habitats (where information is available). Where information has not been available, such as for subtidal *Sabellaria alveolata* reefs or for Atlantic saltmeadow communities, a number of scientific review documents have been consulted, including reports produced for the UK Marine SAC LIFE project (see Bibliography section for a full list of these).

Assessments for the Annex II migratory fish have been based on current knowledge (best available scientific knowledge), which is limited for the life phase that shad and lamprey spend in estuarine waters. Given the paucity of information, it has not been possible to assess the level of sensitivity on a three-point scale; they have been assessed to be either 'sensitive' or 'not sensitive'.

For the SPA, the sensitivities have been assessed in relation to the use of habitats by birds and the sensitivities of the individual species themselves to certain activities. For example, wintering birds are highly sensitive to the loss of their roosting or feeding grounds; and they are highly sensitive to the noise of shooting. The sensitivity assessments of the interest features or their component supporting habitats of the Severn Estuary SPA are based on a number of scientific review documents. These include reports produced for the UK Marine SAC LIFE project (Davison & Hughes 1998; Elliott *et al.*, 1998), the Countryside Council for Wales Science Report (Holt *et al.*, 1995) and the Marine Habitats Review (Jones *et al.*, 2000.).

The magnitude or scale of the effect of an activity and the resultant change in environmental factors are site specific. For the purpose of this advice, the assessments of sensitivity have been adjusted for *changes in suspended sediments* and *turbidity* to reflect the particular conditions affecting the site. As a result of the high tidal energy of the site, the concentration of suspended sediment and turbidity are naturally very high. The marine fauna, including the migratory fish, are adapted to such high concentrations of suspended sediment and thus they are unlikely to have any significant effect. Consequently the sensitivities relating to *changes in suspended sediments* and *turbidity* have been downgraded.

Table 22 shows the sensitivity assessments for the SAC features and sensitivity assessments for the SPA can be seen in Table 23.

5.2.2 Exposure assessment

Exposure assessment has been undertaken for the Severn Estuary European Marine Site by assessing the relative exposure of the interest features or their component supporting habitats to the effects of broad categories of operations, resulting from human activities currently occurring on the site. Exposure has been assessed against a matrix which relates activities to operation pressures (see Appendix 10). The

matrix has been used as a guide and interpreted to assess the exposure to current activities known to be present within the site.

In assigning a three-point score (High, Moderate or Low) to the exposure, each activity is considered for:

- Spatial extent of the pressure
- Frequency of the pressure and
- Intensity of the pressure

For the SPA, the exposure has been assessed in relation to the use of habitats by birds and on the bird species themselves. As an example, the feeding and roosting grounds of wintering birds may be considered highly exposed to toxic contamination from synthetic compounds due to the locations and intensity of discharges into an area.

5.2.3 Vulnerability assessment

The third step in the process is to determine the vulnerability of interest features or their component supporting habitats to operations. This category results from an integration of sensitivity and exposure. Only if a feature is both sensitive and exposed to a human activity will it be considered vulnerable. In this context therefore, 'vulnerability' has been defined as **'the exposure of a habitat, community or individual (or individual colony) of a species to an external factor to which it is sensitive'** (Hiscock, 1996).

Tables 22 and 23 show the vulnerability assessments for the SAC features and the SPA features respectively.

5.3 Update and review of advice

Information as to the categories of operations which may cause the deterioration of natural habitats or the habitats or disturbance of species for which the site has been designated, is provided in light of what CCW and Natural England know about current activities and patterns of usage within the Severn Estuary European Marine Site. The general information on current activities and patterns of usage (which was used in part to derive Table 23) has been refined at the local level in producing the management scheme for the SPA and through further discussion with the relevant authorities. This management scheme is available at the ASERA website (<http://www.severnestuary.net/asera/>) although this will require review following this more detailed analysis of impacts on the estuarine habitats that are supporting habitats for the birds of the SPA.

The information provided in this advice on the sensitivity of interest features or their supporting habitats (Table 23) will change as a result of an improvement in our scientific knowledge, which will be a relatively long term process. It is suggested that advice for sites be kept under review and is periodically updated through discussion with relevant authorities and others to reflect significant changes in our understanding of sensitivity together with the potential effects of plans and projects on the marine environment.

5.4 Plans and Projects

Under Regulation 48(1), an appropriate assessment must be undertaken by competent authorities in respect of any plan or project which:

- a. either alone or in combination with other plans or projects is likely to have a *significant effect* on a European site; and
- b. is not directly connected with or necessary to the management of the site for nature conservation.

This legal requirement applies to all European sites (SACs and SPAs). Regulation 48 is also applied, as a matter of Government policy, to proposed SPAs and listed Ramsar sites.

Tables 22 and 23 provides competent authorities with a guide against which to initiate an assessment of the 'significance' of any plans or projects (and on-going operations or activities) proposed for the site, although this will only be a starting point for assessing impacts and does not remove the need for competent authorities to consult CCW or Natural England formally over individual plans and projects where required under the Regulations.

5.5 Review of consents

Regulation 50 of the Conservation (Natural Habitats, &c.) Regulations 1994 requires a competent authority to undertake a review of any existing consent or permission to which Regulation 48(1) would apply if it were to be reconsidered as of the date on which the site became a European site. Where a review is required under these provisions it must be carried out as soon as reasonably practicable after classification of the European Marine Site. Consents will need to be reviewed in the light of these objectives.

5.6 Specific Advice on Operations for the Severn Estuary SAC

This section provides information to help relate general advice to each of the specific interest features of the Severn Estuary SAC. Where specific examples are given they are provided to aid understanding of possible impacts and are not intended to be a comprehensive list of all relevant operations.

This advice relates to the vulnerability of the interest features and supporting habitats of the Severn Estuary SAC as set out in more detail in Table 22. A brief explanation of the sensitivity of the interest features or supporting habitats follows, with an explanation of their exposure and consequently their vulnerability to damage or disturbance from the listed categories of operations is also given. This enables links between the categories of operation and the ecological requirements of the European Marine Site and Ramsar Site interest features to be made.

The precise impact of any category of operation occurring on the site will be dependent upon the nature, scale, location and timing of events. In accordance with Government policy guidance, the Advice on Operations provided here, is feature and site specific, and provided in the light of current activities and patterns of usage at the site.

As such, it is important that future consideration of this advice by relevant authorities, and others, takes account of changes in usage patterns that have occurred at the site over the intervening period. Advice for sites should be kept under review: it is suggested that periodic discussions with relevant authorities and others be undertaken to reflect significant changes in the understanding of sensitivities, as well as the potential effects of future plans or projects on the marine environment.

5.6.1 Estuaries feature

(Note : this advice is also relevant to the “estuaries” feature of the Ramsar Site – refer also to section 5.8)

5.6.1.1 Sensitivity

The **estuary** and its associated biological communities are **moderately to highly sensitive** to:

- **physical loss**
- **physical damage**
- **toxic contamination**
- **non-toxic contamination** and
- **biological disturbance**

These result from a range of activities known to occur in the estuary. Further details are provided in points i) to xiv) below, with details of the level of sensitivity set out in Table 22.

5.6.1.2 Exposure

The **estuary** and its associated biological communities are **moderately to highly exposed** to:

- **substratum loss**
- **smothering**
- **changes in suspended sediment**
- **changes in water flow rate**
- **changes in wave exposure**
- **abrasion and physical disturbance**
- **noise and visual disturbance**
- **toxic contamination (introduction of synthetic & non synthetic compounds)**
- **changes in nutrient loading**
- **changes in thermal regime**
- **changes in turbidity**
- **changes in salinity**
- **changes in oxygenation**
- **introduction of microbial pathogens**
- **introduction of non-native species**
- **selective extraction of species**

5.6.1.3 Vulnerability

The **estuary** and its associated biological communities are **moderately to highly vulnerable** to:

i. Substratum loss

The estuary feature is considered to have **high sensitivity** and **high exposure** and therefore **high vulnerability** to substratum loss.

The physical loss of areas of intertidal habitats may be caused directly through a change in land use, or indirectly as a consequence of changes to sedimentation processes (e.g. resulting from the construction of groynes or of seawalls). Subtidal sedimentary habitats will be directly affected by the removal of material during maintenance dredging and aggregate extraction in particular. These activities, coupled with strong current flows, result in material being suspended in the water column and removed away from their point of origin. Removal of the substratum will lead to partial loss of faunal diversity, exposure of the underlying sediment and changes in the topography of the area. Intertidal seagrass beds will be adversely affected by substratum loss, with recoverability depending upon recruitment from other populations.

ii. Smothering

The estuary feature is considered to have **high sensitivity** and **moderate exposure** and therefore **high vulnerability** to smothering

Smothering of organisms is likely to occur as a result of the direct deposition of material on top of them and/or on their habitat. Examples of activities causing smothering in intertidal areas include beach replenishment, port developments, archaeological activities, coastal farming, industrial effluent discharge, oil spills, land runoff including highways discharge and sewage discharge. In subtidal areas, dumping of spoil from dredging operations is responsible for most smothering events. Both intertidal and subtidal seagrass beds are considered to be highly sensitive to smothering. A seagrass bed close to the second Severn crossing is known to have been adversely affected by smothering as a result of changes to sediment movements due to temporary works associated with the bridge construction in the early 1990's.

iii. Changes in suspended sediment

The estuary feature is considered to have **moderate sensitivity** and **moderate exposure** and therefore **moderate vulnerability** to changes in suspended sediment

As a result of the high tidal energy of the site, the concentration of suspended sediment and turbidity are naturally very high. This high tidal energy is one of the reasons for site selection as part of the Natura 2000 series. The marine fauna, including the migratory fish, are adapted to high concentrations of suspended sediment. Increase in sediment in suspension is unlikely to cause problems unless it leads to smothering (see smothering). Of greater concern in the Severn estuary would be the decrease in suspended sediments leading to increased light penetration and changes in the habitats and their plant and animal communities.

Activities likely to result in changes in suspended sediment would include those which would affect sediment availability or the water flow rate (coastal defences, development, construction and dredging).

iv. Changes in water flow rate

The estuary feature is currently considered to have **moderate sensitivity** and **high exposure** and therefore **high vulnerability** to changes in water flow rate.

The estuary is considered to have high exposure due to its highly constrained nature (by man made hard defences). Increases or decreases to the water flow rate are likely to lead to, respectively, increased sediment erosion or accretion in certain areas. Seagrass beds in particular are intolerant to any activity that changes the sediment regime. Activities/structures responsible for changing the water flow rate could include in-estuary construction; groynes, beach replenishment, sea walls/breakwaters, port developments and aggregate extraction.

v. Changes in wave exposure

The estuary feature is currently considered to have **high sensitivity** and **high exposure** and therefore **high vulnerability** to changes in wave exposure.

The estuary is considered to have high exposure due to its highly constrained nature (coastal defence structures; groynes, seawalls, breakwaters and beach replenishment) and presence of significant aggregate extraction which can cause changes in wave exposure. Storms and intense wave action may move or remove substrata from shallow subtidal sandbanks. Increased wave action will disrupt feeding and burrowing, and reduce species abundance, richness and biomass. Decreased wave exposure will result in increased food availability, but suspension feeders are intolerant of sediment increases in silt/clay content and therefore the proportion of suspension feeders may decrease in favour of deposit feeders. Both intertidal and subtidal seagrass beds are highly sensitive to changes in wave exposure, with an increase leading to loss of substrata and exposure of rhizomes, and a decrease causing deposition of fine particles on leaves which may result in smothering.

vi. Abrasion and physical disturbance

The estuary feature is currently considered to have **moderate sensitivity** and **high exposure** and therefore **high vulnerability** to physical disturbance and abrasion.

This factor includes mechanical interference, crushing, trampling, rubbing or erosion of the organism or habitat of interest. The activities most likely to cause abrasion include beach replenishment, development of port facilities, maintenance dredging, aggregate extraction, fixed netting, benthic trawls, sea-based recreation (including anchoring, power boat and jet ski wash), archaeology, coastal farming, educational visits, shipping, litter and debris. Habitats/communities that are moderately sensitive to abrasion include saltmarsh - see section 4.4 (at risk from overgrazing, erosion from moored boats or from trampling or vehicles), intertidal mudflats and sandflats (see section 4.3), and seagrass beds in particular.

vii. Toxic contamination

The estuary feature is currently considered to have **moderate sensitivity** and **high exposure** and therefore **high vulnerability** to toxic contamination. (Note that there is currently insufficient scientific information on the sensitivities of the estuarine habitats to radionuclides to determine any vulnerability).

This category includes contamination from synthetic compounds (including pesticides and herbicides), non-synthetic compounds (including heavy metals) and hydrocarbons (oil related products). As a result of the predominance of physical conditions within the Estuary, for the majority of biological communities there is little unequivocal evidence of additional impact due to contaminants across the Estuary as a whole. Individual populations may have been impacted close to major discharges however.

A number of synthetic compounds may be present locally in elevated concentrations. Riverine inputs are probably responsible for the majority of these compounds entering the Estuary. The concentration of metals in sediments (cadmium, arsenic, chromium, silver, copper, zinc and nickel in particular) are commonly above interim sediment quality guidelines over much of the Estuary, but only occasionally exceed probable effects levels (Langston et al., 2003). Bioaccumulation of metals occurs widely in invertebrates, though the ecological significance is still uncertain. Hydrocarbon compounds may also be present locally in elevated concentrations. Sources include a combination of fossil fuel combustion, shipping, urban run-off, sewage treatment works and various point-source and diffuse discharges from industrialised areas. Moderately high levels of poly-aromatic hydrocarbons (PAHs) are present in sediments across much of the Estuary. Overall vulnerability to all toxic contamination is considered 'high' (due to the exposure from sewage inputs being classed as 'high' and also with 'moderate' levels from industrial inputs etc.).

Note that there is currently insufficient scientific information on the sensitivities of the estuarine habitats to radionuclides to determine any vulnerability. However despite the presence of several potential sources of radionuclides (Berkeley, Oldbury and Hinkley Nuclear Power Plants, a manufacturer of radiopharmaceuticals in Cardiff and a number of other smaller sources) the accumulation of radionuclides in the Severn Estuary is generally low compared with samples from the Irish Sea. The exceptions to this are Tritium and Carbon 14, which have been found locally at significant levels. This is thought to be related to discharges from the radiopharmaceutical company in Cardiff, for which remedial action is being taken. (Langston et al, 2003).

viii. Changes in nutrient loading

The estuary feature is considered to have **high sensitivity** and **high exposure** to changes in nutrient loading but **is not considered vulnerable to changes in nutrient loading due to the high natural turbidity**.

Whilst nutrient levels and loadings within the Estuary are considered significant in UK terms (and thus have been scored as high for sensitivity and high for exposure), the high natural turbidity of the system negates these high levels, with algal productivity being generally low except in localised hotspots. Where these do occur, nutrient enrichment may lead to significant shifts in community composition on/in subtidal sandbanks (see section 5.2) and on/in intertidal mudflats and sandflats (see section 5.3), but recoverability is likely to be high. Should there be a decrease in natural turbidity levels, then the overall associated 'masking effect' would be lessened and there would be a higher risk of nutrient enrichment.

At the present time, despite the high sensitivity and high exposure scores discussed above, the high natural turbidity levels across most of the estuary lead to a conclusion that the estuary is not considered vulnerable to changes in nutrient loading.

ix. Changes in thermal regime

The estuary feature is considered to have **moderate sensitivity** and **moderate exposure** and therefore **moderate vulnerability** to changes in thermal regime

Temperature can affect many biological, physical and chemical geochemical processes within the water column including stratification, mixing and turbidity, nutrients, oxygenation, salinity and pH. For example, activities which can cause short or longterm changes in temperature can include thermal discharges (eg from power station cooling waters and other discharges). Thermal discharges are likely to be between 2 and 10 degrees above ambient temperature and a long term duration of changes may impact on the larval forms and breeding cycles of marine organisms.

x. Changes in salinity

The estuary feature is considered to have **moderate sensitivity** and **high exposure** and therefore **high vulnerability** to changes in salinity.

Decreases in salinity within the Estuary are likely to result from heavy rain events and associated land/waterfront run-off and riverine inputs. The vast floodplain and catchment area of the Severn Estuary results in annual extreme flooding events and prolonged periods of freshwater input the estuary so the exposure is considered to be high. Localised salinity changes may also result around discharges. Certain biotopes associated with subtidal sandbanks occur in conditions of reduced salinity and these biotopes are considered to be moderately vulnerable to any long-term increases in salinity levels.

xi. Changes in oxygenation

The estuary feature is currently considered to have **moderate sensitivity** and **high exposure** and therefore **high vulnerability** to changes in oxygenation.

A cycle of changes in oxygenation occurs within the Severn as a result of both seasonal and tidal cycles and is linked to fluctuating sediment regimes. In addition occasional, intermittent oxygen sags occur in low salinity regions of the Severn and in some of the principal rivers feeding the Estuary. These probably originate from high densities of suspended solids and associated particulate organic matter, perhaps enhanced by discharge outfalls. Other causes include maintenance dredging, aggregate extraction, spoil dumping, coastal farming and shipping.

Oxygen-deficient marine areas are characterized by a decline in the number and diversity of species. Certain communities occurring within the Estuary's intertidal mudflats and sandflats are moderately sensitive to decreases in dissolved oxygen levels. However, recoverability of these areas should be rapid upon return to normal conditions. The fish assemblage is also likely to be sensitive to decreases in dissolved oxygen levels, although it is unclear what the level of sensitivity is at the present time.

xii. Introduction of microbial pathogens

The estuary feature is currently considered to have **high sensitivity** and **high exposure** and therefore **high vulnerability** to changes in microbial pathogens.

Microbial pathogens are most likely to enter the Severn's ecosystem by means of sewage discharges, be these from port facilities, recreational boating, shipping or the outfalls from sewage treatment works. For the majority of biological communities there is insufficient information available to be able to make an assessment of their sensitivity to microbial pathogens. Of the few known impacts, subtidal seagrass beds of *Zostera marina* are known to be highly sensitive to the marine fungus *Labyrinthula macrocystis* which causes 'wasting disease'. The disease causes the death of leaves and, after 2-3 seasons, can lead to the death of regenerative shoots, rhizomes and the loss of up to 90% of the population and its associated

biotope. However, no information has been found which confirms the presence of the wasting disease in the Estuary.

While no information has been found which confirms the presence of the wasting disease in the estuary, the potential significant consequences for one of this notable estuarine community in particular has led to the conclusion that estuary is highly sensitive to microbial pathogens. The exposure is considered to be high due to the high number of sewage discharges.

xiii. Introduction of non-native species

The estuary feature is currently considered to have **high sensitivity** and **moderate exposure** and therefore **high vulnerability** to the introduction of non-native species.

The saltmarsh cordgrass *Spartina anglica* is an invasive pioneer species whose rapid growth consolidates sediment, raises mudflats and reduces sediment availability elsewhere. It is regarded as being a potential threat to intertidal beds of *Zostera noltei* in particular. However, whilst recognising *S. anglica* as an invasive species, it also has a role in saltmarsh formation and the community SM6 in which it features should be allowed to develop into other Atlantic Salt Meadow or transitional communities. The Japanese seaweed *Sargassum muticum* is another non-native species which is thought to compete for space with the subtidal seagrass *Zostera marina*, though evidence for actual competition is conflicting. The presence of another non-native, the slipper limpet *Crepidula fornicata*, in large numbers may alter the species composition within certain soft mud habitats leading to a decline in overall species richness. However, *C. fornicata* has yet to penetrate the Estuary, possibly due to the strong water flows. The exposure to introduction of non-natives to the estuary is considered to be moderate because of the considerable volume of ship traffic, including transport to and from the major ports at Cardiff, Newport and Bristol.

xiv. Selective extraction of species

The estuary feature is currently considered to have **moderate sensitivity** and **high exposure** and therefore **high vulnerability** to the selective extraction of species.

This category refers to the removal of key species within a biotope or of a prey species. Activities which occur within the Estuary which are likely to be implicated bait digging, fixed netting, commercial fishing, recreational angling, wildfowling and educational visits. Whilst the majority of biotopes have a low sensitivity to such activities, intertidal *Zostera noltei* beds are highly sensitive to grazing by species of wildfowl. Significant amounts of dwarf eelgrass can be consumed by wildfowl, particularly during the autumn and winter months. However as these grazers are also part of the natural estuarine ecosystem and designated features in their own right their impact is not judged to be detrimental.

5.6.2 Subtidal sandbanks feature

5.6.2.1 Sensitivity

The **sandbanks** and their associated biological communities are **moderately to highly sensitive** to:

- **physical loss**
- **physical damage**
- **toxic contamination**
- **non-toxic contamination**
- **biological disturbance**

These result from a range of activities known to occur in the vicinity of the sandbanks. Further details are provided in points i) to vii) below, with details of the level of sensitivity set out in Table 22.

5.6.2.2 Exposure

The **sandbanks** and their associated biological communities are **moderately to highly exposed** to:

- **substratum loss**
- **smothering**
- **changes in suspended sediment**
- **abrasion and physical disturbance**
- **noise and visual disturbance**
- **toxic contamination (introduction of synthetic & non synthetic compounds)**
- **changes in nutrient loading**
- **changes in turbidity**
- **changes in salinity**
- **changes in oxygenation**
- **introduction of microbial pathogens**

5.6.2.3 Vulnerability

The subtidal sandbanks communities are **moderately to highly vulnerable** to:

i. Substratum loss

The subtidal sandbanks feature is currently considered to have **moderate sensitivity** and **moderate exposure** and therefore **moderate vulnerability** to substratum loss.

The physical loss of subtidal sandbanks will occur through the removal of material during maintenance dredging and aggregate extraction in particular. These activities, coupled with strong current flows, result in material being suspended in the water column and removed away from their point of origin. Removal of the substratum will lead to partial loss of faunal diversity, exposure of the underlying sediment and changes in the topography of the area. Recolonisation of the biotope might occur within a few months, but the biotope would be unlikely to be recognized until after six months. Cohesive mud and sandy mud communities are considered to be moderately sensitive to substratum loss.

ii. Changes in suspended sediment

The subtidal sandbanks feature is currently considered to have **moderate sensitivity** and **moderate exposure** and therefore **moderate vulnerability** to changes in suspended sediment.

Increase in sediment in suspension are unlikely to cause problems unless it leads to smothering (see smothering). A decrease in suspended sediments may lead to increased light penetration and changes in the sandbank communities.

Activities likely to result in changes in suspended sediment would include those which would affect sediment availability or the water flow rate (coastal defences, development, construction and dredging).

iii. Toxic contamination

The subtidal sandbanks feature is currently considered to have **moderate sensitivity** and **high exposure** and therefore **high vulnerability** to toxic contamination. (Note that there is currently insufficient scientific information on the sensitivities of subtidal sandbank communities to radionuclides to determine their vulnerability).

This category includes contamination from synthetic compounds (including pesticides and herbicides), non-synthetic compounds (including heavy metals) and hydrocarbons (oil related products). As a result of the domination of physical conditions within the Estuary, for the majority of biological communities there is little unequivocal evidence of additional impact due to contaminants across the Estuary as a whole. Individual populations may have been impacted close to major discharges however.

Moderately high levels of poly-aromatic hydrocarbons (PAHs) are present in sediments across much of the Estuary (Langston et al., 2003). Generally speaking however, subtidal sediments are less likely to be at risk from oil spills than intertidal sediments unless oil dispersants are used or if wave action causes dispersion of oil into the water column and sediment mobility drives oil into the sediment. Certain species such as amphipods which occur within the Estuary's infralittoral mobile clean sand community have been found to be moderately sensitive to oil pollution. (See also section 5.1).

Despite the presence of several potential sources of radionuclides (Berkeley, Oldbury and Hinkley Nuclear Power Plants, a manufacturer of radiopharmaceuticals in Cardiff and a number of other smaller sources) the accumulation of radionuclides in the Severn Estuary is generally low compared with samples from the Irish Sea. The exceptions to this are Tritium and Carbon 14, which have been found at locally at significant levels. This is thought to be related to discharges from the radiopharmaceutical company in Cardiff, for which remedial action is being taken. The exposure for subtidal sandbanks is therefore thought to be low.

iv. Changes in nutrient loading

The subtidal sandbanks feature is currently considered to have **low sensitivity** and **high exposure** and therefore **moderate vulnerability** to changes in nutrient loading

Whilst nutrient levels and loadings within the Estuary are considered significant in UK terms the high natural turbidity of the system negates these high levels, with algal productivity being generally low except in localised hotspots. Where these do occur, nutrient enrichment may lead to significant shifts in community composition on/in subtidal sandbanks but recoverability is likely to be high.

v. Changes in salinity

The subtidal sandbanks feature is currently considered to have **moderate sensitivity** and **high exposure** and therefore **high vulnerability** to changes in salinity.

Apelochaeta marioni, a polychaete worm which characterizes the shallow sandbanks' biotope of variable salinity infralittoral mobile sand, is very tolerant of low salinity conditions but would be moderately vulnerable to any long-term increases in salinity levels. This species has a wide distribution throughout the Estuary, being present on subtidal and intertidal sand habitats on both sides of the Estuary.

vi. Changes in oxygenation

The subtidal sandbanks feature is currently considered to have **low sensitivity** and **high exposure** and therefore **moderate vulnerability** to changes in oxygenation.

A cycle of changes in oxygenation occurs within the Severn as a result of both seasonal and tidal cycles and is linked to fluctuating sediment regimes. In addition occasional, intermittent oxygen sags occur in low salinity regions of the Severn and in some of the principal rivers feeding the Estuary.

Decreases in oxygenation levels can result from maintenance dredging, aggregate extraction, industrial effluent discharge, land/waterfront runoff and sewage discharge (Langston et al., 2003). Oxygen-deficient

marine areas are characterized by a decline in the number and diversity of species. Certain communities occurring within the Estuary's subtidal sandbanks are moderately sensitive to decreases in dissolved oxygen levels. However, recoverability of these areas should be rapid upon return to normal conditions.

vii. Introduction of microbial pathogens

The subtidal sandbanks feature is currently considered to have **high sensitivity** and **high exposure** and therefore **high vulnerability** to the introduction of microbial pathogens.

Microbial pathogens are most likely to enter the Severn's ecosystem by means of sewage discharges. For the majority of biological communities there is insufficient information available to be able to make an assessment of their sensitivity to microbial pathogens. However, some research has been undertaken on marine bivalves, several species of which occur within the Estuary's sandbanks. Mass mortalities of bivalves can result from diseases caused by bacteria, viruses (over 20 have been described for marine bivalves) or protozoans. There is a greater likelihood of such events occurring in areas adjacent to outfalls than elsewhere. Recovery of populations is probable.

5.6.3 Mudflats and sandflats feature

(Note : this advice is also relevant to the Ramsar Site as the mudflats and sandflats are both a subfeature of the estuaries feature and a supporting habitat of the birds species, for which the Ramsar Site has been designated – refer also to section 5.8)

5.6.3.1 Sensitivity

The **mudflats and sandflats** and their associated biological communities are **moderately to highly sensitive** to:

- **physical loss**
- **physical damage**
- **toxic contamination**
- **non-toxic contamination**
- **biological disturbance**

These result from a range of activities known to occur in the vicinity of the mudflats and sandflats. Further details are provided in points i) to xiii) below, with details of the level of sensitivity set out in Table 22.

5.6.3.2 Exposure

The **mudflats and sandflats** and their associated biological communities are **moderately to highly exposed** to:

- **substratum loss**
- **smothering**
- **changes in suspended sediment**
- **changes in water flow rate**
- **changes in wave exposure**
- **abrasion and physical disturbance**
- **toxic contamination(introduction of synthetic & non synthetic compounds)**
- **changes in nutrient loading**
- **changes in thermal regime**
- **changes in turbidity**
- **changes in salinity**
- **changes in oxygenation**
- **introduction of microbial pathogens**

5.6.3.3 Vulnerability

The **intertidal mudflats and sandflats** communities are **moderately to highly vulnerable** to:

i. Substratum loss

The intertidal mudflats and sandflats feature is currently considered to have **high sensitivity** and **high exposure** and therefore **high vulnerability** to substratum loss.

Areas of intertidal habitats will be lost as a direct result of land claim or developments, or indirectly as a consequence of changes to sedimentation processes (e.g. resulting from the construction of groynes or of seawalls). Consequently, there is moderate to high exposure of mudflats and sandflats to substratum loss. The sediment infauna reside in the uppermost layers of the substratum and the removal of this layer would cause a major decline in species richness as they would have been removed with it. Thus the sensitivity of the biotopes in question is high. Fortunately, recovery of the community is also regarded as being high as recolonisation is likely following deposition of suitable substrata.

ii. Smothering

The intertidal mudflats and sandflats feature is considered to have **moderate sensitivity** and **moderate exposure** and therefore **moderate vulnerability** to smothering

Smothering of organisms is likely to occur as a result of the direct deposition of material on top of them and/or on their habitat. Examples of activities causing smothering in intertidal areas include beach replenishment, port developments, archaeological activities, coastal farming, industrial effluent discharge, oil spills, land runoff including highways discharge and sewage discharge.

iii. Changes in suspended sediment

The intertidal mudflats and sandflats feature is considered to have **moderate sensitivity** and **moderate exposure** and therefore **moderate vulnerability** to changes in suspended sediment

Changes in suspended sediments could change the extent and nature of intertidal habitats including affecting estuary-wide erosion and accretion patterns. Increase in sediment in suspension are unlikely to cause problems unless it leads to smothering (see smothering) and in some cases the invertebrate communities associated with the sediment may provide additional food resources for feeding birds. A decrease in suspended sediments may lead to increased light penetration and changes in the intertidal mud and sandflat communities.

Activities likely to result in changes in suspended sediment would include those which would affect sediment availability or the water flow rate (coastal defences, development, construction and dredging).

iv. Changes in water flow rate

The intertidal mudflats and sandflats feature is currently considered to have **moderate sensitivity** and **high exposure** and therefore **high vulnerability** to changes in water flow rate.

Increases or decreases to the water flow rate are likely to lead to, respectively, increased sediment erosion or accretion in certain areas. Activities/structures responsible for changing the water flow rate include construction activities, groynes, beach replenishment, sea walls/breakwaters, port developments and aggregate extraction.

v. Changes in wave exposure

The intertidal mudflats and sandflats feature is currently considered to have **high sensitivity** and **high exposure** and therefore **high vulnerability** to changes in wave exposure.

Changes in wave exposure result from coastal defence structures (groynes, seawalls, breakwaters and beach replenishment), shipping and possibly aggregate extraction. Increased wave action will disrupt feeding and burrowing, and reduce species abundance, richness and biomass. The strength of wave action determines the topography, steepness and shore width of the intertidal zone.

vi. Abrasion and physical disturbance

The intertidal mudflats and sandflats feature is currently considered to have **moderate sensitivity** and **high exposure** and therefore **high vulnerability** to physical disturbance and abrasion.

The activities most likely to cause abrasion to mudflats and sandflats include beach replenishment, bait digging, maintenance dredging, aggregate extraction, land-based recreation and archaeology. Boating, anchoring, trampling or the use of vehicles are also likely to cause physical disturbance, with compaction of the substratum being of particular concern. For example, the use of vehicles on mudflats or sandflats appears to have a potentially severe impact on gaper clams *Mya arenaria*. Large clams live in permanent burrows and are therefore susceptible to burrow collapse and sediment compaction through trampling and especially vehicle use. Another two key species found in muddy sand, the heart urchin *Echinocardium cordatum* and the razor shell *Ensis ensis*, are probably highly sensitive to physical disturbance. Recovery is likely to be moderate because, although the individual key species may recolonize an area within five years, several of the species are very long-lived and so the biotope may take longer to return to its original age structure and species diversity.

vii. Toxic contamination

The intertidal mudflats and sandflats feature is currently considered to have **high sensitivity** and **high exposure** and therefore **high vulnerability** to toxic contamination by synthetic and non-synthetic compounds. (Note that there is currently insufficient scientific information on the sensitivities of communities present on/in intertidal mudflats and sandflats to radionuclides to determine their vulnerability).

This category includes contamination from synthetic compounds (including pesticides and herbicides), non-synthetic compounds (including heavy metals) and hydrocarbons (oil related products). Infaunal populations present within intertidal sediments are likely to have been impacted close to major discharges, with a number of synthetic compounds known to have elevated concentrations locally (Langston et al., 2003). However, because of the energetic hydrodynamic regime in the Severn, and the resultant high turbidity, there is considerable mixing and redistribution of fines and their associated contamination burden, resulting in a fairly homogenous distribution.

Whilst the concentration of metals within the Estuary's sediments (cadmium, arsenic, chromium, silver, copper, zinc and nickel in particular) are commonly above interim sediment quality guidelines, these only occasionally exceed probable effects levels (Langston et al., 2003).. Contamination loadings of metals will be highest where fine particulates predominate (for example between Avonmouth and Severn Beach, Caldicot Flats, the River Parrett and outer Bridgewater Bay, and between the mouths of the Usk and Taff), and lowest on sands (for example the Middle to Welsh Grounds, and Culver Sands). Bioaccumulation of metals is known to occur widely in invertebrates, though the ecological significance is still uncertain. Note also that the toxicity of metals to many invertebrates increases with decreased salinity and elevated temperature (Langston et al., 2003). Thus many benthic invertebrates living within their normal salinity range may be less susceptible to heavy metal pollution than those living in salinities near the lower limit of their salinity tolerance.

Hydrocarbon compounds are present locally in elevated concentrations (Langston et al., 2003).. Sources include a combination of fossil fuel combustion, shipping, urban run-off, sewage treatment works and various point-source and diffuse discharges from industrialised areas. Moderately high levels of poly-aromatic hydrocarbons (PAHs) are present in sediments across much of the Estuary (Langston et al., 2003).

Overall vulnerability to all toxic contamination is considered 'high' (due to the exposure from sewage inputs being classed as 'high' and also with 'moderate' levels from industrial inputs etc.).

Despite the presence of several potential sources of radionuclides (Berkeley, Oldbury and Hinkley Nuclear Power Plants, a manufacturer of radiopharmaceuticals in Cardiff and a number of other smaller sources) the accumulation of radionuclides in the Severn Estuary is generally low compared with samples from the Irish Sea. The exceptions to this are Tritium and Carbon 14, which have been found at locally at significant levels. This is thought to be related to discharges from the radiopharmaceutical company in Cardiff, for which remedial action is being taken. The intertidal mudflats and sandflats are therefore thought to be moderately exposed to radionuclides (Langston et al, 2003).

viii. Changes in nutrient loading

The intertidal mudflats and sandflats feature is currently considered to have **moderate sensitivity** and **high exposure** and therefore **high vulnerability** to changes in nutrient loading.

The most obvious sign of an increase in nutrient loading (or organic enrichment) on mudflats is the lush growth of green seaweeds on the surface. Such increases coupled with reduced oxygenation typically lead to anaerobic conditions predominating within the sediment. Moderate organic enrichment does provide food which can enhance species diversity but with greater enrichment, the diversity declines and the community becomes increasingly dominated by a few, pollution tolerant, opportunistic species such as the polychaete *Capitella capitata*. In sandier sediments where particle size is greater, the effects of an increase in organic enrichment are less dramatic. However, the structure of the community is still likely to change from one dominated by suspension feeders to one favouring deposit feeders, accompanied by an increase in the abundance of opportunistic species and a decrease in species richness. Note, however,

that the high natural turbidity of the system negates many of these effects, and algal productivity is generally low except in localised hotspots.

ix. Changes in thermal regime

The intertidal mudflats and sandflats feature is currently considered to have **moderate sensitivity** and **moderate exposure** and therefore **moderate vulnerability** to changes in thermal regime

Temperature can affect many biological, physical and chemical geochemical processes within the water column including stratification, mixing and turbidity, nutrients, oxygenation, salinity and pH. For example, activities which can cause short or longterm changes in temperature can include thermal discharges (eg from power station cooling waters and other discharges). Thermal discharges are likely to be between 2 and 10 degrees above ambient temperature and a long term duration of changes may impact on the larval forms and breeding cycles of marine organisms.

x. Changes in salinity

The intertidal mudflats and sandflats feature is currently considered to have **low sensitivity** and **high exposure** and therefore **moderate vulnerability** to changes in salinity

Decreases in salinity are likely to result from heavy rain events and associated land/waterfront run-off and riverine inputs. Localised salinity changes may also result around discharges. The vast floodplain and catchment area of the Severn Estuary results in annual extreme flooding events and prolonged periods of freshwater input to the intertidal areas so the exposure is considered to be high. However the metabolism of intertidal communities cope with vast extremes of conditions which result from the dynamic nature of the estuary's tidal regime and so are considered to have low sensitivity.

xi. Changes in oxygenation

The intertidal mudflats and sandflats feature is currently considered to have **low sensitivity** and **high exposure** and therefore **moderate vulnerability** to changes in oxygenation.

A cycle of changes in oxygenation occurs within the Severn as a result of both seasonal and tidal cycles and is linked to fluctuating sediment regimes. In addition occasional, intermittent oxygen sags occur in low salinity regions of the Severn and in some of the principal rivers feeding the Estuary.

Decreases in oxygenation levels will result from maintenance dredging, aggregate extraction, industrial effluent discharge, land/waterfront runoff and sewage discharge. Oxygen-deficient marine areas are characterized by a decline in the number and diversity of species. Certain communities occurring within the Estuary's intertidal mudflats and sandflats are moderately sensitive to decreases in dissolved oxygen levels. However, recoverability of these areas should be rapid upon return to normal conditions.

xii. Introduction of microbial pathogens

The intertidal mudflats and sandflats feature is currently considered to have **high sensitivity** and **high exposure** and therefore **high vulnerability** to the introduction of microbial pathogens.

Microbial pathogens are most likely to enter the Severn's ecosystem by means of sewage discharges. For the majority of biological communities there is insufficient information available to be able to make an assessment of their sensitivity to microbial pathogens. However, some research has been undertaken on marine bivalves, several species of which occur within the Estuary's intertidal sandbanks. Mass mortalities of bivalves can result from diseases caused by bacteria, viruses (over 20 have been described for marine bivalves) or protozoans. There is a greater likelihood of such events occurring in areas adjacent to outfalls than elsewhere. Recovery of populations is probable.

xiii. Introduction of non-native species

The intertidal mudflats and sandflats feature is currently considered to have **high sensitivity** and **low exposure** and therefore **moderate vulnerability** to the introduction of non-native species.

The saltmarsh cordgrass *Spartina anglica* is an invasive pioneer species whose rapid growth consolidates sediment, raises mudflats and reduces sediment availability elsewhere. It is regarded as being a potential threat to intertidal beds of *Zostera noltei* in particular. However, whilst recognising *S. anglica* as an invasive species, it also has a role in saltmarsh formation and the community SM6 in which it features should be allowed to develop into other Atlantic Salt Meadow or transitional communities. The presence of another non-native, the slipper limpet *Crepidula fornicata*, in large numbers may alter the species composition within certain soft mud habitats leading to a decline in overall species richness. However, *C. fornicata* has yet to penetrate the Estuary, possibly due to the strong water flows.

Note, in relation to ‘noise and visual disturbance’, that while mudflats and sandflats communities have moderate exposure to both noise and visual disturbance, these habitats are not sensitive to these factors but they do provide a vitally important role as supporting habitats for waterfowl that use these areas for roosting and feeding and these are considered highly sensitive to both noise and visual disturbance – see sections 5.7.1 & 5.7.2). So while the habitats themselves have low vulnerability their dependant bird species have high vulnerability.

5.6.4 Atlantic salt meadow feature

(Note : this advice is also relevant to the Ramsar Site as the Atlantic saltmeadows are both a subfeature of the estuaries feature and a supporting habitat of the birds species, for which the Ramsar Site has been designated – refer also to section 5.8)

5.6.4.1 Sensitivity

The **Atlantic salt meadow** and its associated biological communities are **moderately or highly sensitive** to:

- **physical loss**
- **physical damage**
- **toxic contamination**
- **non-toxic contamination**

These result from a range of activities known to occur on or in the vicinity of the salt meadows. Further details are provided in points i) to xiii) below, with details of the level of sensitivity set out in Table 22.

5.6.4.2 Exposure

The **Atlantic salt meadow** and its associated biological communities are **moderately to highly exposed** to:

- **substratum loss**
- **smothering**
- **changes in suspended sediment**
- **changes in water flow rate**
- **changes in wave exposure**
- **abrasion and physical disturbance**
- **changes in grazing management**
- **noise and visual disturbance**
- **toxic contamination(introduction of synthetic & non synthetic compounds)**
- **changes in nutrient loading**
- **changes in salinity**
- **changes in oxygenation**
- **introduction of microbial pathogens**

5.6.4.3 Vulnerability

The **saltmarsh** communities are **moderately to highly vulnerable** to:

i. Substratum loss

The Atlantic salt meadows and their associated communities feature is currently considered to have **high sensitivity** and **high exposure** and therefore **high vulnerability** to substratum loss

Saltmarshes, cordgrass and *Salicornia* are highly sensitive to physical loss. This can occur mostly through one-off developments such as infrastructure construction and modification involving land claim and changes in land management and coastal farming, and also as a result of coastal squeeze. This is a process by which coastal features such as saltmarshes and *Salicornia* are eroded as they become trapped between man-made structures such as sea walls and rising sea levels. Where this occurs on saltmarshes, it may result in the replacement of mid-marsh communities by pioneer saltmarsh communities or through erosion changing saltmarsh to intertidal mud and sand. Changes to coastal processes may also affect the sediment budget of estuaries and reduce the supply of sediment to saltmarsh, *Salicornia* and cordgrass areas. Whilst some areas of the Estuary are subject to these pressures, others are not, yet it remains a real

threat as is reflected in the moderate to high exposure score. When combined with high sensitivity this leads to a high vulnerability.

ii. Smothering

The Atlantic salt meadows feature is considered to have **high sensitivity** and **moderate exposure** and therefore **high vulnerability** to smothering.

Smothering of saltmarsh is likely to occur as a result of the direct deposition of material on the surface. This can happen by either direct deposition of materials on land or through silt-laden tides. The saltmarshes of the Severn are subject to spring tides each year which can in some locations deposit a thick layer of sediment on the surface which can persist for some months. Normally the level of this natural deposition is compatible with the speed of vertical accretion and growth of the saltmarsh. Higher levels of sediment deposition which may be associated with development activities (increasing sediment suspension) can cause smothering to occur resulting in loss of vegetation or shifts in community composition and zonation. Examples of activities likely to cause smothering from tidal deposition include coastal defence works, dredging, construction and archaeological works. Examples of direct deposition are fly tipping and accumulation of tidal debris.

iii. Changes in suspended sediment

The Atlantic salt meadows and their associated communities feature is currently considered to have **moderate sensitivity** and **moderate exposure** and therefore **moderate vulnerability** to changes in suspended sediment

Changes in suspended sediments could change the extent and nature of saltmarsh communities and other intertidal habitats including affecting estuary-wide erosion and accretion patterns. Increases in suspended sediment are unlikely to cause problems unless it leads to smothering (see smothering).

Activities likely to result in changes in suspended sediment would include those which would affect sediment availability or the water flow rate (coastal defences, development, construction and dredging).

iv. Desiccation and changes in emergence regime

The Atlantic salt meadows and their associated communities feature is currently considered to have **high sensitivity** and **low exposure** and therefore **moderate vulnerability** to desiccation and changes in emergence regime

Changes in the emergence regime will result in changes in the time habitats or species spend either covered in water or exposed to the air, one consequence of which is the desiccation (drying) of habitats and species. Examples of activities which may induce these changes are the construction of coastal and flood defences and other developments which change the tidal regime and water flow characteristics of the estuary.

The morphology, zonation and composition of saltmarshes are determined by their position within the tidal frame. They therefore considered highly sensitive to changes in the emergence regime and desiccation in particular.

These changes occurring in saltmarshes may result in either the stranding and exposure of communities or lengthened periods of inundation and lack of drying out with consequent impacts on species composition of swards (through dieback and shifts in community types) and affecting their suitability for species dependant on them. These changes may also cause the expansion of *Spartina* into both saltmarsh habitats and across adjacent mudflats.

The size of the estuary means that most small scale activities will have limited impacts with only large scale or estuary-wide activities likely to be of concern and exposure to this operation is therefore currently considered as low.

v. Changes in water flow rate

The Atlantic salt meadows and their associated communities feature is currently considered to have **moderate sensitivity** and **high exposure** and therefore **high vulnerability** to changes in water flow rate.

A reduction in the rate of water flow over the saltmarsh will result in an increase in the deposition of sediment. The rate at which this occurs will depend on the sediment supply, the duration of the tidal cover and the extent to which the tidal flow is impeded by the vegetation itself to facilitate deposition. Saltmarsh communities actually require a degree of sediment deposition in order to survive and flourish and they have been assessed as having a low to moderate sensitivity. Exposure to changes in water flow rate on saltmarsh communities will vary throughout the Estuary.

vi. Changes in wave exposure

The Atlantic salt meadows and their associated communities feature is currently considered to have **high sensitivity** and **high exposure** and therefore **high vulnerability** to changes in wave exposure.

Changes in wave exposure result from the presence of coastal defence structures (groynes, seawalls, breakwaters), beach replenishment and possibly aggregate extraction. Increased wave action can have two opposing effects. On the one hand it is likely to lead to a greater amount of suspended sediment being carried to the saltmarsh, while on the other hand the greater energy regime is likely to prevent the settlement of this material and may even remove material from the saltmarsh through erosion at the saltmarsh edge. A decrease in wave action will lead to greater sediment deposition with the possibility of smothering.

vii. Abrasion and physical disturbance

The Atlantic salt meadows and their associated communities feature is currently considered to have **moderate sensitivity** and **high exposure** and therefore **high vulnerability** to physical disturbance and abrasion.

Physical disturbance or abrasion to saltmarsh communities may result from a wide range of activities including recreational usage (both land-based and water-based), any of which may damage individual saltmarsh plants or areas of saltmarsh. Trampling by foot, and particularly by off-road vehicles, causes localised damage which may impact upon the ecological structure and function of larger areas, and requiring long-term recovery. Saltmarshes are also sensitive to erosion as a result of trampling or overgrazing, with communities that support succulents such as *Limonium* spp. being very susceptible to any form of grazing. In addition, it is widely recognised that shipping and boating can increase saltmarsh erosion from their wash.

viii. Changes in grazing management

The Atlantic salt meadows and their associated communities feature is currently considered to have **high sensitivity** and **high exposure** and therefore **high vulnerability** to changes in grazing management.

The presence, duration and intensity of grazing management can alter the vegetation composition and structure of saltmarsh habitats. Abandonment or introduction of grazing can result in changes in the saltmarsh plant and animal communities which are important in their own right and which also provide food resources for passage and wintering birds. Grazing changes may also affect the suitability of saltmarsh areas as resting and roosting sites for birds where open terrain with low vegetation is an important factor. Changes may also affect the presence of specific niches for scarce and notable plants.

ix. Toxic contamination

The Atlantic salt meadows and their associated communities feature is currently considered to have **moderate to high sensitivity** and **high exposure** and therefore **high vulnerability** to toxic contamination from both synthetic and non-synthetic compounds.

Atlantic salt meadows, cordgrass swards and *Salicornia* within the Estuary are considered to have a moderate sensitivity to toxic contamination by synthetic compounds (which includes domestic/industrial effluent, pesticides, anti-foulant paints and PCBs) and a high sensitivity to non-synthetic compounds

(which includes domestic/industrial effluent, heavy metals and hydrocarbons). Although saltmarsh plants may be reasonably tolerant of certain synthetic substances, they can bioaccumulate toxic compounds and act as sinks for them. This could have implications for wildfowl which feed on saltmarsh plants.

Saltmarsh communities are also highly sensitive to oil and oil products, even at relatively low levels. This is mainly by virtue of their ability to trap sediments. Acute events, such as oil spills, can be particularly damaging to saltmarsh plants. Dispersants used to treat oil spills can also have a toxic effect on saltmarsh plants, sometimes to a greater degree than the spilled oil itself. Saltmarshes have been reported to recover from chronic oil pollution, where denuded of vegetation, within ten years, although recovery depends largely on the degree to which oil is retained in the sediment and the clean up procedures used.

x. Changes in nutrient loading

The Atlantic salt meadows and their associated communities feature is currently considered to have **moderate sensitivity** and **high exposure** and therefore **high vulnerability** to changes in nutrient loading.

The Estuary's saltmarshes and associated communities are thought to be more susceptible to nutrient enrichment than was previously realised (Deegan, L. A. et al. 2007), so they have been assessed as being of high sensitivity to increases in nutrient loading and/or organic enrichment. However, increased growth of certain seaweed species may result from elevated levels of nitrates and phosphates and cause local smothering which is known to have a detrimental effect on glasswort (*Salicornia* spp.) in low marsh communities. In addition, the species composition of the plants on the saltmarsh may be altered by changes in nutrient loading leading to a change in the structure of the sward.

xi. Changes in salinity

The Atlantic salt meadows and their associated communities feature is currently considered to have **moderate sensitivity** and **high exposure** and therefore **high vulnerability** to changes in salinity.

Changes to the salinity of water flowing across the saltmarshes as a result of the tides are likely to occur following heavy rain events and associated land/waterfront run-off and riverine inputs. The vast floodplain and catchment area of the Severn Estuary results in annual extreme flooding events and prolonged periods of freshwater input to the intertidal areas so the exposure is considered to be high. The botanical composition of the saltmarshes reflects salinity. The saltmarshes, while capable of tolerating a wide range of salinities, are considered moderately sensitive to changes in salinity particularly prolonged periods of change which can cause shifts in composition and zonation.

xii. Changes in oxygenation

The Atlantic salt meadows and their associated communities feature is currently considered to have **low sensitivity** and **high exposure** and therefore **moderate vulnerability** to changes in oxygenation.

A cycle of changes in oxygenation occurs within the Severn as a result of both seasonal and tidal cycles and is linked to fluctuating sediment regimes. In addition occasional, intermittent oxygen sags occur in low salinity regions of the Severn and in some of the principal rivers feeding the Estuary.

xiii. Introduction of microbial pathogens

The Atlantic salt meadows and their associated communities feature is currently considered to have **low sensitivity** and **high exposure** and therefore **moderate vulnerability** to the introduction of microbial pathogens

For the majority of saltmarsh communities there is insufficient information available to be able to make an assessment of their sensitivity to microbial pathogens.

*Note, in relation to 'noise and visual disturbance', that while Atlantic salt meadows and their associated plant communities have **high exposure** to both noise and visual disturbance, these habitats are **not sensitive** to these factors but they do provide a vitally important role as supporting habitats for waterfowl that use these areas for roosting and feeding and these are considered **highly sensitive** to both noise and*

*visual disturbance – see sections 5.7.1 & 5.7.2). So while the habitats themselves have **low vulnerability** their dependant bird species have high vulnerability.*

5.6.5 Reefs feature

5.6.5.1 Sensitivity

The reefs and their associated biological communities are **moderately to highly sensitive** to:

- **physical loss**
- **physical damage**

These result from a range of activities. Note that there is currently insufficient scientific information to assess the degree of sensitivity of reefs to **toxic & non-toxic contamination** and also to **biological disturbance**. In these cases, the precautionary principle has been applied with a **moderate level of sensitivity** being assumed until proven otherwise. Further details are provided in points i) to vii) below, with details of the level of sensitivity set out in Table 22.

5.6.5.2 Exposure

The reefs and associated biological communities are **moderately to highly exposed** to:

- **changes in suspended sediment**
- **toxic contamination (introduction of synthetic & non synthetic compounds)**
- **changes in nutrient loading**
- **changes in turbidity**
- **changes in salinity**
- **changes in oxygenation**
- **introduction of microbial pathogens**

The reefs of the Severn Estuary are biogenic in origin, that is, they are built by a concretion-forming organism creating elevated structures. The organism in this case is the honeycomb worm *Sabellaria alveolata*. These reefs occur both in the intertidal (where one might expect to find them) and, most unusually, in the subtidal. Indeed, the Severn Estuary has the only extensive subtidal *Sabellaria alveolata* reef in Britain. There has been little research undertaken on these subtidal *Sabellaria alveolata* reefs, so the scientific information on their sensitivities is extremely limited. In the advice given here, much has been drawn on the information known about subtidal reefs of the closely related *Sabellaria spinulosa*.

5.6.5.3 Vulnerability

The reef communities are **moderately to highly vulnerable** to:

i. Changes in suspended sediment

The reefs feature is currently considered to have **moderate sensitivity** and **moderate exposure** and therefore **moderate vulnerability** to changes in suspended sediment

The reduced availability of sand, essential for *S. alveolata* tube building, may lead to the reduced development of *S. alveolata* reefs and the decline of colonies. Increase in suspended sediment is unlikely to cause problems unless it leads to smothering of the reef. Activities likely to result in changes in suspended sediment would include those which would affect sediment availability or the water flow rate (coastal defences, development, construction and dredging).

ii. Toxic contamination

The **sensitivity** of *Sabellaria alveolata* to toxic contaminants (domestic effluent, industrial effluent, heavy metals, hydrocarbons) entering the water is **not known**. The precautionary principle should therefore be applied.

The reefs are considered to have **high exposure** to both synthetic compounds and non-synthetic compounds (industrial effluents, heavy metals, hydrocarbons etc.),

The reefs are therefore **moderately vulnerable** to the introduction of synthetic compounds and non-synthetic compounds.

iii. Changes in nutrient loading

The reefs feature is currently considered to have **low sensitivity** and **high exposure** and therefore **moderate vulnerability** to changes in nutrients.

iv. Changes in salinity

The reefs feature is currently considered to have **low sensitivity** and **high exposure** and therefore **moderate vulnerability** to changes in salinity.

Decreases in salinity within the Estuary are likely to result from heavy rain events and associated land/waterfront run-off and riverine inputs. The vast floodplain and catchment area of the Severn Estuary results in annual extreme flooding events and prolonged periods of freshwater input the estuary so the exposure is considered to be high.

v. Changes in oxygenation

The reefs feature is currently considered to have **low sensitivity** and **high exposure** and therefore **moderate vulnerability** to changes in oxygenation.

A cycle of changes in oxygenation occurs within the Severn as a result of both seasonal and tidal cycles and is linked to fluctuating sediment regimes. In addition occasional, intermittent oxygen sags occur in low salinity regions of the Severn and in some of the principal rivers feeding the Estuary.

vi. Introduction of microbial pathogens

Microbial pathogens are most likely to enter the Severn's ecosystem by means of sewage discharges. There is considered to be **high exposure** to microbial pathogens due to the high number of sewage discharges within the estuary.

For the majority of biological communities there is insufficient information available to be able to make an assessment of their sensitivity to microbial pathogens and there is currently no information on the sensitivity of *Sabellaria* reefs to the introduction of microbial pathogens. The vulnerability of the *Sabellaria* reefs therefore remains unknown and the precautionary principle should be applied.

vii. Introduction of non-native species

There is insufficient information on the sensitivity of reefs to introduction of non native species therefore the vulnerability is unknown.

5.6.6 Shad and lamprey features

(Note : this advice is also relevant to the Ramsar Site as these features are also part of the “assemblage of migratory fish species” for which the Ramsar Site has been designated – refer also to section 5.8)

Note that in the explanatory text that follows, the term ‘shad and lamprey’ refer to three species of migratory fish: twaite shad *Alosa fallax*, river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus*.

As the populations of these migratory fish depend upon the freshwater habitats of the Rivers Usk, Wye and Severn as well as the estuarine habitats of the Severn Estuary during their lifetime, the advice presented here should be read in conjunction with the advice given for the River Usk SAC and the River Wye SAC (Management Plans and Conservation Objectives) available from CCW and Natural England on request.

5.6.6.1 Sensitivity

The **shad and lamprey** are considered **sensitive** to:

- **physical damage** of their supporting habitats
- **non-physical disturbance**
- **toxic contamination**
- **non-toxic contamination**
- **biological disturbance**

These result from a range of activities known to occur within the Estuary on which further details are provided in points i) to xi) below.

5.6.6.2 Exposure

The **shad and lamprey** and their supporting habitats (whilst within the Estuary) are **moderately to highly exposed** to:

- **noise** (part of ‘noise and visual presence’ but latter not applicable)
- **toxic contamination(introduction of synthetic & non synthetic compounds)**
- **changes in nutrient loading**
- **changes in thermal regime**
- **changes in turbidity**
- **changes in salinity**
- **changes in oxygenation**
- **introduction of microbial pathogens**

The Estuary provides an important migration route for these three rare species, to and from their spawning and nursery grounds. Shad and lamprey are known to be present in coastal and estuarine waters throughout the year, though there remains a lack of information on these migratory species during the time they actually spend in the Estuary. More information exists for the rivers where they migrate to spawn and for the subsequent development of juveniles. Little is known of their biology and distribution during the marine part of their life cycle.

In the assessments given below, it is assumed that these species would be capable of avoiding unsuitable areas, that is, given the size of the Estuary, localized activities are unlikely to adversely affect the population.

5.6.6.3 Vulnerability

Assessment of vulnerability of these features is particularly difficult given that there is little or no information to enable the level of sensitivity to be established. In line with the “precautionary principle” **where there is moderate to high exposure the feature is considered vulnerable.**

Therefore the **shad and lamprey** are considered **vulnerable** to:

i. Noise (part of ‘noise and visual presence’ but latter not applicable)

Research has shown that shad are sensitive to vibration which can arise from noisy activities. High frequency vibration (70 – 300Khtz) can be barrier to migration affecting movement both up and downstream and preventing fish reaching spawning areas. In some circumstances high frequency vibrations can be fatal. Vibration sources need to be assessed at the planning and consent stage and their potential impacts mitigated for, particularly during the key upstream migration phase.

ii. Toxic contamination

A decrease in water quality within the Estuary may impede the migration of these fish to their spawning grounds in the rivers. Poor water quality may also affect their supply of food. Shad require a good supply of small crustacean prey species, especially mysids and small fish (particularly clupeids). At sea, river lamprey feed on a variety of small fish such as clupeids, whilst sea lamprey feed on larger fish including salmon. Pollution tolerance levels of shad and lamprey are unknown, but EA water quality policy is that levels should comply with targets established under the EA Review of Consents and the Water Framework Directive.

iii. Changes in nutrient loading

It is possible that changes in nutrient levels may affect the food supply of the shad and lamprey. However, due to the natural high turbidity of the system and the volumes of water involved, it is thought that any effects would be minimal.

iv. Changes in thermal regime

Water temperature is believed to act as a trigger for the shad to migrate upstream to spawn in the rivers. There could be changes in water temperature in the vicinity of the power stations (eg Hinkley Point and Oldbury) and from other discharges

v. Changes in turbidity

It is not known whether the migratory fish are sensitive to changes in turbidity within the Estuary. Given the extremely high background levels of turbidity, it is unlikely that any changes in turbidity will have any significant impact on the shad and lamprey whilst in the estuarine waters.

vi. Changes in salinity

Decreases in salinity within the Estuary are likely to result from heavy rain events and associated land/waterfront run-off and riverine inputs. The vast floodplain and catchment area of the Severn Estuary results in annual extreme flooding events and prolonged periods of freshwater input the estuary so the exposure is considered to be high. Within the Estuary, juvenile twaite shad prey on mysids feeding at the salt wedge near the head of the tide. It must be assumed that any activities affecting the salinity regime of the estuary would in turn affect the distribution of these prey species, which may have consequences for the shad.

vii. Changes in oxygenation

A cycle of changes in oxygenation occurs within the Severn as a result of both seasonal and tidal cycles and is linked to fluctuating sediment regimes. In addition occasional, intermittent oxygen sags occur in low salinity regions of the Severn and in some of the principal rivers feeding the Estuary. Shad and lamprey may therefore be vulnerable to changes in oxygenation given the high exposure to changes resulting from operations within the Estuary.

viii. Introduction of microbial pathogens

There is insufficient information available to make any meaningful assessment on the introduction of microbial pathogens to these species of fish, but there is potential for high exposure.

Note regarding ‘changes in water flow rate’

It is thought unlikely that changes in water flow rate within the Estuary will affect these fish but they are likely to be affected (and therefore vulnerable) once in the rivers where water abstraction and freshwater flows may have more of a bearing.

Note regarding ‘selective extraction of species’

After hatching in the rivers, young shad gradually move downstream into the upper estuary where they feed and mature until the end of their second summer before moving into coastal waters. Young shad feed on estuarine invertebrates while adult shad feed on mysids and other fish (particularly other clupeids such as sprat and herring). Both river and sea lamprey spend several years of development in riverine mud and then, after a relatively rapid metamorphosis, migrate downstream to the estuary. River lamprey feed on a variety of estuarine fish, particularly herring, sprat and flounder. At sea, sea lamprey feed on larger fish including large salmon.

Extraction of target species - *it is reported that twaite shad are vulnerable to capture on cooling water intakes, particularly those associated with power stations, where the numbers killed can be considerable.*

Extraction on non target species - *the shad and lamprey may be vulnerable to the extraction of their prey species (levels unknown) affecting their feeding behavior and patterns and long-term survival.*

Table 22 Sensitivity, exposure and vulnerability of the Severn Estuary SAC to physical, chemical and biological pressures

Sensitivity		Exposure		Vulnerability	
High sensitivity	OOO O	High Exposure	x x x x	High vulnerability	⊗⊗⊗⊗ ⊗⊗⊗O ⊗⊗⊗x
Moderate sensitivity	OOO	Medium Exposure	x x x	Moderate vulnerability	⊗⊗OO ⊗⊗x x ⊗⊗⊗
Low sensitivity	OO	Low Exposure	x x	Low vulnerability	⊗⊗O ⊗xxx ⊗⊗x ⊗xx ⊗⊗ ⊗x
No detectable sensitivity	O	No exposure	x	No vulnerability	⊗O
?S = Insufficient information on sensitivity; ✓ = migratory fish considered to be sensitive, but insufficient information to assess level of sensitivity					Unknown vulnerability

Categories of operations which may cause deterioration or disturbance ²⁵	Annex I features						Annex II species
	Estuaries	Subtidal Sandbanks	Mudflats & sandflats	Atlantic saltmeadow	Reefs	Fish ²⁶	
Physical loss							
Removal / substratum loss	⊗⊗⊗⊗	⊗⊗⊗	⊗⊗⊗⊗	⊗⊗⊗⊗	⊗⊗O	⊗x	
Smothering	⊗⊗⊗O	⊗⊗x	⊗⊗⊗	⊗⊗⊗O	⊗⊗	⊗x	
Physical damage							
Changes in suspended sediment	⊗⊗⊗	⊗⊗⊗	⊗⊗⊗	⊗⊗⊗	⊗⊗⊗	⊗x	
Desiccation & changes in emergence regime	⊗⊗O	⊗O	⊗⊗O	⊗⊗OO	⊗O	✓xx	
Changes in water flow rate	⊗⊗⊗x	⊗⊗O	⊗⊗⊗x	⊗⊗⊗x	⊗⊗O	✓xx	
Changes in wave exposure	⊗⊗⊗⊗	⊗⊗O	⊗⊗⊗⊗	⊗⊗⊗⊗	⊗⊗O	⊗x	
Abrasion / physical disturbance (of habitats)	⊗⊗⊗x	⊗⊗x	⊗⊗⊗x	⊗⊗⊗x	⊗⊗O	✓xx	
Changes in grazing management	⊗⊗	Not relevant	Not relevant	⊗⊗⊗⊗	Not relevant	Not relevant	
Non-physical disturbance							
Noise & visual presence	⊗xx	⊗xx	⊗⊗x	⊗xxx	⊗x	✓xxx	
Toxic contamination							
Introduction of synthetic compounds	⊗⊗⊗x	⊗⊗⊗x	⊗⊗⊗⊗	⊗⊗⊗x	⊗⊗xx	✓xxxx	
Introduction of non-synthetic compounds	⊗⊗⊗x	⊗⊗⊗x	⊗⊗⊗⊗	⊗⊗⊗⊗	?Sxxxx	✓xxxx	
Introduction of radionuclides	?Sxx	?Sxx	?Sxx	?Sxx	?Sxx	✓xx	
Non-toxic contamination²⁷							
Changes in nutrient loading	⊗⊗⊗⊗ ²⁸	⊗⊗xx	⊗⊗⊗x	⊗⊗⊗x	⊗⊗xx	✓xxxx	
Changes in thermal regime	⊗⊗⊗	⊗⊗	⊗⊗⊗	⊗⊗	⊗⊗	✓xxxx	
Changes in turbidity ²⁹ (light penetration)	⊗⊗x	⊗⊗x	⊗⊗x	⊗x	⊗xx	✓xxx	
Changes in salinity	⊗⊗⊗x	⊗⊗⊗x	⊗⊗xx	⊗⊗⊗x	⊗⊗xx	✓xxxx	
Changes in oxygenation	⊗⊗⊗x	⊗⊗xx	⊗⊗xx	⊗⊗xx	⊗⊗xx	✓xxxx	
Biological disturbance							
Introduction of microbial pathogens	⊗⊗⊗⊗	⊗⊗⊗⊗	⊗⊗⊗⊗	⊗⊗xx	?Sxxxx	✓xxxx	
Introduction of non-native species	⊗⊗⊗O	⊗⊗O	⊗⊗OO	⊗⊗	?Sxx	✓xx	
Selective extraction of species	⊗⊗⊗x	⊗⊗	⊗⊗	⊗⊗	⊗⊗	✓xx	

²⁵ For a further explanation of each category see <http://www.marlin.ac.uk/sah/baskitemplate.php?benchmarks>²⁶ River lamprey, sea lamprey & twaite shad²⁷ All elements of non toxic contamination are interrelated and also link closely with changes in suspended sediment (physical damage)²⁸ The high natural turbidity of the estuary negates these high levels with algal productivity being generally low – the estuary feature is therefore not considered vulnerable – see section 5.6.1.3.(viii)²⁹ Turbidity here incorporates light penetration; suspended sediment under ‘changes in suspended sediment’ and its deposition under ‘smothering’

5.7 Specific Advice on Operations for the Severn Estuary SPA

This section provides information to help relate general advice to each of the specific interest features of the Severn Estuary SPA. Where specific examples are given they are provided to aid understanding of possible impacts and are not intended to be a comprehensive list of all relevant operations.

This advice relates to the vulnerability of the interest features and supporting habitats of the Severn Estuary SPA as set out in Table 23. An explanation of the sensitivity of the interest features or supporting habitats follows with an explanation of their exposure and therefore their vulnerability to damage or disturbance from the listed categories of operations. This enables links between the categories of operation and the ecological requirements of the SPA's interest features (as set out in Section 2.2) to be made. It should be noted that sensitivity scorings are a combination of whether the habitat itself is likely to be affected by a particular operation (which is drawn from the SAC scores in Table 22), in combination with an assessment as to whether the outcome is likely to affect the bird's use of that habitat.

Note that this advice for the SPA supercedes that issued to ASERA in February 2005 following reassessment of exposure, sensitivity and vulnerability to take account of availability of new information in the Severn Estuary CHaMP and MarLIN sensitivities and following the more detailed analysis of impacts on the SAC estuarine habitats that are supporting habitats for the birds of the SPA.

5.7.1 Internationally important populations of regularly occurring Annex 1 species (Bewick's swan)

(Note : this advice is also relevant to the Ramsar Site's internationally important population of waterfowl "Bewick's swan" feature and as part of the "internationally important assemblage of waterfowl" feature for which the Ramsar Site has been designated – refer also to section 5.8)

5.7.1.1 Sensitivity

The Annex 1 species is **moderately to highly sensitive** to :

- **Physical loss**
- **Physical damage**
- **Non-physical disturbance**
- **Toxic contamination**
- **Non- toxic contamination**
- **Biological disturbance**

These result from a range of activities known to occur within the Estuary. Further details are provided in points i) to xii) below, with details of the level of sensitivity set out in Table 23.

5.7.1.2 Exposure

The Annex 1 species is **moderately to highly exposed** to:

- **Substratum loss and smothering**
- **Changes in suspended sediment**
- **Desiccation and changes in emergence regime**
- **Changes in water flow**
- **Changes in wave exposure**
- **Changes in grazing regime**
- **Noise and visual disturbance**
- **Toxic contamination**
- **Changes in nutrient loading**
- **Changes in salinity**
- **Changes in oxygenation**
- **Introduction of microbial pathogens**

5.7.1.3 Vulnerability

The Annex 1 species is **moderately to highly vulnerable** to:

i. Substratum loss and smothering

The intertidal habitats and therefore the Bewick's Swan feature which these habitats support are considered to have **moderate to high sensitivity** and **moderate to high exposure** and therefore **moderate to high vulnerability** to physical loss (removal and smothering).

The physical loss of areas of intertidal habitats may be caused directly through change of land use or indirectly as a consequence of changes to sedimentation processes (e.g. coastal defences) as well as via the effects of smothering by artificial structures (e.g. jetties) or the disposal of spoils. Activities or developments resulting in physical loss of the intertidal supporting habitats are likely to reduce the availability of food and roosting habitat and thus be detrimental to the favourable condition of the SPA interest features including the Annex 1 species, Bewick's swan. The intertidal mudflats and sandflats and the saltmarsh are highly sensitive to removal by land reclamation and major construction activities.

ii. Changes in suspended sediment

It is thought unlikely that changes in the suspended sediment within the Estuary will affect the Bewick's Swan directly but such changes may have marked effects on the supporting habitats on which they are dependant for roosting and feeding. The saltmarshes and intertidal mudflats and sandflats are currently considered to have **moderate sensitivity** and **moderate exposure** and therefore **moderate vulnerability** to changes in suspended sediments. (Refer also to sections 5.6.3 and 5.6.4). Impacts on the suitability of these habitats may affect the long term survival of individuals (in terms of energy and competition) or alter behavior and patterns of use or distribution.

iii. Desiccation and changes in emergence regime

It is thought unlikely that changes in the emergence regime within the Estuary will affect the Bewick's Swan directly but such changes may have marked effects on the supporting habitats on which they are dependant for roosting and feeding. The saltmarshes are currently considered to have **high sensitivity** and **low exposure** and therefore **moderate vulnerability** to desiccation and changes in emergence regime. (Refer also to section 5.6.4.) Impacts on the suitability of these habitats may affect the long term survival of individuals (in terms of energy and competition) or alter behavior and patterns of use or distribution.

iv. Changes in water flow rate

It is thought unlikely that changes in water flow rate within the Estuary will affect the Bewick's Swan directly but such changes may have marked effects on the supporting habitats on which they are dependant for roosting and feeding. The saltmarshes and intertidal mudflats and sandflats of the estuary are considered to have **moderate sensitivity** and **high exposure** and therefore **high vulnerability** to changes in water flow rate. (Refer also to sections 5.6.3 and 5.6.4). Impacts on the suitability of these habitats may affect the long term survival of individuals (in terms of energy and competition) or alter behavior and patterns of use or distribution.

v. Changes in wave exposure

It is thought unlikely that changes in wave exposure within the Estuary will affect the Bewick's Swan directly but such changes may have marked effects on the supporting habitats on which they are dependant for roosting and feeding. The saltmarshes and intertidal mudflats and sandflats of the estuary are considered to have **high sensitivity** and **high exposure** and therefore **high vulnerability** to changes in water flow rate. (Refer also to sections 5.6.3 and 5.6.4). Impacts on the extent and suitability of these habitats may affect the long term survival of individuals (in terms of energy and competition) or alter behavior and patterns of use or distribution.

vi. Changes in grazing management

The Bewicks Swan feature, which is dependent on the saltmarsh habitats, is considered to have **high sensitivity** and **high exposure** and therefore **high vulnerability** to changes in grazing management.

The vegetation composition of saltmarsh habitats can be altered by changes in grazing management. This can affect the palatability of the sward for grazing Bewick's swans and therefore affect the availability of adequate preferred feeding areas within the SPA. There are critical areas for this species located at the Dumbles in the uppermost part of the estuary all of which are grazed.

vii. Noise and visual presence

Overwintering birds are disturbed by sudden movements and sudden noises. This can displace the birds from their feeding grounds. Disturbance can prevent the birds from feeding and in response they either a) decrease their energy intake at their present (disturbed) feeding site through displacement activity, or b) move to an alternative less favoured feeding site. Such a response affects energy budgets and thus survival. There is intermittent disturbance from both the landward and seaward side of the site. Bewick's swans are mainly affected by disturbance from the landward side and any increase in disturbance should be avoided. At present the Annex 1 species are **moderately vulnerable** to noise and visual disturbance on the intertidal mudflats and sandflats and have a **high vulnerability** to this category of operation on the saltmarsh.

viii. Toxic contamination through the introduction of synthetic and/or non-synthetic compounds

Waterfowl are subject to the accumulation of toxins through the food chain or through direct contact with toxic substances when roosting or feeding. Their ability to feed can also be affected by the abundance or change in palatability of their prey caused by toxic contamination. At the moment there is no evidence to show that this is the case, but the estuary is vulnerable to oil spills and there is a continuous discharge of toxins into the estuary,

some of which bind to the sediments. This is an area which requires further assessment and is likely to be addressed by work arising from both the Water Framework Directive and ongoing Review of Consents by the Environment Agency. The Bewick's swans has a **moderate vulnerability** to toxic contamination.

ix. Changes in nutrient loading

Changes in organic or nutrient loading can change the species composition of the plants on the saltmarsh and thus the structure of the sward. This could affect the palatability of the sward for grazing Bewick's swans and therefore affect the availability of adequate preferred feeding areas within the SPA. There are critical areas for this species located at the Dumbles in the uppermost part of the estuary all of which are grazed.

x. Changes in salinity

It is thought unlikely that changes in salinity within the Estuary will affect the Bewicks Swan feature directly but such changes may have marked effects on the supporting saltmarsh habitats on which this species are dependant for feeding. The saltmarshes of the estuary are considered to have **moderate sensitivity** and **high exposure** and therefore **high vulnerability** to changes in salinity. Impacts on these habitats may affect the long term survival of individuals (in terms of energy and competition) or alter behavior and patterns of use or distribution.

xi. Changes in oxygenation

It is thought unlikely that changes in oxygenation within the Estuary will affect the Bewicks Swan feature directly but such changes may have an effect on the community composition of supporting saltmarsh habitats on which this species are dependant for feeding. The saltmarshes of the estuary are considered to have **low sensitivity** and **high exposure** and therefore **moderate vulnerability** to changes in oxygenation. Impacts on these habitats may affect the long term survival of individuals (in terms of energy and competition) or alter behavior and patterns of use or distribution.

xii. Introduction of microbial pathogens

Bewicks swan is considered to have **low sensitivity** and **high exposure** (due to the high number of sewage discharges) and therefore **moderate vulnerability** to the introduction of microbial pathogens.

Microbial pathogens are most likely to enter the Severn's ecosystem by means of sewage discharges. Bewicks swans on their feeding or roosting grounds may be affected by direct infection by pathogens (bacteria or viruses) present in the water or river sediments and through the release of endo or exotoxins bacterial toxins. Infection may cause mortality, loss of condition and behavioural changes in individuals and within the population using the site through onward contamination.

5.7.2 Internationally important waterfowl assemblage including populations of regularly occurring migratory species

(Note : this advice is also relevant to the Ramsar Site's "internationally important populations of waterfowl" features and the "internationally important assemblage of waterfowl" feature for which the Ramsar Site has been designated – refer also to section 5.8)

5.7.2.1 Sensitivity

The Internationally important waterfowl assemblage including populations of regularly occurring migratory species is **moderately to highly sensitive** to:

- Physical loss
- Physical damage
- Non-physical disturbance
- Toxic contamination
- Non-Toxic contamination
- Biological disturbance

These result from a range of activities known to occur within the Estuary. Further details are provided in points i) to xvi) below, with details of the level of sensitivity set out in Table 23.

5.7.2.2 Exposure

The Internationally important waterfowl assemblage including populations of regularly occurring migratory species is **moderately to highly exposed** to:

- Substratum loss and smothering
- Changes in suspended sediment
- Desiccation and changes in emergence regime
- Changes in water flow
- Changes in wave exposure
- Abrasion and physical disturbance
- Grazing management
- Noise and visual disturbance
- Toxic contamination
- Changes in nutrient loading
- Changes in thermal regime
- Changes in salinity
- Changes in oxygenation
- Introduction of microbial pathogens
- Introduction of non-native species
- Selective extraction of species

5.7.2.3 Vulnerability

The Internationally important waterfowl assemblage including populations of regularly occurring migratory species has **moderate to high vulnerability** to:

i. Substratum loss and smothering

The intertidal habitats and therefore the waterfowl assemblage feature which these habitats support are considered to have **moderate to high sensitivity** and **moderate to high exposure** and therefore **moderate to high vulnerability** to physical loss (substratum loss and smothering).

The physical loss of areas of intertidal habitats may be caused directly through change of land use or indirectly as a consequence of changes to sedimentation processes (e.g. coastal defences) as well as via the effects of smothering by artificial structures (e.g. jetties) or the disposal of spoils. Activities or developments resulting in

physical loss of the intertidal supporting habitats are likely to reduce the availability of food and roosting habitat and thus be detrimental to the favourable condition of the SPA interest features including all the migratory species and waterfowl assemblage. The intertidal mudflats and sandflats and the saltmarsh are highly sensitive to removal by land reclamation and major construction activities.

Eelgrass beds (which are a food source for some species of the assemblage) are being affected by siltation due to changes in sediment movement after construction of the Second Severn Crossing which has resulted in smothering.

ii. Changes in suspended sediment

It is thought unlikely that changes in the suspended sediment within the Estuary will affect the waterfowl assemblage directly but such changes may have marked effects on the supporting habitats on which they are dependant for roosting and feeding.. (Refer also to sections 5.6.1, 5.6.3 and 5.6.4). The supporting habitats are all are currently considered to have **moderate sensitivity** and **moderate exposure** and therefore **moderate vulnerability** to desiccation and changes in emergence regime. Impacts on the suitability of these habitats may affect the long term survival of individuals (in terms of energy and competition) or alter behavior and patterns of use or distribution.

iii. Desiccation and changes in emergence regime

It is thought unlikely that changes in the emergence regime within the Estuary will affect the waterfowl assemblage directly but such changes may have marked effects on the supporting habitats on which they are dependant for roosting and feeding.. (Refer also to sections 5.6.1, 5.6.3 and 5.6.4). The saltmarshes are currently considered to have **high sensitivity** and **low exposure** and therefore **moderate vulnerability** to desiccation and changes in emergence regime. Impacts on the suitability of these habitats may affect the long term survival of individuals (in terms of energy and competition) or alter behavior and patterns of use or distribution.

iv. Changes in water flow rate

It is thought unlikely that changes in water flow rate within the Estuary will affect the designated bird species of the assemblage directly but such changes may have marked effects on the supporting habitats on which these species are dependant for roosting and feeding. All the supporting habitats are considered to have **moderate sensitivity** and **high exposure** and therefore **high vulnerability** to changes in water flow rate . (Refer also to sections 5.6.1, 5.6.3 and 5.6.4). Impacts on the suitability of these habitats may affect the long term survival of individuals (in terms of energy and competition) or alter behavior and patterns of use or distribution.

v. Changes in wave exposure

It is thought unlikely that changes in wave exposure within the Estuary will affect the designated bird species of the assemblage directly but such changes may have marked effects on the supporting habitats on which these species are dependant for roosting and feeding. All the supporting habitats are considered to have **high sensitivity** and **high exposure** and therefore **high vulnerability** to changes in water flow rate . (Refer also to sections 5.6.1, 5.6.3 and 5.6.4). Impacts on the extent and suitability of these habitats may affect the long term survival of individuals (in terms of energy and competition) or alter behavior and patterns of use or distribution.

vi. Abrasion and physical disturbance

Saltmarsh may be physically damaged from overgrazing or eroded when boats are moored on it and when paths are worn through it to reach moored boats on foot or via vehicles. Currently all supporting habitats are considered to be moderately vulnerable to abrasion. Intertidal habitats are **highly sensitive** to damage by direct and indirect effects of aggregate dredging. The intertidal mudflats and sandflats and the shingle and rocky shore are therefore considered **highly vulnerable** to selective extraction.

vii. Changes in grazing management

The waterfowl assemblage which is in part dependant on the saltmarsh habitats is considered to have **high sensitivity** and **high exposure** and therefore **high vulnerability** to changes in grazing management.

The vegetation composition of saltmarsh habitats can be altered by changes in grazing management. This can affect the palatability of the sward for grazing wildfowl and availability of invertebrate food sources and therefore affect the availability of adequate preferred feeding areas within the SPA. Grazing changes may also

affect the suitability saltmarsh areas as resting and roosting sites for birds where open terrain with low vegetation is an important factor.

viii. Noise or visual disturbance

Overwintering birds are disturbed by sudden movements and sudden noises. This can have the effect of displacing the birds from their feeding grounds. Disturbance can prevent the birds from feeding and in response they either a) decrease their energy intake at their present (disturbed) feeding site through displacement activity, or b) move to an alternative less favoured feeding site. Such a response affects energy budgets and thus survival. There is intermittent disturbance to the internationally important migratory species and the waterfowl assemblage from both the landward and seaward side of the site which has increased in recent years, due to the estuary becoming more populated and the development of all weather recreational pursuits. All supporting habitats are currently **highly vulnerable** to noise and visual disturbance.

ix. Toxic contamination through the introduction of synthetic and/or non-synthetic compounds

Waterfowl are subject to the accumulation of toxins through the food chain or through direct contact with toxic substances when roosting or feeding. Their ability to feed can also be affected by the abundance or change in palatability of their prey caused by toxic contamination. At the moment there is no evidence to show that this is the case on the Severn Estuary, but the estuary is vulnerable to oil spills and there is a continuous discharge of toxins into the estuary, some of which bind to the sediments. This is an area that requires further assessment. The intertidal mudflats and sandflats and the saltmarsh are currently **highly vulnerable** to the introduction of synthetic and non-synthetic compounds.

x. Changes in nutrient loading

Changes in organic or nutrient loading can change the species composition of the plants on the saltmarsh and thus the structure of the sward. Increases in nutrients can cause excessive algal growth on the mudflats, denying the birds access to their invertebrate prey and changing the invertebrate species composition in the sediment. However, high nutrient loads can also be beneficial to some species of birds by increasing the density and size of prey items. Though the water quality has been improved in recent years there are still local areas of concern. On balance, any increase in nutrient loading should be avoided. At present the intertidal mudflats and sandflats are **moderately vulnerable** to this category of operation.

xi. Changes in thermal regime

It is thought unlikely that changes in the thermal regime within the Estuary will affect the designated bird species of the assemblage directly but such changes may have marked effects on the community composition of supporting habitats on which these species are dependant for feeding. The intertidal mudflats and sandflats of the estuary are considered to have **moderate sensitivity** and **moderate exposure** and therefore **moderate vulnerability** to changes in thermal regime. Impacts on these habitats may affect the long term survival of individuals (in terms of energy and competition) or alter behavior and patterns of use or distribution.

xii. Changes in salinity

It is thought unlikely that changes in salinity within the Estuary will affect the waterfowl assemblage feature directly but such changes may have marked effects on the supporting habitats on which these species are dependant for feeding. The saltmarshes, intertidal mudflats and sand flats and hard substrate habitats (rocky shores) of the estuary are considered to have **low to moderate sensitivity** and **high exposure** and therefore **moderate to high vulnerability** to changes in salinity. Impacts on these habitats may affect the long term survival of individuals (in terms of energy and competition) or alter behavior and patterns of use or distribution.

xiii. Changes in oxygenation

It is thought unlikely that changes in oxygenation within the Estuary will affect the waterfowl assemblage feature directly but such changes may have marked effects on the community composition of supporting habitats on which these species are dependant for feeding. The saltmarshes, intertidal mudflats and sand flats and hard substrate habitats (rocky shores) of the estuary are considered to have **low sensitivity** and **high exposure** and therefore **moderate vulnerability** to changes in oxygenation. Impacts on these habitats may affect the long term survival of individuals (in terms of energy and competition) or alter behavior and patterns of use or distribution.

xiv. Introduction of microbial pathogens

The bird assemblage is considered to have **low to high sensitivity** and **high exposure** (due to the high number of sewage discharges) and therefore **moderate vulnerability** to the introduction of microbial pathogens.

Microbial pathogens are most likely to enter the Severn's ecosystem by means of sewage discharges. Waterfowl may be affected by microbial pathogens (bacteria or viruses) on their feeding or roosting grounds and are considered to be particularly highly exposed when feeding and roosting on the intertidal mudflats and sandflats and hard substrate habitats where there may be bioaccumulation of pathogens within food sources (filter feeding organisms). Birds may also be affected by direct infection by pathogens present in the water or river sediments and through the release of endo or exotoxins bacterial toxins. Infection may cause mortality, loss of condition and behavioural changes in individuals and within the population using the site through onward contamination.

xv. Introduction of non-native species

The birds assemblage is considered to have **high sensitivity** and **low exposure** and therefore **moderate vulnerability** to the introduction of non native species.

The saltmarsh cordgrass *Spartina anglica* is an invasive pioneer species whose rapid growth consolidates sediment, raises mudflats and reduces sediment availability elsewhere. This expansion can affect areas of intertidal habitats (mud and sandflats and hard substrate habitats) which are key habitats for roosting and feeding birds. Such expansion is regarded as being a potential threat to intertidal beds of eelgrass *Zostera noltei* in particular which are a food source for some species within the assemblage (Wigeon and European white-fronted goose). However, whilst recognising *S. anglica* as an invasive species, it also has a role in saltmarsh formation and the community SM6 in which it features should be allowed to develop into other Atlantic Salt Meadow or transitional communities which are also of value as feeding and roosting habitats for birds within the assemblage.

The presence of another non-native, the slipper limpet *Crepidula fornicata*, in large numbers may alter the species composition within certain soft mud habitats leading to a decline in overall species richness and consequent implications on food availability for feeding birds. However, *C. fornicata* has yet to penetrate the Estuary, possibly due to the strong water flows.

xvi. Selective extraction of species

The birds assemblage is considered to have **moderate sensitivity** and **moderate exposure** and therefore **moderate vulnerability** to the selective extraction of species.

Wildfowling is carried out all around the estuary. It is believed that there is currently no direct detrimental effect on the overall bird populations but wildfowling is one of many activities that may be contributing (through disturbance) to the decline in some species on the Severn. Continuing monitoring and regulation of wildfowling is achieved by the countryside agencies and through the management of wildfowling by a British Association of Shooting and Conservation (BASC) affiliated associations, applying the BASC wildfowlers code of conduct.

Bait digging is also carried out in localised areas of the mid and outer estuary. Extensive areas of digging can change the availability of prey in the sediment as the area needs a period of recovery and recolonisation. There is currently no evidence that existing levels of activity is detrimental to the birds on the European Marine Site.

The removal of strandline vegetation by beach cleaning removes an important habitat for invertebrates, as well as many of the invertebrates themselves, reducing the quantity and variety of prey available to the birds. Much of the saltmarsh is managed by grazing and changes in management can alter the availability of prey and suitability of roosting sites.

Table 23 Sensitivity, exposure and vulnerability of the Severn Estuary SPA to physical, chemical and biological pressures (See note in section 5.7 on changes to this table since version issued in 1995.)

Sensitivity		Exposure		Vulnerability	
High sensitivity	OOOO	High Exposure	× × × ×	High vulnerability	⊗⊗⊗⊗ ⊗⊗⊗O ⊗⊗⊗×
Moderate sensitivity	OOO	Medium Exposure	× × ×	Moderate vulnerability	⊗⊗OO ⊗⊗× × ⊗⊗⊗
Low sensitivity	OO	Low Exposure	× ×	Low vulnerability	⊗⊗O ⊗××× ⊗⊗× ⊗×× ⊗⊗ ⊗×
No detectable sensitivity	O	No exposure	×	No vulnerability	⊗O
?S =Insufficient information on sensitivity				Unknown vulnerability	

Categories of operations which may cause deterioration or disturbance	Internationally important populations of regularly occurring Annex 1 species		Internationally important migratory species and waterfowl assemblage		
	Intertidal mudflats and sandflats	Saltmarsh	Intertidal mudflats and sandflats	Saltmarsh	Hard substrates
Physical Loss					
Removal/substratum loss	⊗⊗⊗⊗	⊗⊗⊗⊗	⊗⊗⊗⊗	⊗⊗⊗⊗	⊗⊗⊗⊗
Smothering	⊗⊗⊗	⊗⊗⊗	⊗⊗⊗	⊗⊗⊗	⊗⊗⊗
Physical Damage					
Changes in suspended sediment	⊗⊗⊗	⊗⊗⊗	⊗⊗⊗	⊗⊗⊗	⊗⊗⊗
Desiccation and changes in emergence regime	⊗⊗O	⊗⊗OO	⊗⊗O	⊗⊗OO	⊗⊗O
Changes in water flow	⊗⊗⊗×	⊗⊗⊗×	⊗⊗⊗×	⊗⊗⊗×	⊗⊗⊗×
Changes in wave exposure	⊗⊗⊗⊗	⊗⊗⊗⊗	⊗⊗⊗⊗	⊗⊗⊗⊗	⊗⊗⊗⊗
Abrasion / physical disturbance (of habitats)	⊗⊗	⊗⊗O	⊗⊗⊗⊗	⊗⊗⊗×	⊗⊗⊗×
Grazing management	Not relevant	⊗⊗⊗⊗	Not relevant	⊗⊗⊗⊗	Not relevant
Non-physical disturbance					
Noise & visual presence	⊗⊗OO	⊗⊗⊗O	⊗⊗⊗O	⊗⊗⊗⊗	⊗⊗⊗O
Toxic contamination					
Introduction of synthetic compounds	⊗⊗⊗	⊗⊗⊗	⊗⊗⊗⊗	⊗⊗⊗×	⊗⊗⊗×
Introduction of non-synthetic compounds	⊗⊗⊗	⊗⊗⊗	⊗⊗⊗⊗	⊗⊗⊗⊗	⊗⊗⊗×
Introduction of radionuclides	?S××	?S××	?S××	?S××	?S××
Non-toxic contamination					
Changes in nutrient loading	⊗×××	⊗⊗⊗×	⊗⊗⊗×	⊗⊗⊗×	⊗⊗××
Changes in thermal regime	⊗×	⊗⊗	⊗⊗⊗	⊗⊗	⊗⊗
Changes in turbidity (light penetration)	⊗××	⊗×	⊗⊗×	⊗×	⊗⊗×
Changes in salinity	⊗×××	⊗⊗⊗×	⊗⊗××	⊗⊗⊗×	⊗⊗××
Changes in oxygenation	⊗×××	⊗⊗××	⊗⊗××	⊗⊗××	⊗⊗××
Biological disturbance					
Introduction of microbial pathogens	⊗⊗××	⊗⊗××	⊗⊗⊗⊗	⊗⊗××	⊗⊗⊗⊗
Introduction of non-native species	⊗×	⊗⊗	⊗⊗OO	⊗⊗	⊗⊗OO
Selective extraction of species	⊗⊗O	⊗⊗O	⊗⊗⊗	⊗⊗⊗	⊗××

5.8 Specific Advice on Operations for the Severn Estuary Ramsar Site

Separate advice for the Ramsar Site features has not been produced here as it repeats the advice given in the previous sections (5.6 and 5.7) for the SAC and SPA respectively due to the overlapping nature of the Ramsar features. The following table therefore cross references the features of these designations and provides a direct reference to the section where advice relevant to the Ramsar features can be found.

Table 24 Cross reference table relating features of the Ramsar Site to the advice on operations for the SAC and SPA

Ramsar interest features	Relevant SAC and SPA features and supporting habitats	Reference section for advice on operations relevant to the Ramsar features
<i>Ramsar Interest feature 1 : Estuaries</i>	SAC: Annex I habitats Estuaries Intertidal mudflats and sandflats Atlantic Salt Meadows	Section 5.6.1 & Table 22 Section 5.6.3 & Table 22 Section 5.6.4 & Table 22
<i>Ramsar Interest feature 2 : Migratory fish assemblage</i>	SAC : Annex II species River lamprey <i>Lampetra fluviatilis</i> ; Sea lamprey <i>Petromyzon marinus</i> ; Twaite shad <i>Alosa fallax</i>	Section 5.6.6 & Table 22 Section 5.6.6 & Table 22 Section 5.6.6 & Table 22
Internationally important populations of waterfowl <i>Ramsar Interest feature 3: Bewick's swan</i> <i>Ramsar Interest feature 4: European white-fronted goose</i> <i>Ramsar Interest feature 5: Dunlin</i> <i>Ramsar Interest feature 6: Redshank</i> <i>Ramsar Interest feature 7: Shelduck</i> <i>Ramsar Interest feature 8: Gadwall</i>	SPA : Internationally important populations of regularly occurring Annex 1 species (Bewick's swan) SPA: Internationally important populations of regularly occurring migratory species (same species as column to left) Supporting habitats Intertidal mudflats and sandflats Saltmarsh Hard substrates .	Section 5.7.1 & Table 23 Section 5.7.2 & Table 23 Section 5.6.3 & Table 22 Section 5.6.4 & Table 22
<i>Ramsar Interest feature 9</i> Internationally important assemblage of waterfowl	SPA: Internationally important assemblage of waterfowl Supporting habitats Intertidal mudflats and sandflats Saltmarsh Hard substrates	Section 5.7.2 & Table 23 Section 5.6.3 & Table 22 Section 5.6.4 & Table 22

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7. Glossary

Advisory Group	The body of the representatives from local interests, user groups and conservation groups, formed to advise the management group
Annex 1 Bird species	The species listed in Annex 1 of the Birds Directive are the subject of special conservation measures concerning their habitat. These measures ensure the survival and reproduction of the birds in their area of distribution. Species listed on Annex 1 are in danger of extinction, rare or vulnerable
Annex I habitat type(s)	A natural habitat(s) listed in Annex I of the Habitats Directive for which Special Areas of Conservation can be selected.
Annex II species	A species listed in Annex II of the Habitats Directive for which Special Areas of Conservation can be selected.
Annex V	The listing, in the Habitats Directive, of the animal and plant species whose taking in the wild and exploitation may be subject to management measures.
Assemblage	A collection of plants and/or animals characteristically associated with a particular environment.
Attribute	Characteristic of an interest feature or supporting habitat which provides an indication of the condition of the feature or supporting habitat to which it applies.
BASC	British Association of Shooting and Conservation
Benthos	Those organisms attached to, or living on, in or near, the seabed, including that part which is exposed by tides.
Birds Directive	The abbreviated term of <i>Council Directive 79/409/EEC of 1979 on the conservation of wild birds</i> .
Biodiversity	The total variety of life on earth. This includes diversity within species, between species and ecosystems.
Biotope	The physical habitat with its biological community; a term which refers to the combination of physical environment and its distinctive assemblage of conspicuous species.
BTO	British Trust for Ornithology
CCW	Countryside Council for Wales
Characteristic	Special to, or especially abundant in, a particular situation or biotope. Characteristic species should be immediately conspicuous and easily identified.
Community	A group or organisms occurring in a particular environment, presumably interacting with each other and with the environment, and identifiable by means of ecological survey from other groups.
Competent authority	Any Minister, government department, public or statutory undertaker, public body or person holding a public office that exercises legislative powers.
Conservation objective	A statement of the nature conservation aspirations for a site, expressed in terms of the favourable condition that we wish to see the species and/or habitats for which the site has been selected to attain. Conservation objectives for European Marine Sites relate to the aims of the Habitats Directive.
DEFRA	Department for Environment, Food and Rural Affairs
DETR	Department of the Environment, Transport and the Regions
Epifauna	Benthic animals living on the seabed.
EN	English Nature (now incorporated into Natural England).
Eulittoral	The main part of the intertidal zone characterised by limpets, barnacles, mussels, fucoid algae and with red algae often abundant on the lower part.

European Marine Site	A European site which consists of, or in so far as it consists of, areas covered intermittently or continuously by seawater.
European Site	A classified SPA, designated SAC, site of Community importance (a site selected as a candidate SAC, adopted by the European Commission but not yet designated), a candidate SAC (in England only) or a site hosting a priority species in respect of which Article 5 of the Habitats directive applies.
Favourable condition	The condition represented by the achievement of the conservation objectives, in other words the desired condition for a designated habitat or a species on an individual site.
Favourable conservation status (FCS)	A range of conditions for a natural habitat or species at which the sum of the influences acting upon that habitat or species are not adversely affecting its distribution, abundance, structure or function throughout the EC in the long term. The condition in which the habitat or species is capable of sustaining itself on a long-term basis.
Habitat	The place in which a plant or animal lives.
Habitats Directive	The abbreviated term of <i>Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora</i> . It is the aim of this Directive to promote the conservation of certain habitats and species within the European Union.
Habs Regs	The Conservation (Natural Habitats &c.) Regulations 1994.
HAT	Highest Astronomical Tide.
Infauna	Benthic animals which live within the sediment.
Infralittoral	The subtidal zone in which upward facing rocks are dominated by erect algae, typically kelps.
Interest feature	A natural or semi-natural feature for which a European site has been selected. This includes any Habitats Directive Annex I habitat, or any Annex II species and any population of a bird species for which an SPA has been designated under the Birds Directive.
JNCC	Joint Nature Conservation Committee.
Maintain	The action required for an interest feature when it is considered to be in favourable condition.
Management group	The body of relevant authorities formed to manage the European Marine Site.
Management scheme	The framework established by the relevant authorities at a European Marine Site under which their functions are exercised to secure, in relation to that site, compliance with the requirements of the Habitats Directive.
MNR	Marine Nature Reserve.
Nationally scarce/rare Natura 2000	For marine purposes, these are regarded as species of limited national occurrence. The European network of protected sites established under the Birds Directive and the Habitats Directive.
NNR	National Nature Reserve.
Notable species	A species that is considered to be notable due to its importance as an indicator, and may also be of nature conservation importance, and which is unlikely to be a 'characteristic species.'
Operations which may cause deterioration or disturbance	Any activity or operation taking place within, adjacent to, or remote from a European Marine Site that has the potential to cause deterioration to the natural habitats for which the site was designated, or disturbance to the species and its habitats for which the site was designated.
PCB	Polychlorinated Biphenyls.

Peak mean counts (5 yr)	The Severn Estuary is broken down into count sectors. Over the winter months WeBS volunteers count all the birds which are visible within each sector. The yearly figures for each species in the Severn Estuary are then averaged over a five year period to give the 5 yr peak mean count.
Plan or project	Any operation that is within a competent authority's (including relevant authorities) function to control, or over which a competent authority (including relevant authorities) has a statutory function to decide on applications for consents, authorisations, licences or permissions. There is no generally accepted definition of the term "plan or project". This definition may be subject to review and may require further discussion in the context of developing a management scheme for the Severn Estuary SPA.
Ramsar	Site designated under the 1971 Ramsar Convention as a wetland of international importance.
Relevant authority	The specific competent authority which has powers or functions which have, or could have, an impact on the marine environment, or adjacent to, a European Marine Site.
Reporting period	The cycle within which a definitive report on the condition of features protected within the site series will be produced, set as once in every 6 years.
Restore	The action required for an interest feature when it is not considered to be in a favourable condition.
SAC	Special Area of Conservation.
Sensitivity	The intolerance of a habitat, community or individual species to damage from an external force.
SPA	Special Protection Area for birds.
SSSI	Site of Special Scientific Interest.
Strandline	The organic matter particularly rotting seaweed deposited by the tide anywhere along the intertidal.
Supporting Habitats	The key habitats within the European Marine Site necessary to support the interest feature.
TAN 5	Planning Guidance (Wales) Technical Advice Note (TAN)5: Nature Conservation and Planning (Welsh Assembly Government)
TBT	Tri-butyl tin
Vulnerability	The exposure of a habitat, community or individual of a species to an external factor to which it is sensitive.
WeBS	Wetland Bird Survey: a collaborative national surveillance scheme of the UK's waterfowl based on counts undertaken once per month outside of the breeding season.
WWT	Wildfowl & Wetlands Trust

ANNEX 5

Information downloaded from the JNCC website



Resource hub

Natura 2000 summary site details

2019

Freshwater Marine Terrestrial Protected Areas Natura 2000

Abstract

This spreadsheet contains the latest UK wide data submitted to the EU Commission (in October 2019), as part of the Standard Data Form information completed for all Natura 2000 sites. It contains details of all Special Areas for Conservation (under the Habitats Directive) and Special Protection Areas (under the Birds Directive). Note that Gibraltar information is not included in this spreadsheet. The information in the Standard Data Forms was resubmitted with substantive changes in December 2015. The rationale behind this is explained in the UK Approach Document.

The information provided here follows the officially agreed site information format for Natura 2000 sites, as set out in the Official Journal of the European Union recording the Commission Implementing Decision of 11 July 2011 (2011/484/EU).

The content matches exactly the data submitted to the European Commission. Further technical documentation may be found on the Eionet website.

More general information on Special Areas of Conservation (SACs) in the United Kingdom is available from the SAC home page on JNCC's website. More general information on Special Protection Areas (SPAs) in the United Kingdom is available from the SPA home page on JNCC's website.

This sheet is organised in a series of tabs, corresponding to different sections of the standard data form. On some tabs, SPA and SAC data are separated, whereas on others they are combined. Where they are combined, there is always a column to indicate the type of site (SAC or SPA). All sheets are filterable by Country codes (E, S, W, NI and OF for offshore). Cross border sites take the first letter of each country code (e.g. EW for England/Wales; SO for Scotland/Offshore). The tabs are: *SAC site details* contains summary information about the SACs themselves, including their size, location and date of designation. This tab contains descriptions of the quality/importance of the site and physical characteristics. *SPA site details* - contains summary information about the SPAs themselves, including a brief description, their size, location and date of classification. Most of the data are sourced from the Natura 2000 Data Form, the exceptions are those in 'overview' and 'local authority' which are sourced from the 2001 SPA Review. The list includes all classified SPAs. There is also an indication of which sites contain marine components ie can be considered to be part of the Marine Protected Areas Network. *Admin regions* contains details of the administrative regions for each site using the NUTS Level 2 categories. *SAC interest features* contains a full listing of all Habitats Directive features occurring on SACs in the UK. This includes non-qualifying ('D-grade') features that are not a reason for SAC selection at

a particular site. Note that a feature may not occur on all parts of a site, especially in the case of large SACs. *SPA interest features* shows bird data submitted to the EU - ie the occurrence of each species on each site. The list of species for each site includes only those listed on the Natura 2000 Data Form submitted to the European Commission (specifically those listed in section 3.2 of this form). It does not yet take account of the amendments published in the SPA Review - because in many cases these data have not yet been submitted to the EU as part of an amended Natura 2000 Data Form. This does not include assemblages – these are listed in a separate sheet. *SAC interest features* contains a full listing of all Habitats Directive features occurring on SACs in the UK. This includes non-qualifying ('D-grade') features that are not a reason for SAC selection at a particular site. Note that a feature may not occur on all parts of a site, especially in the case of large SACs. *Maps* offers a simple mapping facility. If a particular feature or site is selected in the above worksheets using the Autofilter function, a dot map will be displayed showing the location of the site(s). *Habitat classes* indicates the percentage of each SAC/SPA comprised of certain broad habitat types. These are intended to give a general impression of the character of the SAC. They should not be confused with the Annex I habitats, which are listed in the SAC interest feature worksheet. *Threats and pressures* lists the positive and negative factors that impact on the site. These data were collated for the first time in the UK as part of the December 2015 submission to the EU. *Management Body* – indicates the appropriate Statutory Nature Conservation Bodies. *Management plan* – indicates whether or not a management plan exists for the site. *Designation type* – this refers to a very limited range of National Designations, specifically SSSI, (ASSI in Northern Ireland), Marine Nature Reserves and National Nature Reserves.

✱ Detail

🔧 Usage

⚙️ Meta

☁️ Resources 1

📍 Extent

- Natura 2000 site details - spreadsheet
XLSX
2.3MB UK-Natura2000-2019-10-31.xlsx

Resource type NonGeographicDataset

Topic category Environment

Reference date 2019-10-31

Lineage

Each of the tabs in the spreadsheet has been derived from a master SQL server database managed by JNCC. This database is used to provide the official EU submission and also to generate the Standard Data Forms. Prior to December 2015, JNCC published separate spreadsheets for both SAC and SPA. The information provided here, follows the officially agreed site information format for Natura 2000 sites, as set out in the Official Journal of the European Union recording the Commission Implementing Decision of 11 July 2011 (2011/484/EU). This is known as the Standard Data Format. As part of the December 2015 submission,

several sections of the UK's previously published Standard Data Forms have been updated. For details of the approach taken by the UK in this submission please refer to the following document:
http://jncc.defra.gov.uk/pdf/Natura2000_StandardDataForm_UKApproach_Dec2015.pdf.
More general information on Special Protection Areas (SPAs) in the United Kingdom is available from the SPA home page on the JNCC website. This webpage also provides links to Standard Data Forms for all SPAs in the UK. For all sites other than those in the offshore zone, the Statutory Nature Conservation Body responsible for the site (eg Natural England or Scottish Natural Heritage) has supplied JNCC with the information for the standard data forms.

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Natura 2000 Summary Site Details 2019

Qualifying Species

	SITE_CODE	SITE_NAME	Country	LOCAL_AUTHORITY	Site_status	X_coord	Y_coord	Nowak_code	IS_MARINE	Species	Common_name	Season	Pop
621	UK9005012	Upper Solway Flat: ES		Cumbria, South Western Scotland	Designated SPA	308669	557723	A160		1 Numenius arquata	Eurasian curlew	w	
622	UK9005012	Upper Solway Flat: ES		Cumbria, South Western Scotland	Designated SPA	308669	557723	A162		1 Tringa totanus	Common redshank	w	
623	UK9005012	Upper Solway Flat: ES		Cumbria, South Western Scotland	Designated SPA	308669	557723	A169		0 Arenaria interpres	Ruddy turnstone	w	
624	UK9005012	Upper Solway Flat: ES		Cumbria, South Western Scotland	Designated SPA	308669	557723	A672		1 Calidris alpina alpina	Dunlin	w	
625	UK9015022	Severn Estuary	EW	Dorset and Somerset, East Wales, Gloucestershire, Wiltshire and Bristol/Bath area, West Wales and The Valleys	Designated SPA	327741	147013	A037		0 Cygnus columbianus bewickii	Tundra swan	w	
626	UK9015022	Severn Estuary	EW	Dorset and Somerset, East Wales, Gloucestershire, Wiltshire and Bristol/Bath area, West Wales and The Valleys	Designated SPA	327741	147013	A048		1 Tadorna tadorna	Common shelduck	w	
627	UK9015022	Severn Estuary	EW	Dorset and Somerset, East Wales, Gloucestershire, Wiltshire and Bristol/Bath area, West Wales and The Valleys	Designated SPA	327741	147013	A051		1 Anas strepera	Gadwall	w	
628	UK9015022	Severn Estuary	EW	Dorset and Somerset, East Wales, Gloucestershire, Wiltshire and Bristol/Bath area, West Wales and The Valleys	Designated SPA	327741	147013	A162		1 Tringa totanus	Common redshank	w	
629	UK9015022	Severn Estuary	EW	Dorset and Somerset, East Wales, Gloucestershire, Wiltshire and Bristol/Bath area, West Wales and The Valleys	Designated SPA	327741	147013	A394		0 Anser albifrons albifrons	Greater white-fronted goose	w	
630	UK9015022	Severn Estuary	EW	Dorset and Somerset, East Wales, Gloucestershire, Wiltshire and Bristol/Bath area, West Wales and The Valleys	Designated SPA	327741	147013	A672		1 Calidris alpina alpina	Dunlin	w	
631	UK9013011	The Dee Estuary	EW	Cheshire, East Wales, Extra-Regio, Merseyside, West Wales and The Valleys	Designated SPA	321148	378892	A048		1 Tadorna tadorna	Common shelduck	w	
632	UK9013011	The Dee Estuary	EW	Cheshire, East Wales, Extra-Regio, Merseyside, West Wales and The Valleys	Designated SPA	321148	378892	A052		1 Anas crecca	Eurasian teal	w	
633	UK9013011	The Dee Estuary	EW	Cheshire, East Wales, Extra-Regio, Merseyside, West Wales and The Valleys	Designated SPA	321148	378892	A054		1 Anas acuta	Northern pintail	w	
634	UK9013011	The Dee Estuary	EW	Cheshire, East Wales, Extra-Regio, Merseyside, West Wales and The Valleys	Designated SPA	321148	378892	A130		1 Haematopus ostralegus	Eurasian oystercatcher	w	
635	UK9013011	The Dee Estuary	EW	Cheshire, East Wales, Extra-Regio, Merseyside, West Wales and The Valleys	Designated SPA	321148	378892	A141		1 Pluvialis squatarola	Grey plover	w	

	Population_count_min	Population_count_max	Pop_units	SPECIES_DATA_QUALITY	COUNT_PERIOD	IMPORTANCE	SPECIES_POPULATION	SPECIES_CONSERVATION	SPECIES_ISOLATION	SPECIES_GLOBAL
621	5881	5881	individuals	Good	5 year peak mean 91/2 to 95/6	1.7% of JNCC defined international population (wintering)	B	NULL	C	NULL
622	3088	3088	individuals	Good	5 year peak mean 91/2 to 95/6	1.7% of JNCC defined international population (wintering)	B	NULL	C	NULL
623	600	600	individuals	Good	5 year peak mean, 1986/7-1990/	0.9% of Great Britain (Wintering)	C	NULL	C	NULL
624	14566	14566	individuals	Good	5 year peak mean 91/2 to 95/6	2.7% of Great Britain (Wintering)	B	NULL	C	NULL
625	280	280	individuals	Good	5 year peak mean 91/2 to 95/6	3.9% of JNCC defined GB population (wintering)	B	NULL	C	NULL
626	3330	3330	individuals	Good	5 year peak mean 91/2 to 95/6	1.1% of JNCC defined international population (wintering)	B	NULL	C	NULL
627	282	282	individuals	Good	5 year peak mean 91/2 to 95/6	0.9% of JNCC defined international population (wintering)	B	NULL	C	NULL
628	2330	2330	individuals	Good	5 year peak mean 91/2 to 95/6	1.3% of JNCC defined international population (wintering)	B	NULL	C	NULL
629	2664	2664	individuals	Good	5 year peak mean 91/2 to 95/6	0.4% of JNCC defined international population (wintering)	A	NULL	B	NULL
630	44624	44624	individuals	Good	5 year peak mean 91/2 to 95/6	3.3% of JNCC defined international population (wintering)	B	NULL	C	NULL
631	7725	7725	individuals	Good	5 year peak mean 91/2 to 95/6	1.1% of JNCC defined international population (wintering)	B	NULL	C	NULL
632	5251	5251	individuals	Good	NULL	NULL	C	NULL	C	NULL
633	5407	5407	individuals	Good	5 year peak mean 91/2 to 95/6	8.9% of JNCC defined international population (wintering)	A	NULL	C	NULL
634	22677	22677	individuals	Good	5 year peak mean 91/2 to 95/6	2.2% of JNCC defined international population (wintering)	B	NULL	C	NULL
635	1643	1643	individuals	Good	NULL	NULL	C	NULL	C	NULL

Natura 2000 Summary Site Details 2019

Assemblage Species

	SITE_CODE	DESIGNATION_TYPE_CODE	SITE_NAME	COUNTRY_CODE	OTHER_SPECIES_GROUP	OTHER_SPECIES_CODE	OTHER_SPECIES_NAME	OTHER_SPECIES_SENSITIVE	OTHER_SPECIES_NP	OTHER_SPECIES_SIZE_MIN	OTHER_SPECIES_SIZE_MAX	OTHER_SPECIES_UNIT	OTH
42	UK9012011	SPA	The Swale	E	B	WATR	Waterbird assemblage	0	0	65588	65588	individuals	NUL
43	UK9012011	SPA	The Swale	E	B	BBA	Breeding bird assemblage	0	0	NULL	NULL	NULL	NUL
44	UK9008021	SPA	The Wash	E	B	WATR	Waterbird assemblage	0	0	400367	400367	individuals	NUL
45	UK9020296	SPA	Upper Nene V	E	B	WATR	Waterbird assemblage	0	0	23821	23821	individuals	NUL
46	UK9005012	SPA	Upper Solway	ES	B	WATR	Waterbird assemblage	0	0	133440	133440	individuals	NUL
47	UK9015022	SPA	Severn Estuary	EW	B	WATR	Waterbird assemblage	0	0	84317	84317	individuals	NUL
48	UK9013011	SPA	The Dee Estuar	EW	B	WATR	Waterbird assemblage	0	0	90518	90518	individuals	NUL
49	UK9020294	SPA	Liverpool Bay	/EWO	B	WATR	Waterbird assemblage	0	0	69687	69687	individuals	NUL
50	UK9020031	SPA	Lough Foyle	NI	B	WATR	Waterbird assemblage	0	0	36599	36599	individuals	NUL
51	UK9020091	SPA	Lough Neagh	a NI	B	WATR	Waterbird assemblage	0	0	99262	99262	individuals	NUL
52	UK9020011	SPA	Rathlin Island	NI	B	SBA	Seabird assemblage	0	0	66000	66000	individuals	NUL

	OTHER_SPECIES_UNIT	OTHER_SPECIES_CATEGORY	OTHER_SPECIES_MOTIVATION	Column1
42	individuals	NULL	NULL	C
43	NULL	NULL	NULL	D
44	individuals	NULL	NULL	C
45	individuals	NULL	NULL	C
46	individuals	NULL	NULL	C
47	individuals	NULL	NULL	C
48	individuals	NULL	NULL	C
49	individuals	NULL	NULL	D
50	individuals	NULL	NULL	C
51	individuals	NULL	NULL	C
52	individuals	NULL	NULL	C

ANNEX 6

Relevant Conservation Objectives

European Site Conservation Objectives for Exmoor and Quantock Oakwoods Special Area of Conservation Site Code: UK0030148



With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

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

This document should be read in conjunction with the accompanying *Supplementary Advice* document, which provides more detailed advice and information to enable the application and achievement of the Objectives set out above.

Qualifying Features:

H91A0. Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles; Western acidic oak woodland

H91E0. Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*); Alder woodland on floodplains*

S1308. *Barbastella barbastellus*; Barbastelle bat

S1323. *Myotis bechsteinii*; Bechstein's bat

S1355. *Lutra lutra*; Otter

* denotes a priority natural habitat or species (supporting explanatory text on following page)

* Priority natural habitats or species

Some of the natural habitats and species for which UK SACs have been selected are considered to be particular priorities for conservation at a European scale and are subject to special provisions in the Habitats Regulations. These priority natural habitats and species are denoted by an asterisk (*) in Annex I and II of the Habitats Directive. The term 'priority' is also used in other contexts, for example with reference to particular habitats or species that are prioritised in UK Biodiversity Action Plans. It is important to note however that these are not necessarily the priority natural habitats or species within the meaning of the Habitats Regulations.

Explanatory Notes: European Site Conservation Objectives

These Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2017 as amended from time to time (the "Habitats Regulations"). They must be considered when a competent authority is required to make a 'Habitats Regulations Assessment', including an Appropriate Assessment, under the relevant parts of this legislation.

These Conservation Objectives and the accompanying Supplementary Advice (where available) will also provide a framework to inform the measures needed to conserve or restore the European Site and the prevention of deterioration or significant disturbance of its qualifying features.

These Conservation Objectives are set for each habitat or species of a [Special Area of Conservation \(SAC\)](#). Where the objectives are met, the site will be considered to exhibit a high degree of integrity and to be contributing to achieving Favourable Conservation Status for that species or habitat type at a UK level. The term 'favourable conservation status' is defined in regulation 3 of the Habitats Regulations.

Publication date: 27 November 2018 (version 3). This document updates and replaces an earlier version dated 30 June 2014 to reflect the consolidation of the Habitats Regulations in 2017.



European Site Conservation Objectives: Supplementary advice on conserving and restoring site features

**Exmoor and Quantock Oakwoods Special Area of Conservation (SAC)
UK0030148**



*Horner Wood - oak pollard in wood pasture in the Eastwater Valley.
North Exmoor SSSI/Dunkery & Horner Woods National Nature Reserve, Somerset.
Copyright Natural England/Peter Wakely 1990*

Date of Publication: 14 March 2019

About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to Exmoor and Quantock Oakwoods SAC.

This advice should therefore be read together with the SAC Conservation Objectives available [here](#).

This site is contiguous along long boundaries with the Exmoor Heaths SAC so that you should also refer to the separate European Site Conservation Objectives and Supplementary Advice provided for those sites, which are available [here](#).

This advice replaces a draft version dated January 2019 following the receipt of comments from the site's stakeholders.

You should use the Conservation Objectives, this Supplementary Advice and any case-specific advice given by Natural England, when developing, proposing or assessing an activity, plan or project that may affect this site.

This Supplementary Advice to the Conservation Objectives presents attributes which are ecological characteristics of the designated species and habitats within a site. The listed attributes are considered to be those that best describe the site's ecological integrity and which, if safeguarded, will enable achievement of the Conservation Objectives. Each attribute has a target which is either quantified or qualitative depending on the available evidence. The target identifies as far as possible the desired state to be achieved for the attribute.

The tables provided below bring together the findings of the best available scientific evidence relating to the site's qualifying features, which may be updated or supplemented in further publications from Natural England and other sources. The local evidence used in preparing this supplementary advice has been cited. The references to the national evidence used are available on request. Where evidence and references have not been indicated, Natural England has applied ecological knowledge and expert judgement. You may decide to use other additional sources of information.

In many cases, the attribute targets shown in the tables indicate whether the current objective is to 'maintain' or 'restore' the attribute. This is based on the best available information, including that gathered during monitoring of the feature's current condition. As new information on feature condition becomes available, this will be added so that the advice remains up to date.

The targets given for each attribute do not represent thresholds to assess the significance of any given impact in Habitats Regulations Assessments. You will need to assess this on a case-by-case basis using the most current information available.

Some, but not all, of these attributes can also be used for regular monitoring of the actual condition of the designated features. The attributes selected for monitoring the features, and the standards used to assess their condition, are listed in separate monitoring documents, which will be available from Natural England.

These tables do not give advice about SSSI features or other legally protected species which may also be present within the European Site.

If you have any comments or queries about this Supplementary Advice document please contact your local Natural England adviser or email

HDIRConservationObjectivesNE@naturalengland.org.uk

About this site

European Site information

Name of European Site	Exmoor and Quantock Oakwoods Special Area of Conservation (SAC)
Location	Devon, Somerset
Site Map	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	1 April 2005
Qualifying features	See below
Designation Area	1894.05 ha
Designation Changes	None
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	West Exmoor Coast and Woods SSSI, Watersmeet SSSI, North Exmoor SSSI, Barle Valley SSSI, The Quantocks SSSI.
Relationship with other European or International Site designations	On Exmoor, the boundary of the SAC is contiguous with parts of the Exmoor Heaths SAC which can be seen here on the MAGIC website

Site background and geography

This site supports particularly large expanses of this habitat including some of the largest oak woods in southern England including Horner Wood and Watersmeet, which extend to nearly whole valley systems. The SAC has seven distinct blocks separated by semi-natural habitats or farmland and, in the case of the Quantocks, by the Taunton Vale. Most are located within Exmoor National Park, part of the Exmoor National Character Area ([NCA](#)). They include the Heddon Valley woods and Woody Bay in the far west of the National Park, the Watersmeet woodland complex above Lynton, Hawkcombe Woods and the extensive Horner Wood complex south of Porlock, and the Barle Valley woods below Withypool down to Dulverton. The Quantock outlier, within the Quantock Hills Area of Outstanding Natural Beauty, is represented by woodland extending up Holford and Hodder's Combes, together with Alfoxton and Shervage Woods.

The underlying Devonian sandstones and slates of the area underpin plateaux incised by fast flowing streams and rivers such as the Exe and Lyn, to form steep-sided valleys, 'combes'. They are rich in bryophytes, ferns and epiphytic lichens. The woodland is mainly ancient, semi-natural sessile oak woodland with rich lichen and bryophyte communities. The most widespread communities occurring are sessile oak - downy birch - *Dicranum majus* woodland on poorer, more lithomorphic soils on steeper slopes and sessile oak - downy birch - wood sorrel woodland on deeper soils developed on more moderate slopes towards the upper edge of the woods. Very small areas of deeper, wetter soils in the narrow floodplain may support richer stands of ash and alder. Large areas, especially on steep slopes, escaped Bronze Age clearances and later the replanting and coniferisation of the post 1600 modern era. In some places, there are long transitions to other semi-natural habitats, particularly heathland. Small areas of heaths, gorse and hawthorn scrub, acid grassland often with bracken, conifer or mixed woodland are included in the SAC. A small area at Woody Bay occurs on and above sea cliffs.

Much of the woodland will have been managed at some point in the last thousand years, but moving from a mainly pastoral landscape of medieval times into more intensive management within the last 200 years. Upland oak 'plantations' were common, woods that were clear-felled in the late 18th to early 19th century, and extensively planted up with oak for the purpose of producing oak coppice products (tan bark, charcoal and pit props). Many of these woods were coppiced on rotation, which resulted in a landscape covered in a patchwork of coppice coupes of different aged stands. As the coppicing industry declined in the 20th century, many of these coppice stools grew on to maturity. Today, many woodlands are characteristic of this sudden change in management, with a very even aged structure. Other areas represent remnants of the pastoral management and may be wood pasture in structure or open grown trees surrounded by younger stands. These areas have high ecological continuity and are critical to the survival of specialised lichens and other species.

The priority issue on the site is invasive species especially rhododendron and invasive knotweeds. Newer threats include *Montbretia Crocosmia crocosmifolia*, Himalayan balsam *Impatiens glandulifera* and fringe cups *Tellima grandiflora* which are becoming recognised as problems locally and more widely. The wider catchment may be a source of new infestations for the SAC and so needs to be considered. Secondly, parts of the woodland lack a well-developed and open structure due to limited understorey development and/or an over-dominant canopy (lack of light and younger age classes) and locally an excessive abundance of beech. This is particularly a problem for areas rich in lichens of international importance. Thirdly, adaptation to climate change will be necessary, including to pests and diseases. Ash dieback (*Chalara*) is present locally on Exmoor and on the Quantocks. Ash trees are particularly valuable lichen hosts at younger ages than other species such as oak. Oak woodland on slightly richer soils with areas of mature ash, particularly along river valleys or derived from wood pasture, support the most important lichen communities of international importance. Dieback threatens this interest in the medium to long term and the future potential of the wood if whole generations of younger trees are affected. Additionally, nitrogen deposition exceeds site relevant critical loads and it is uncertain whether this is a major problem. Currently a sensitive feature, the lichen assemblage, appears to be in favourable condition for this particular factor. Currently grazing levels in woodlands are at generally acceptable levels because this type of woodland benefits from light to moderate grazing levels, providing more open conditions for woodland birds, lichens and dead wood invertebrates). Locally, studies suggest deer have greater impact than agricultural stock. In places heavy deer browsing can have a significant impact, preventing natural regeneration.

About the qualifying features of the SAC

The following section gives you additional, site-specific information about this SAC's qualifying features. These are the natural habitats and/or species for which this SAC has been designated.

Qualifying habitats:

- **H91A0. Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles.**

This site supports large expanses of this habitat including some of the largest oakwoods in southern England including Horner Wood and Watersmeet, forming whole valley systems. They are rich in bryophytes, ferns and epiphytic lichens. The most widespread communities occurring are W17 sessile oak - downy birch - *Dicranum majus* woodland (Rodwell, 1991) on poorer, more lithomorphic soils on steeper slopes and W11 sessile oak - downy birch - wood sorrel woodland on deeper soils developed on more moderate slopes towards the upper edge of the woods. W16b *Quercus* ssp - *Betula* spp - *Deschampsia flexuosa* woodland (*Vaccinium myrtillus* - *Dryopteris dilatata* sub-community) also occurs, particularly to the east.

It tends to be less bryophyte-rich than some of the western oakwood types, reflecting the fact that the Quantocks is towards the eastern edge of the range for this type. There are also areas of W10 *Quercus robur* – *Rubus fruticosus* – *Pteridium aquilinum*. The woods generally have rich Atlantic bryophyte/fern communities (Ratcliffe 1968), including species that are scarce on Exmoor such as the liverwort *Bazzania trilobata*, hay-scented buckler-fern *Dryopteris aemula* and Tunbridge filmy-fern *Hymenophyllum tunbrigense*. The rocky ravine areas of Watersmeet and the Barle woods have the most well developed bryophytes. Lichens are especially important, especially epiphytes including on old trees, often associated with old pollards or open-grown maiden trees, since parts are former wood-pasture rather than the oak coppice that is more common with this type. The combination of high humidity, and air quality, an open canopy which allows good illumination of epiphytes and the presence of relatively mature ash and oak standards favours the development of very diverse communities. Parts of the Exmoor series of woods are of international importance, including the Horner complex and the Barle.

The two major lichen associations well represented here are the Lobarion and *Lecanactidetum premneae*. These are communities of ancient woodland and many species which are particularly indicative of a long continuity of woodland cover are present for example: *Nephroma laevigatum*, *Peltigera collina*, *P. horizontalis*, *Sticta limbata*, *S. sylvatica*, *Thelotrema lepadinum*, *Cresponea premnea*, *Biatorina atropurpurea* and all four species of *Lobaria* which are to be found in Britain. The Lobarion association is best represented here on larger trees in the combe bottom and on old pollards where conditions are moist and not too shaded. The *Lecanactidetum premneae* is to be found on drier well-lit parts of trees often on the higher parts of the slopes. The Quantock woodlands are less surveyed but are probably important on a national scale for a range of old woodland and parkland species, principally on oak but also holly and ash. The coastal woodland at Woody Bay represents a transition to, and example of, Vegetated sea cliffs of the Atlantic and Baltic coasts under the Habitats Directive. The more coastal woods such as Woody Bay and Watersmeet hold important populations of rare and endemic whitebeam *Sorbus* species.

- **H91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)**

This habitat comprises woods dominated by alder *Alnus glutinosa* and willow *Salix* spp. along many streams in narrow flood plains in a range of situations from islands in river channels to low-lying wetlands alongside the channels. The habitat typically occurs on moderately base-rich, eutrophic soils subject to periodic inundation. Many such woods are dynamic, being part of a successional series of habitats. Their structure and function are best maintained within a larger unit that includes the open communities, mainly fen and swamp, of earlier successional stages. The main NVC equivalent W7 *Alnus glutinosa* – *Fraxinus excelsior* – *Lysimachia nemorum* woodland. On the drier or more neutral margins of these areas other tree species, notably ash *Fraxinus excelsior* and elm *Ulmus* spp., may become abundant in the canopy.

Understorey species include Hazel *Corylus avellana*, Field Maple *Acer campestre* and Blackthorn *Prunus spinosa*. The ground flora is dominated in many of the drier areas by Dog's Mercury *Mercurialis perennis* or by Pendulous Sedge *Carex pendula* on wetter soils. Ramsons *Allium ursinum* is present on flushed slopes.

The main NVC equivalent is W8 *Fraxinus excelsior* *Acer campestre* *Mercurialis perennis* woodland. These have some affinities with the *Tilio-Acerion* Ravine woodland under the Habitats Directive. In other situations the alder woods occur as a stable component within transitions to surrounding dry-ground forest, sometimes including other Annex I woodland types. These transitions from wet to drier woodland and from open to more closed communities provide an important facet of ecological variation. The ground flora is correspondingly varied. Some stands are dominated by tall herbs and sedges, for example common nettle *Urtica dioica*, greater tussock-sedge *Carex paniculata*, and meadowsweet *Filipendula ulmaria*, while others have lower-growing communities with creeping buttercup *Ranunculus repens*, common marsh bedstraw *Galium palustre*, opposite-leaved golden-saxifrage *Chrysosplenium oppositifolium* and marsh-marigold *Caltha palustris*.

Qualifying Species:

- **S1308. Barbastelle *Barbastella barbastellus*;**

The barbastelle *Barbastella barbastellus* is a medium-sized species of bat by British standards, weighing between 6-13 grams. Its fur is almost black, usually with very pale or golden brown tips to the hairs giving it a frosted appearance. The under-fur is grey-brown, again often with pale tips to the hairs. The ears are black, short, broad and joined across the forehead and together with the rather squat face give this bat a very distinctive 'pug-like' appearance.

Barbastelle ecology is relatively poorly-known although more information has become available since this SAC was designated. It is a northern temperate species, occurring in upland sites in southern Europe. In the UK it is found in a variety of habitats where suitable roosting and foraging is found. The species forages in mixed habitats, including over water. Barbastelles appear to select cracks and crevices in wood for breeding, mostly in old or damaged trees, but cracks and crevices in the timbers of old buildings may also be used. Maternity colonies may move between suitable crevices within a small area, such as a piece of woodland or a complex of buildings. Caves and underground structures may be used for hibernation. The species is very sensitive to disturbance, together with the loss of roost-sites and food resources.

The barbastelle is one of the UK's rarest mammals. In recent years this species has been found to be more widespread across southern England and south Wales than previously recognised. The Exmoor and Quantock Oakwoods SAC is one of the few sites to be protected by SAC designation for barbastelle bats. A colony of barbastelle is associated with the cracks and crevices of trees within Horner Wood, the lower Barle Valley and the woods on the Quantocks including Alfoxton woods, Hodders Combe and Holford Combe. These trees are used as a summer maternity roost where the female bats gather to give birth and rear their young. Baby bats are usually born in July, sometimes even in early August; females usually produce a single baby, but occasionally twins. Juvenile bats can fly at about 3 weeks, and by 6 weeks can forage for themselves. Research indicates that juveniles follow the adults into their established foraging areas.

All species of bat present in the UK, including the barbastelle, are fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of the Conservation of Habitats and Species Regulations 2017, making it a 'European Protected Species'. A licence may therefore be required for any activities likely to harm or disturb individual bats.

- **S1323. Bechstein's bat *Myotis bechsteinii*;**

Bechstein's bat *Myotis bechsteinii* is a medium-sized species, with very long ears and a long, pointed, bare, pink face. It has shaggy light-to reddish-brown fur on its back and contrasting greyish white-tipped fur on its underside. The species is closely associated with mature deciduous woodland and appears to select old woodpecker holes or rot holes in trees for breeding. It also occurs in coniferous woodland in some areas. Maternity colonies may move between suitable crevices within a small area, such as a piece of woodland. It is believed to hibernate in hollow trees and sometimes in underground localities.

Bechstein's bat *Myotis bechsteinii* is one of the UK's rarest mammals, recorded from only a small number of sites in southern England and Wales. Recent surveys indicate hotspots in the distribution of breeding colonies in Dorset/Somerset, southwest Hampshire/IOW and Sussex. Bechstein's have been recorded on the Quantocks - two breeding females being captured in Holford Combe and Alfoxton Woods, and then traced back to roosts in Alfoxton Park (adjoining the SAC boundary). Very few maternity roosts are

currently known, but surveys of lactating females or females in breeding season are being found more regularly and in tree roosts. The great majority of other records come from caves or abandoned mines, which are important hibernation sites for a range of bat species.

All species of bat present in the UK, including the Barbastelle, are fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of the Conservation of Habitats and Species Regulations 2017, making it a 'European Protected Species'. A licence may therefore be required for any activities likely to harm or disturb individual bats.

- **S1355. Otter *Lutra lutra*;**

Otters are semi aquatic, living mainly along rivers. They mainly eat fish, though crustaceans, frogs, voles and aquatic birds may also be taken. Being at the top of the food chain, an otter needs to eat up to 15% of its body weight in fish daily.

Otters are solitary shy animals, usually active at dusk and during the night. Otters can travel widely over large areas. Some are known to use 20 km or more of river habitat. Otters tend to live alone as they are very territorial. Otters deposit faeces in prominent places along a watercourse (known as spraints) which have a characteristic sweet musky odour. These mark their range which may help neighbouring animals keep in social contact with one another. Otters are found on most Exmoor and other rivers in Somerset and records show use of all the rivers within the SAC.

The otter is also a 'European Protected Species' in the UK, and it is an offence to disturb, capture, injure or kill an otter (either on purpose or by not taking enough care), or to damage, destroy or obstruct access to its breeding or resting places, without first getting a licence.

General References

Ratcliffe, D. A. 1968. An ecological account of the Atlantic bryophytes of the British Isles. New Phytologist, 67, 365-439.

Rodwell, J.S. (ed.) 1991. British Plant Communities. Volume 1 - Woodlands and scrub. Cambridge University Press

Site-specific seasonality of SAC features

The table below highlights in grey those months in which significant numbers of each qualifying feature are most likely to be present at the SAC during a typical calendar year. This table is provided as a general guide only. The presence of the features may vary depending on weather conditions.

Unless otherwise indicated, the months shown below are primarily based on information relating to the general months of occurrence of the feature in the UK. Where site-based evidence is available and has been used to indicate below that significant numbers of the feature are typically present at this SAC outside of the general period, the site-specific references have been added to indicate this.

Applicants considering projects and plans scheduled in the periods highlighted in grey would benefit from early consultation with Natural England given the greater scope for there to be likely significant effects that require consideration of mitigation to minimise impacts to qualifying features during the principal periods of site usage by those features. The months which are *not* highlighted in grey are not ones in which the features are necessarily absent, rather that features may be present in less significant numbers in typical years. Furthermore, in any given year, features may occur in significant numbers in months in which typically they do not. Thus, applicants should not conclude that projects or plans scheduled in months not highlighted in grey cannot have a significant effect on the features. There may be a lower likelihood of significant effects in those months which nonetheless will also require prior consideration.

Any assessment of potential impacts on the features must be based on up-to-date count data and take account of population trends evident from these data and any other available information. Additional site-based surveys may be required.

Feature	Season	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Site-specific references where available
Barbastelle and Bechstein's bats	Breeding													

Table 1: Supplementary Advice for Qualifying Features: H91AO. Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles and H91EO. Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-padion*, *Alnion incanai*, *Salicion albae*)

Attributes		Targets		Supporting and Explanatory Notes	Sources of site-based evidence (where available)	
Extent and distribution of the feature	Extent of the feature within the site	Maintain the total extent of the feature to not less than 1545 ha as measured for each individual SSSI a follows:		There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored.	Boyce, 2009.	
		SSSI	Oak-woods	Alluvial forest	The baseline-value of extent given has been generated using data gathered from the listed site-based surveys. Area measurements given may be approximate depending on the methods, age and accuracy of data collection, and as a result this value may be updated in future to reflect more accurate information.	Boyce, 2012.
		The Quantocks	307 ha	1 ha	The extent of an Annex I habitat feature covers the sum extent of all of the component vegetation communities present and may include transitions and mosaics with other closely-associated habitat features. Where a feature is susceptible to natural dynamic processes, there may be acceptable variations in its extent through natural fluctuations. Where a reduction in the extent of a feature is considered necessary to meet the Conservation Objective for another Annex I feature, Natural England will advise on this on a case-by-case basis.	English Nature, 2000.
		North Exmoor	386 ha	26 ha		Goldberg and Kirby, 2013.
		Barle Valley	357 ha	7 ha		National Trust, 1990.
		Watersmeet	250 ha	1 ha		National Trust, 2007.
		West Exmoor Coast & Woods	210 ha	0 ha		National Trust, 2011.
						National Trust, 2015.
			For this feature tree roots (particularly of veteran trees) can extend a considerable distance beyond the boundary of the site - they can be impacted by soil compaction (such as caused by vehicles or construction works); agricultural operations or other soil disturbance (like trenches); and agro chemicals or other chemicals which get into the soil.	Teverson, 1995.		
			Any loss of woodland area - whether at the edge or in the middle of a site will reduce the core woodland area where woodland conditions are found - these support significant assemblages of species dependent on woodland conditions (e.g. lichens and bryophytes - being one example). Loss of any woodland area which fragments a site into different parts will clearly disturb the movement of species between the remaining parts of the woodland.	This attribute will be periodically monitored as part of Natural England's SSSI condition assessments		

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>The area of Old sessile oakwoods includes mainly W11 and W17 woodland, plus W16 to the drier east, but with transitions to W8, W9 & W10 stands within the natural variation in communities within western oakwood type.</p> <p>The area of Alluvial forests on richer soils is mainly W7, with some W8 stands as transitional to drier ground. In some places W9 occurs, as well as closer to the coast above sea cliffs.</p>	
Extent and distribution of the feature	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	<p>A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species, plus transitional communities) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes.</p> <p>This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat. Smaller fragments of habitat can typically support smaller and more isolated populations which are more vulnerable to extinction.</p> <p>These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature.</p>	<p>Boyce, 2009.</p> <p>Boyce, 2012.</p> <p>English Nature, 2000.</p> <p>Goldberg and Kirby, 2013.</p> <p>National Trust, 1990.</p> <p>National Trust, 2007.</p> <p>National Trust, 2011.</p> <p>National Trust, 2015.</p> <p>Teverson, 1995.</p> <p>This attribute will be periodically monitored as part of Natural England's SSSI condition assessments</p>
Structure and function (including its typical species)	Vegetation community composition	Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification type(s): W11, W16, W17 forming a mosaic, together with W8, W9 and W10, and to W7 on wetter ground.	<p>This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC).</p> <p>Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be</p>	<p>Boyce, 2009.</p> <p>Boyce, 2012.</p> <p>English Nature, 2000.</p> <p>Goldberg and Kirby, 2013.</p> <p>National Trust, 1990.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			important to sustaining the overall habitat feature. This will also help to conserve their typical plant species (i.e. the constant and preferential species of a community), and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations).	National Trust, 2007. National Trust, 2011. National Trust, 2015. Teverson, 1995. This attribute will be periodically monitored as part of Natural England's SSSI condition assessments
Structure and function (including its typical species)	Vegetation structure - canopy cover	Maintain an appropriate tree canopy cover across the feature, which will typically be between 30-90% except in wood pasture stands or in lichen rich stands where the minimum cover is 20%.	Canopy cover is the overall proportion of vegetative cover consisting of any woody layer ranging from established regeneration to mature and veteran stages. Woodland canopy density and structure is important because it affects ecosystem function and in particular microclimate, litter fall, soil moisture, nutrient turnover and shading; this in turn influences the composition of plants and animals in lower vegetation layers and soil. Open canopies with just scattered trees will have less of a woodland character and reduced diversity of woodland-dependent species (although they may be still be important as a form of woodland-pasture). Completely closed canopies across the whole woodland are not ideal either however, as they cast heavier shade and support fewer species associated with edges, glades and open grown trees, and have little space where tree regeneration could occur. In general, the woodland canopy of this feature should provide a core of woodland interior conditions with some open and edge habitat as well.	Boyce, 2009. Boyce, 2012. This attribute will be periodically monitored as part of Natural England's SSSI condition assessments
Structure and function (including its typical species)	Vegetation structure - open space	Maintain areas of permanent/temporary open space within the woodland feature, typically to cover approximately 10% of area.	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a	Boyce, 2009. Boyce, 2012. This attribute will be periodically monitored as part of Natural

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>particular site, taking account of its known interest, history, past management and the landscape context.</p> <p>Having some open, sunlit and largely tree-less areas as part of the woodland community is often important to facilitate natural tree and shrub regeneration and also to provide supporting habitat for specialist woodland invertebrates, birds, vascular and lower plants. Such open space can be permanent or temporary and may consist of managed grazed areas, linear rides and glades, or naturally-produced gaps caused by disturbance events such as windthrow/fire/tree falling over/snow damage.</p>	England's SSSI condition assessments
Structure and function (including its typical species)	Vegetation structure - old growth	Maintain the extent and continuity of undisturbed, mature/old growth stands (typically at least 10% of the feature at any one time) or the assemblages of veteran and ancient trees at 5-10 trees per hectare.	Good woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. . For this habitat type, old or over-mature elements of the woodland are particularly characteristic and important features, and their continuity should be a priority.	<p>Boyce, 2009.</p> <p>Boyce, 2012.</p> <p>Mosaic Mapping, 2010.</p> <p>Mosaic Mapping, 2011.</p>
Structure and function (including its typical species)	Vegetation structure - dead wood	Maintain the continuity and abundance of standing or fallen dead and decaying wood, typically between 30 - 50 m3 per hectare of standing or fallen timber or 3-5 fallen trees >20cm diameter per hectare, and minimum 4-10 standing dead trees per hectare	<p>Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning.</p> <p>Dead and actively decaying wood, either as part of a standing tree or as a fallen tree on the woodland floor, is an important component of woodland ecosystems, and supports a range of specialist invertebrates, fungi, lichens and bryophytes, and associated hole-nesting birds and roosting bats, all of which may be very typical of the feature.</p>	This attribute will be periodically monitored as part of Natural England's SSSI condition assessments
Structure and function (including its typical species)	Vegetation structure - age class distribution	Maintain at least 3 age classes (pole stage/ medium/ mature) spread across the average life expectancy of the commonest trees.	A distribution of size and age classes of the major site-native tree and shrub species that indicate the woodland will continue in perpetuity, and will provide a variety of the woodland habitats and niches expected for this type of woodland at the site in question.	<p>Boyce, 2009.</p> <p>Boyce, 2012.</p> <p>This attribute will be periodically monitored as part of Natural England's SSSI condition assessments</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	Vegetation structure - shrub layer	Maintain an understorey covering at least 1-30% of total stand area, except (a) in wood pasture stands where there is no effective minimum and (b) in lichen-rich areas where dense shrub or climber growth particularly of evergreens e.g. rhododendron, ivy and holly around tree trunks no more than 10% and (c) on Exmoor where typically 10% is more appropriate.	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context. A higher target for W7 and W8 may be appropriate.	Boyce, 2009. Boyce, 2012. Sanderson, 2009. Sanderson, 2011. This attribute will be periodically monitored as part of Natural England's SSSI condition assessments
Structure and function (including its typical species)	Vegetation structure - woodland edge	Maintain a graduated woodland edge into adjacent semi-natural open habitats, other woodland/ wood-pasture types or scrub.	Woodland edge is defined as being the transitional zone between the forest feature and adjacent but different habitat types - the best woodland edges will have a varied structure in terms of height and cover. Many typical forest species make regular use of the edge habitats for feeding due to higher herb layer productivity and larger invertebrate populations. Grasslands / arable fields managed with high doses of agro-chemicals could potentially not allow this gradation of woodland edge and could have other impacts on the integrity of the site (pollution/ nutrient enrichment etc.).	
Structure and function (including its typical species)	Adaptation and resilience	Maintain the resilience of the feature by ensuring a diversity (at least 3 species) of site-native trees (e.g. sessile oak, birch, holly, rowan, willow) across the site.	The overall vulnerability of this SAC to climate change has been assessed by Natural England (2015) as being low, taking into account the sensitivity, fragmentation, topography and management of its habitats. This means that this site is considered to be vulnerable overall but are a lower priority for further assessment and action. Individual species may be more or less vulnerable than their supporting habitat itself. In many cases, change will be inevitable so appropriate monitoring would be advisable. This recognises the increasing likelihood of natural habitat features needing to absorb or adapt to wider environmental changes. Resilience may be described as the ability of an	Natural England, 2015.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>ecological system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning.</p> <p>Such environmental changes may include changes in sea levels, precipitation and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site. The vulnerability and response of features to such changes will vary. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability.</p>	
Structure and function (including its typical species)	Browsing and grazing by herbivores	Maintain browsing at a low to moderate level that allows a well-developed understorey with no obvious browse line, & lush ground vegetation with some grazing sensitive species evident (bramble, ivy etc.), and tree seedlings and sapling common in larger gaps.	<p>Herbivores, especially deer, are an integral part of woodland ecosystems. They are important in influencing woodland regeneration, composition and structure and therefore in shaping woodland wildlife communities. In general, both light grazing and browsing is desirable to promote both a diverse woodland structure and continuous seedling establishment. Short periods with no grazing at all can allow fresh natural regeneration of trees, but a long-term absence of herbivores can result in excessively dense thickets of young trees which shade out ground flora and lower plant species. However, heavy grazing by deer or sheep prevents woodland regeneration, and can cause excessive trampling and/or poaching damage, canopy fragmentation, heavy browsing, bark stripping and a heavily grazed sward.</p> <p>Higher levels of browsing are tolerated on this site as wood pasture origin and structure are present in many areas, large woodland blocks are grazed by red deer and grazing is critical for the maintenance of the oak woodland lichen interest feature. Without grazing the lower plants would be shaded out by growth of ground flora, undergrowth shading trunks and epiphytes such as ivy.</p>	<p>Boyce, 2009.</p> <p>Boyce, 2012.</p>
Structure and function (including its	Regeneration potential	Maintain and restore the potential for sufficient natural regeneration of desirable trees and shrubs; typically tree seedlings of	The regeneration potential of the woodland feature must be maintained if the wood is to be sustained and survive, both in terms of quantity of regeneration and in terms of appropriate species. This will include regeneration of the trees and shrubs	<p>Boyce, 2009.</p> <p>Boyce, 2012.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
typical species)		desirable species (measured by seedlings and <1.3m saplings - above grazing and browsing height) should be visible in sufficient numbers in large (> 1ha) canopy gaps, at the wood edge and/or as regrowth as appropriate to maintain canopy density over a 10 year (Quantocks) or 50 year (Exmoor) period	<p>from saplings or suckers, regrowth from coppice stools or pollards, and where appropriate planting. Browsing and grazing levels must permit regeneration at least in intervals of 5 years every 20. The density of regeneration considered sufficient is less in parkland sites than in high forest. Regeneration from pollarding of veteran trees should be included where this is happening.</p> <p>Less regeneration (50 year period) is accepted on this site as wood pasture origins are present in many areas, large woodland blocks are grazed by red deer and grazing is critical for the maintenance of the oak woodland lichen interest feature. Without grazing the lower plants would be shaded out by growth of ground flora, undergrowth shading trunks and epiphytes such as ivy.</p>	This attribute will be periodically monitored as part of Natural England's SSSI condition assessments
Structure and function (including its typical species)	Tree and shrub species composition	<p>Maintain or restore a canopy and under-storey of which 95% is composed of site native acceptable naturalised species trees and shrubs: sessile oak <i>Quercus petraea</i> and pedunculate oak <i>Q. robur</i>, ash <i>Fraxinus excelsior</i>, birch <i>Betula</i> spp., holly <i>Ilex aquifolium</i>, alder <i>Alnus glutinosa</i>, hazel <i>Corylus avellana</i>, rowan <i>Sorbus aucuparia</i> and native whitebeams <i>Sorbus</i> spp. willows <i>Salix</i> spp., hawthorn <i>Crataegus monogyna</i>, field maple <i>Acer campestre</i> and yew <i>Taxus baccata</i>.</p> <p>On the Quantocks holly >10% cover is not acceptable</p> <p>Sessile oak to be present in areas away from W7 areas and providing at least 30% cover in</p>	<p>Native trees and shrubs in general support a greater diversity of associated species than non-native species, especially amongst groups of invertebrates which depend directly on trees for food and shelter. There are many plants and animals which use or co-exist with non-native trees, but many rare and threatened woodland species are specialists adapted to one or a few native trees or shrub species (birches, willows and oaks, are examples of trees that host many specialist insect species).</p> <p>Beech, sweet chestnut and sycamore are not site native but can be important in some areas. Sycamore can be important for lichens - along river valleys tolerate up to 10-20% in larger age categories. Beech or sweet chestnut is acceptable as mature/veterans or locally where mapped as dominant stands with little prospects of restoration to Annex I habitat type.</p> <p>Recent guidance (Natural England, 2009) on dealing with the changing distribution of tree species suggests decisions should be taken at a site level with reasons for either (a) a presumption towards acceptance of a species in a particular site or (b) towards management of a species in a particular site.</p> <p>The oak woodland (in the widest sense with sessile oak, ash, field maple, holly, alder, hazel, birch, hawthorn and willow all</p>	<p>Boyce, 2009.</p> <p>Boyce, 2012.</p> <p>Natural England, 2009.</p> <p>This attribute will be periodically monitored as part of Natural England's SSSI condition assessments</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		the canopy of mature stands over feature as a whole.	significant) and its exceptional lichen interest here is considered sufficiently important to generally aim to maintain the past native tree and shrub composition as closely as possible, whilst accepting change is inevitable (cf Chalara). In some areas where composition is more mixed up to 20% Beech, sycamore and other naturalised species (except rhododendron) should be accepted.	
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	<p>Maintain or restore the abundance of the species listed below to enable each of them to be a viable component of the Annex 1 habitat:</p> <p>Epiphytic lichen assemblage</p> <p>Rich Atlantic bryophyte communities including oceanic species such as <i>Hyocomium armoricum</i>, <i>Plagiochila spinulosa</i>, <i>Scapania gracilis</i>, <i>Saccogyna viticulosa</i>, the rare fern <i>Hymenophyllum wilsonii</i>, and gametophyte of Schedule 8 plant <i>Trichomanes speciosum</i>.</p> <p>Endemic and rare <i>Sorbus</i> species including: Slender whitebeam <i>Sorbus subcuneata</i>, Bloody whitebeam <i>S. vexans</i>, Margaret's whitebeam <i>S. margaretae</i> and No Parking whitebeam <i>S. admonitor</i>.</p> <p>Breeding woodland birds including particularly strong populations of pied flycatcher <i>Ficedula hypoleuca</i>, wood warbler <i>Phylloscopus sibilatrix</i> and redstart <i>Phoenicurus</i></p>	<p>Some plant or animal species (or related groups of such species) make a particularly important contribution to the necessary structure, function and/or quality of an Annex I habitat feature at a particular site. These species will include;</p> <ul style="list-style-type: none"> • Structural species which form a key part of the Annex I habitat's structure or help to define that habitat on a particular SAC (see also the attribute for 'vegetation community composition'). • Influential species which are likely to have a key role affecting the structure and function of the habitat (such as bioturbators (mixers of soil/sediment), grazers, surface borers, predators or other species with a significant functional role linked to the habitat) • Site-distinctive species which are considered to be a particularly special and distinguishing component of an Annex I habitat on a particular SAC. <p>There may be natural fluctuations in the frequency and cover of each of these species. The relative contribution made by them to the overall ecological integrity of a site may vary, and Natural England will provide bespoke advice on this as necessary. The list of species given here for this Annex I habitat feature at this SAC is not necessarily exhaustive. The list may evolve, and species may be added or deleted, as new information about this site becomes available.</p>	<p>For bryophytes: Holyoak, 2007. Callaghan, 2010.</p> <p>For fungi, including lichens: Green, 1993.</p> <p>National Trust, 2015.</p> <p>Sanderson, NA, 2009.</p> <p>Sanderson, NA, 2009.</p> <p>Sanderson, NA, 2009.</p> <p>Sanderson, NA, 2009.</p> <p>Sanderson, 2009.</p> <p>Sanderson, NA, 2011.</p> <p>British Lichen Society, 2013.</p> <p>For Sorbus: Rich, <i>et al.</i> 2010.</p> <p>For birds: Boyce, and Freshney, 2014.</p> <p>National Trust, 2015.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<p><i>phoenicurus</i> together with the rarer Lesser Spotted woodpecker <i>Dryobates minor</i></p> <p>Red wood ant <i>Formica rufa</i></p> <p>Wood-decay invertebrate fauna (saproxylics)</p> <p>Deadwood fungi</p>		<p>For invertebrates:</p> <p>National Trust, 2015.</p> <p>National Trust, 2017</p> <p>Boyce, 2002.</p> <p>Alexander, 1996.</p> <p>Duff, A, 1994.</p> <p>Hodge, 1994.</p>
Structure and function (including its typical species)	Invasive, non-native and/or introduced species	<p>Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the feature</p> <p>Maximum acceptable cover of rhododendron or Himalayan/ Japanese knotweed = 0%</p>	<p>Invasive or introduced non-native species are a serious potential threat to the biodiversity of native and ancient woods, because they are able to exclude, damage or suppress the growth of native tree, shrub and ground species (and their associated typical species), reduce structural diversity and prevent the natural regeneration of characteristic site-native species.</p> <p>Once established, the measures to control such species may also impact negatively on the features of interest (e.g. use of broad spectrum pesticides). Such species can include Rhododendrons, Montbretia, snowberry, Japanese knotweed, giant hogweed and Himalayan balsam, for example. Similarly, this would include pheasants, rabbits and non-native invertebrate 'pest' species.</p>	<p>Boyce, 2009.</p> <p>Information on the distribution of knotweed is available from the Exmoor Knotweed Control Project</p>
Structure and function (including its typical species)	Soils, substrate and nutrient cycling	<p>Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the habitat.</p>	<p>Soil is the foundation of basic ecosystem function and a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms.</p> <p>Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			ecological structure, function and processes associated with this Annex I feature.	
Structure and function (including its typical species)	Root zones of ancient trees	Maintain the soil structure within and around the root zones of the mature and ancient tree cohort in an un-compacted condition	<p>The management of land within and around forest habitats which are characterised by ancient trees can be crucial to their individual welfare and long-term continuity, and the landscape they are part of can be just as or even more important. The condition of the soil surrounding such trees will affect their roots, associated mycorrhizal fungi and growth. Plants have difficulty in compacted soil because the mineral grains are pressed together, leaving little space for air and water which are essential for root growth.</p> <p>Unless carefully managed, activities such as construction, forestry management and trampling by grazing livestock and human feet during recreational activity may all contribute to excessive soil compaction around ancient trees.</p>	
Supporting processes (on which the feature relies)	Air quality	Restore the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	<p>This habitat type is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it.</p> <p>Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH₃), oxides of nitrogen (NO_x) and sulphur dioxide (SO₂), and critical loads for nutrient nitrogen deposition and acid deposition.</p> <p>There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis. Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and</p>	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>measures to tackle diffuse air pollution, within realistic timescales.</p> <p>A 'restore' target has been included here as the maximum Critical Loads and Levels are being exceeded and present a risk to this vegetation.</p>	
Supporting processes (on which the feature relies)	Hydrology	At a site, unit and catchment level, maintain natural hydrological processes to provide the conditions necessary to sustain the feature within the site	<p>Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present.</p> <p>This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts. This is included as disruption/damage to hydrological processes could be caused by activities at some distance from the site boundary, e.g. through extraction of ground or surface waters; diverting or damming river channels; pollution of water source; channel alignment that disrupts natural geomorphological processes; tunnelling etc.</p>	<p>Environment Agency SW Region. 2005.</p> <p>See River Basin Management Plans at https://www.gov.uk/government/collections/river-basin-management-plans-2015 and Catchment Flood Management Plans for North Devon or West Somerset at https://www.gov.uk/government/collections/catchment-flood-management-plans#south-west-river-basin-district</p>
Supporting processes (on which the feature relies)	Illumination	Ensure artificial light is maintained below a level which is unlikely to affect natural phenological cycles and processes to the detriment of the feature and its typical species at this site.	<p>Woodland biodiversity has naturally evolved with natural patterns of light and darkness, so disturbance or modification of those patterns can influence numerous aspects of plant and animal behaviour.</p> <p>For example, light pollution (from direct glare, chronically increased illumination and/or temporary, unexpected fluctuations in lighting) can affect animal navigation, competitive interactions, predator-prey relations, and animal physiology. Flowering and development of trees and plants can also be modified by un-natural illumination which can disrupt natural seasonal responses.</p>	See for example Sky Quality data in the Exmoor National Park IDSA Dark Sky Places Annual Report October 2014 -2015
Version Control Advice last updated: 13 March 2019: Added additional survey information in Extent of feature within site attribute. Variations from national feature-framework of integrity-guidance:				

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<p>The targets for some attributes listed above include both 'maintain' or 'restore' objectives. This is because this SAC is an extensive complex of geographically-separate component sites which are currently in different states of condition. Overall, both objectives will be applicable to the SAC but these will differ between each component site depending on its particular circumstances. Natural England will be able to provide further specific advice on request.</p> <p>Browsing and grazing by herbivores and Regeneration potential have adapted to follow the relevant component SSSI Favourable Condition Tables where browsing is acceptable at slightly higher levels and regeneration at lower levels to reflect wood pasture conditions or the importance of epiphytic lichens.</p> <p>Vegetation structure - canopy cover and Vegetation structure - shrub layer adapted to follow the relevant component SSSI Favourable Condition Tables where tree canopy cover is acceptable at slightly lower levels to reflect wood pasture conditions or the importance of epiphytic lichens.</p> <p>Vegetation structure - old growth and Vegetation structure - deadwood adapted to follow Common Standards Monitoring guidance which is less demanding at minimum 10% (cf. 20%) over-maturity, 5-10 trees/ha (cf. 10 trees/ha) or 3 fallen lying trees >20cm (3-5 trees >30cm).</p>	

Table 2: Supplementary Advice for Qualifying Features: S1323. Bechstein's bat *Myotis Bechsteinii* and S1308. Barbastelle bat *Barbastella barbastellus*

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Population (of the feature)	Population abundance - maternity colony	<p>Maintain the abundance of the breeding population at a level which is above the baseline at or soon after the time of SAC designation, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.</p> <p>Bechstein's baseline</p> <p>This baseline was the presence of a maternity colony but no estimate of abundance was known.</p> <p>Barbastelle baseline</p> <p>Population above 51-100 bats</p>	<p>This will ensure there is a viable population of the feature which is being maintained at or increased to a level that contributes as appropriate to its Favourable Conservation Status across its natural range in the UK. Due to the dynamic nature of population change, the target-value given for the population size or presence of this feature is considered to be the minimum standard for conservation/restoration measures to achieve. This minimum-value may be revised where there is evidence to show that a population's size or presence has significantly changed as a result of natural factors or management measures and has been stable at or above a new level over a considerable period (generally at least 10 years). The values given here may also be updated in future to reflect any strategic objectives which may be set at a national level for this feature.</p> <p>Given the likely fluctuations in numbers over time, any impact-assessments should focus on the current size of the site's population, as derived from the latest known or estimated level established using the best available data. This advice accords with the obligation to avoid deterioration of the site or significant disturbance of the species for which the site is designated, and seeks to avoid plans or projects that may affect the site giving rise to the risk of deterioration. Similarly, where there is evidence to show that a feature has historically been more abundant than the stated minimum target and its current level, the ongoing capacity of the site to accommodate the feature at such higher levels in future should also be taken into account in any assessment.</p> <p>Unless otherwise stated, the population size or presence will be that measured using standard methods, such as peak mean counts or breeding surveys. This value is also provided recognising there will be inherent variability as a result of natural fluctuations and margins of error during data collection. Whilst we will endeavour to keep these values as up to date as</p>	<p>Greena Ecological Consultancy, 2000.</p> <p>Bat Conservation Trust. 2011.</p> <p>Amec, 2012.</p> <p>Billington, 2000.</p> <p>Kazcanow, 2000.</p> <p>Bat Conservation Trust, 2016 & 2017.</p> <p>Scott & Altringham, 2014.</p>

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<p>possible, local Natural England staff can advise that the figures stated are the best available.</p> <p>Bechstein's Bat: At Horner Wood, a male Bechstein's was discovered in 1999 c. 300m+ outside the SSSI/SAC but no records of females have since been found. Lures were deployed by G. Billington subsequently but with no positive results. Further survey in 2007-2011 also found no Bechstein's.</p> <p>Despite the 2007-2011 surveys, two nursery tree roosts were found near Holford in the Quantocks by G. Billington in 2012. H. Andrews also recorded Bechstein's droppings, confirmed by DNA, in a tree roost in 2012-13 in Holford Combe.</p> <p>Barbastelle: The data available on the size of the breeding population is imprecise because it is very difficult to count Barbastelle bats. At this site (as most others in Britain) they roost in trees, which means that they are more difficult to discover than bats roosting in buildings.</p> <p>Scott and Altringham (2014) comment on this topic: Barbastelles are particularly difficult to count out of their roosts, because within the favoured zone of woodland, different trees will be used as roosts on different nights depending on the atmospheric conditions and roosting positions under loose bark cannot be sighted from the ground. Billington (2012) concluded that there was a maternity roost in Alfoxton Park adjoining the SAC in the Quantocks, and in addition it is known that there is at least one maternity roost east of the Quantock maternity roosts again outside the SAC to the east of Kilve.</p> <p>The Bat Conservation Trust carries out annual monitoring of the SAC through the National Bat Monitoring Programme using bat detectors from late July to early September. Three transects are done on the Quantocks at Hodder's Combe & Somerton Combe, Holford Combe and Alfoxton; two on Exmoor at Horner woods, one in Stoke Woods and one at Eastwater. The main purpose of this monitoring is to confirm presence or absence of barbastelles and no attempt is made to estimate the size of the population. The presence of barbastelles was recorded from 2009 in all years to date in</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>Quantock transects and from 2011 (but none in 2012) to date in Horner Wood transects. Reports are produced annually, but each includes a summary of the results from previous years. The most recent report held locally is for 2016. In 2017 Barbastelle were found in all Quantocks transects, and in both Horner Wood transects.</p> <p>The population count used as the baseline at the time of SAC designation was based on best estimation from the radio tracking studies from one general bat survey and two Barbastelle targeted surveys over 3 years at Horner Woods. Subsequently the species has been found in the two other independent colonies: in the southern Barle Valley and in the Quantock woods. These were no doubt present before being discovered. The effective baseline must therefore be higher than the current one, perhaps at least double the numbers, but without further survey or specialist involvement, it is currently impossible to estimate.</p>	
Supporting habitat: structure /function	Supporting off-site habitat (flight-lines)	<p>Maintain the presence, structure and quality of any linear landscape features which function as flightlines between the SAC and surrounding foraging areas used by barbastelle and Bechstein's bats.</p> <p>Flightlines should remain unlit, functioning as dark corridors.</p>	<p>Bechstein's bats don't tend to range far from their roosts, generally up to a maximum distance of 1-2.5km, usually closer to 1km (Dietz <i>et al</i> 2010). Though, a few breeding females may choose to roost in hedgerow trees, which have connections to the main woodland habitat. Generally forages within deciduous woodland which contain water bodies, occasionally feeding along woodland edge, treelines and hedgerows.</p> <p>Bechstein's bat generally commutes along linear landscape features such as woodland edge, hedgerows, however, they will cross open fields to reach roost sites and foraging areas. Flightlines will extend beyond the designated site boundary into the wider local landscape</p> <p>Barbastelle bats may forage up to 5km from their maternity roosts, though some individuals in less favourable habitat may forage further to reach suitable feeding grounds (Greenaway, 2001). Generally forages within woodland canopy and margins, though will feed in more open areas i.e. orchards, suburban parks. Commutes along linear landscape features such as woodland edge, hedgerows etc., though will cross extensive open areas (i.e. arable fields) to reach foraging grounds and may feed to a certain extent within these more open areas.</p>	<p>Dietz, <i>et al.</i> 2009</p> <p>Burrows, 2018</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>Typical flightlines used by these species include linear hedgerows, waterways, blocks of scrub, wooded rides and tracks. Flightlines will extend beyond the designated site boundary into the wider local landscape.</p> <p>Two local councils (West Somerset and Sedgmoor) and Exmoor National Park published a guidance document prepared by Somerset County Council (Burrows 2018) for developers who are planning to build near to the SAC. This identifies zones around the SAC and bands within the zone reflect the likely importance of the habitat for bats and proximity to the maternity and other roost sites. Any development activity taking place within these zones has the potential to impact on the SAC.</p>	
Supporting habitat: structure/function	Supporting off-site habitat (foraging areas)	Maintain any core areas of feeding habitat outside of the SAC boundary that are critical to Barbastelles and Bechstein's Bat during their breeding period	<p>Roost choice, and the presence of bats within the SAC, is likely to be influenced by the site's ability to provide bats with food and shelter. Key feeding areas around a roost, and the commuting routes (or flight-lines) between them, will be an important element of sustaining the SAC population.</p> <p>The current understanding of key roosts and supporting habitat associated with the SAC have also been used to identify a 15.5 km sustenance zone where Barbastelle bats are likely to be present centred around the maternity roosts. Bands within the zone reflect the likely importance of the habitat for bats and proximity to the maternity and other roost sites. Any development activity taking place within this Zone has the potential to impact on the SAC. A guidance document for developers who are planning to build near to the bat SAC has been produced (Burrows, 2018) which reviews current information and identifies these zones around the SAC.</p> <p>Special consideration is also to be given to habitat within 1 km of roost sites, within Juvenile Sustenance Zones (Burrows 2018). Most barbastelle colonies seem to have one large productive foraging zone very close to the roost woodlands to fulfil the juvenile requirement. Although patches closest to the roost area are usually shared by the colony members these may seasonally be left clear by adults as exclusive juvenile foraging zones.</p>	Burrows, 2018

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat: structure/function	Woodland site - maternity colony	Maintain the extent and structural diversity of supporting woodland habitat suitable for roosting, feeding and foraging by Barbastelles and Bechstein's bats	<p>The structural diversity of supporting habitat will be important to provide roosting spaces and maintain optimal feeding and foraging conditions in close proximity to maternity roosts; key aspects of woodland structure will include good canopy cover (typically 50-90%), an abundance of standing and fallen dead wood, areas of permanent and open space and the retention of open water and/or wetland features.</p> <p>Barbastelle: In woodland they forage in the most open places such as Horner Side and along rides or track routes, these can include conifer plantations. Despite barbastelle bats using open habitats within the woodland and hedgerows in the fields, they rarely forage along the outer woodland edges, which can often be the favoured feeding places of several other bat species, which was found in the Horner Woods Bat Survey (Billington 2000)</p> <p>The wood pasture/high forest of Ten Acre Cleave/Eastwater and Horner Wood has a good canopy cover from 75-85% with an abundance of standing and fallen dead wood (Boyce, 2009) and also open water for at least some of the year. BurrIDGE wood near Dulverton has less old trees and standing dead wood but similar canopy.</p> <p>The Quantock woodland areas represent some more mature stands of standard oak (sometimes with some beech and sycamore), amongst a wider matrix of neglected coppice, both with a generally closed canopy.</p>	<p>Boyce, 2009.</p> <p>Boyce, 2012.</p>
Supporting processes (on which the feature and/or its supporting habitat relies)	Disturbance from human activity	Control and minimise human access to roost sites	<p>Currently no buildings are known to be used. Any use of buildings should trigger securing these against unauthorised access, which can result in disturbance to bats at critical times of year and which can affect their population viability and use of the site. Grilles on site access points should be maintained where present.</p> <p>There is no evidence that daytime public access to woodland used by barbastelles for summer or winter roosts causes disturbance to these bats. It seems very likely that light pollution during hours of darkness would be disturbing. Tree management that damages actual or potential roosts, carried out for H&S reasons in areas used by the public, or indeed any</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			other reason, would certainly cause serious disturbance to the bats.	
Supporting processes (on which the feature and/or its supporting habitat relies)	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature and/or its supporting habitats.	<p>Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England.</p> <p>This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, site management strategies or plans, the Views about Management Statement for the underpinning SSSI and/or management agreements.</p> <p>Barbastelle: The survey work carried out by Billington at Horner Wood showed a concentration of activity of barbastelles, suggesting that the woodland in the Eastwater valley of Horner and below Cloutsham Ball is where most roosts within the SAC were situated. The canopy here has many standard oaks and also ash common. In the Barle Valley records are centred on Burr ridge Wood (SSSI unit 2) where breeding is suspected (reasonable numbers and typical nursery roost types -catastrophic fractures - found) but foraging in the other woods above Tarr steps (SSSI unit 35). On the Quantocks roosts within the SAC are in Alfoxton Wood (Unit 38) and Alfoxton Park (outside SAC in Unit 37) and in Hodder's Combe (Unit 49 and Unit 3) and east of Dowsborough Castle (Unit 3). These parts of the woodland and also other areas of old trees with splits and cracks in the remaining woodland within the SAC should be maintained by a regime of minimum management with little disturbance. Tree roosts should be retained intact and allowed to develop naturally. Sufficient suitable trees should be left throughout the surrounding woodland to provide additional roosting sites.</p> <p>Management Plans for this woodland needs to be very long term, and could include intentionally damaging younger trees to make them suitable roosts at an earlier age.</p> <p>The limited radio-tracking studies that have been carried out here showed that bats travelled as far as 9km away in summer</p>	<p>Boyce, 2009</p> <p>Boyce, 2012</p> <p>Burrows 2018</p> <p>Natural England, 2014</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			nights to forage, and less (4km) in autumn. Thus conservation measures outside the boundary of the SAC are also important e.g. planting new woodlands to provide additional roosts for the future, managing hedges appropriately,	
Supporting habitat: extent and distribution	Extent of supporting habitat	<p>Maintain the total extent of the habitats which support the feature at:</p> <p>Bechstein's Bat: the extent of broadleaved woodland within Quantock part of SAC. Maintain the total extent of the habitat(s) which support the feature (at: broadleaved woodland within Quantock part of SAC</p> <p>Barbastelle: approximately 1067ha (the total extent of broadleaved woodland in SSSIs within the SAC currently supporting breeding roosts)</p>	<p>In order to contribute towards the objective of achieving an overall favourable conservation status of the feature at a UK level, it is important to maintain or if appropriate restore the extent of supporting habitats and their range within this SAC. The information available on the extent and distribution of supporting habitat used by the feature may be approximate depending on the nature, age and accuracy of data collection, and may be subject to periodic review in light of improvements in data.</p> <p>Bechstein's Bat: The extent given here is the sum of broadleaved woodland of the two Annex I habitats for the SSSI that is currently known to have breeding barbastelle (The Quantocks). The extent of habitats used for foraging (or roosting but this is unknown) may be greater than this as the species may use other woodland outside the SAC.</p> <p>Barbastelle: The extent given here is the sum of broadleaved woodland of the two Annex I habitats for the three SSSIs that are known to have breeding barbastelle (North Exmoor; Barle Valley; The Quantocks). The total area of habitats used for foraging and non-breeding roosts is likely to be considerably greater than this as the species will use other woodland and habitats outside the SAC (including in the adjacent Exmoor Heaths SAC), ranging widely for foraging in a variety of habitats.</p> <p>The most important habitats used for foraging were: (a) rough/unimproved grassland (94.5% of the habitat in the colonies range was used for foraging); (b) scattered (gorse) scrub and broadleaved woodland (both >57% use); and (c) Bracken, running water and dense (gorse) scrub (all >25% use).</p>	<p>Billington, 2000</p> <p>Billington, 2001</p>
Supporting habitat: extent and distribution	Distribution of supporting habitat	Maintain the distribution and continuity of the feature and its supporting habitat, including where applicable its component vegetation types and associated	A contraction in the range, or geographic spread, of the feature (and its component vegetation) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. Contraction may also reduce	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		transitional vegetation types, across the site	<p>and break up the continuity of a habitat within a site and how well the species feature is able to occupy and use habitat within the site.</p> <p>Such fragmentation may have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for this feature and this may affect its viability.</p>	
Supporting processes (on which the feature and/or its supporting habitat relies)	Adaptation and resilience	Maintain the feature's ability, and that of its supporting habitat, to adapt or evolve to wider environmental change, either within or external to the site	<p>The overall vulnerability of this SAC to climate change has been assessed by Natural England (2015) as being low, taking into account the sensitivity, fragmentation, topography and management of the species' supporting habitats.</p> <p>This means that this site is considered to be vulnerable overall but are a lower priority for further assessment and action. Individual species may be more or less vulnerable than their supporting habitat itself. In many cases, change will be inevitable so appropriate monitoring would be advisable.</p> <p>This recognises the increasing likelihood of natural habitat features needing to absorb or adapt to wider environmental changes. Resilience may be described as the ability of an ecological system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning.</p> <p>Such environmental changes may include changes in sea levels, precipitation and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site. The vulnerability and response of features to such changes will vary. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability.</p>	Natural England, 2015
Supporting habitat:	Soils, substrate and	Maintain the properties of the underlying soil types, including structure, bulk density, total	Soil supports basic ecosystem function and is a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
structure/function	nutrient cycling	carbon, pH, soil nutrient status and fungal: bacterial ratio, within typical values for the supporting habitat	which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with the supporting habitat of this Annex II feature.	
Supporting processes (on which the feature and/or its supporting habitat relies)	Water quantity/quality	Where the feature or its supporting habitat is dependent on surface water and/or groundwater, maintain water quality and quantity to a standard which provides the necessary conditions to support the feature	<p>For many SAC features which are dependent on wetland habitats supported by surface and/or ground water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year. Poor water quality and inadequate quantities of water can adversely affect the structure and function of this habitat type.</p> <p>Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD 2000/60/EC) will also be sufficient to support the achievement of SAC Conservation Objectives but in some cases more stringent standards may be needed to reflect the ecological needs of the species feature. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC.</p>	
Supporting processes (on which the feature and/or its supporting habitat relies)	Air quality	Maintain or, where necessary, concentrations and deposition of air pollutants at or below the site-relevant Critical Load or Level values given for the feature's supporting habitat on the Air Pollution Information System (www.apis.ac.uk).	<p>The supporting habitat of this feature is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of the habitat's substrate, accelerating or damaging plant growth, altering its vegetation structure and composition (including food-plants) and reducing supporting habitat quality and population viability of this feature.</p> <p>Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH₃), oxides of nitrogen (NO_x) and sulphur dioxide (SO₂), and critical loads for nutrient nitrogen deposition and acid deposition. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis.</p>	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales.</p> <p>Currently (September 2018) the Air Pollution Information System (APIS) shows that deposition of nitrogen is above the critical load indicating that this pollutant will be affecting the woodland habitat of the barbastelle bats in this SAC. No data are available on the significance of this effect at this site, or if there is any direct effect on the bats themselves.</p>	
<p>Version Control Advice last updated: 4 March 2019: Following stakeholder comments. Additional information added about the bat guidance for planning provided by Somerset County Council.</p> <p>Variations from national feature-framework of integrity-guidance: The attributes concerned with the external and internal condition of buildings used by maternity colonies/for hibernation and access to the buildings have been deleted as there are no such buildings within the boundaries of the SAC, the maternity roosts being in trees.</p>				

Table 3: Supplementary Advice for Qualifying Features: S1355. Otter *Lutra lutra*;

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Population (of the feature)	Anthropogenic mortality	Reduce levels of mortality as a result of anthropogenic (man-made) factors so that they are not adversely affecting the overall abundance and viability of the population.	<p>High numbers of otter casualties within or adjacent to SAC catchments will adversely affect the condition and viability of the population and mitigation measures should be initiated as quickly as possible. Causes of mortality may include roads, accidents with fishing equipment (nets, lobster creels), poisoning, pollutants, hunting and acidification/contamination of water courses (which reduces fish populations). It should be noted that otters are also a European protected species, and that it is an offence to deliberately disturb, capture, injure or kill an otter.</p> <p>Records of otter casualties from Somerset and Exmoor are held by Somerset Otter Group and the majority are usually recovered for autopsy and forwarded to Cardiff University.</p>	<p>Somerset Otter Group two-day surveys (2017)</p> <p>The Cardiff University Otter Project carries out autopsies on otters from England, Wales and Scotland.</p>
Population (of the feature)	Population abundance	Maintain the continued presence of an actively-breeding otter population within the SAC, whilst avoiding deterioration from current levels as indicated by the latest mean peak count, estimate or equivalent.	<p>This will ensure there is a viable population of the feature which is being maintained at or increased to a level that contributes as appropriate to its Favourable Conservation Status across its natural range in the UK. Due to the dynamic nature of population change, the target-value given for the population size or presence of this feature is considered to be the minimum standard for conservation/restoration measures to achieve. This minimum-value may be revised where there is evidence to show that a population's size or presence has significantly changed as a result of natural factors or management measures and has been stable at or above a new level over a considerable period (generally at least 10 years). The values given here may also be updated in future to reflect any strategic objectives which may be set at a national level for this feature.</p> <p>Given the likely fluctuations in numbers over time, any impact-assessments should focus on the current size of the site's population, as derived from the latest known or estimated level established using the best available data. This advice accords with the obligation to avoid deterioration of the site or significant disturbance of the species for which the site is designated, and seeks to avoid plans or projects that may affect the site giving rise to the risk of deterioration. Similarly, where there is</p>	Somerset Otter Group two-day surveys (2017)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>evidence to show that a feature has historically been more abundant than the stated minimum target and its current level, the ongoing capacity of the site to accommodate the feature at such higher levels in future should also be taken into account in any assessment.</p> <p>For otters, it is difficult to estimate population size. It could be assumed that where there is a high frequency of positive signs in an area, such as a large number of spraints (of several ages), that otters are likely to be occupying the site. Breeding will be indicated by the presence of natal dens, cub sightings and intensive otter activity (e.g. feeding, sprainting, pathways through vegetation). DNA analysis of spraints is now being used as a technique for identifying otters.</p> <p>Otter spraints and occasional sightings confirm otters are present on all the Exmoor and Quantock rivers within the SAC. The Somerset Otter Group, based on many years of surveys of fresh spraint laid over two days, estimated that 20-24 individual otters live on Exmoor. This is broadly equivalent to the numbers expected for Exmoor's proportionate area when compared to the whole of Somerset, adjusted for the area in Devon.</p>	
Supporting habitat: extent and distribution	Distribution of supporting habitat	Maintain the distribution and continuity of the feature and its supporting habitat, including where applicable its component vegetation types and associated transitional vegetation types, across the site	A contraction in the range, or geographic spread, of the feature (and its component vegetation) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. Contraction may also reduce and break up the continuity of a habitat within a site and how well the species feature is able to occupy and use habitat within the site. Such fragmentation may have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for this feature and this may affect its viability.	
Supporting habitat: extent and distribution	Extent of supporting habitat	Maintain the total extent of the habitats which support the feature at: 106km of watercourses	In order to contribute towards the objective of achieving an overall favourable conservation status of the feature at a UK level, it is important to maintain or if appropriate restore the extent of supporting habitats and their range within this SAC. The information available on the extent and distribution of supporting habitat used by the feature may be approximate	Explanation of Detailed River Network . Length mapped from NE Webmap within SAC boundary 17/9/18.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>depending on the nature, age and accuracy of data collection, and may be subject to periodic review in light of improvements in data.</p> <p>The SAC contains 106km of river as mapped on the EA Detailed River Network including Primary, Secondary and Tertiary watercourses</p>	
Supporting habitat: structure/ function	Abundance of breeding and resting places	Maintain an abundance of natural breeding and resting sites within the site	<p>It should be noted that otters are highly mobile and are likely to spend their time within wider territories, where designated sites only form a proportion of their range and make a contribution to their wider requirements. Otters are a European protected species, and it is an offence to disturb their resting places. Otters will often use many holts at any one time.</p> <p>They may give birth in one, but raise their young in another. Important features of a successful breeding site are the availability of food, limited disturbance and safety from the risk of flooding. It is important to consider the whole site and not just the known holts as appropriate management will influence all of these factors. Some natal den structures have a limited lifespan (e.g. hollow tree trunks, piles of timber etc.) and if alternative opportunities for natal dens are limited, suitable replacements can be created or constructed. Maintaining dense bank vegetation, areas of reed etc. will ensure that there are suitable areas for resting couches.</p>	
Supporting habitat: structure/ function	Availability of refugia	Maintain an abundance of dense bankside vegetation to limit significant disturbance to animals	<p>The integrity of the interest feature may be dependent upon the quality of the adjacent habitat outside the boundary of the site, for instance tributaries. This is likely to be the case where bankside vegetation may be an important barrier to disturbing activity but may lie adjacent to and outside the boundary. Nevertheless it will be important to maintain, or in some cases, to restore dense bankside cover.</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat: structure/ function	Food availability	Maintain fish biomass within expected natural levels for the supporting habitat (subject to natural fluctuations).	<p>In freshwater, key fish prey sources for otters include eels, salmonids and bullhead. Frogs can also form an important part of the diet, depending on the habitat and time of year. Crayfish and water beetles may also form part of the diet, as well as an occasional waterbird (young coots, moorhens, ducks) or mammal (rabbits, water voles - although this is uncommon).</p> <p>The diet of otters varies depending on the availability of prey, which in turn varies with the time of year. There should be a diverse range of food sources available throughout the year, within the normal expectations of each particular water course. It should be noted however, that otters may take prey from adjacent fisheries which are stocked to an artificially high level, especially where there are numerous stocked ponds on a floodplain.</p> <p>This can lead to artificially high prey densities adjacent to European sites, which might be expected to, in turn, result in artificially high densities of otter on the designated sites. This highlights the importance of biosecurity around stocked fisheries, and if implemented at all artificial still water fisheries on a floodplain might result in a legitimate reduction in otter density.</p>	
Supporting habitat: structure/ function	Habitat quality - river habitat	Maintain the quality of supporting river habitat features, using advice for H3260 habitat, based on natural river function, which provides a characteristic biotope mosaic that caters for otters.	Dense bank vegetation, mires and tall vegetation are important for otters, but they will use a long stretch of river and this won't necessarily fall within a protected site. Dense bank vegetation is favoured as resting areas, but otters will often travel some distance to a preferred 'couch' and this will not necessarily be along the edge of the river. The structure and quality of bankside vegetation and other nearby habitats should be maintained, particularly where there is evidence of use by otters. However, it is thought that the most significant determinant of otter usage of a habitat is the abundance of prey (Kruuk et al, 1998)	Kruuk, <i>et al</i> , 1998
Supporting habitat: structure/ function	Habitat quality - waterway habitat	Maintain the quality of supporting waterways and habitat features	Smaller tributaries of larger river systems (streams, waters etc) are extremely important for otters and have been shown to have been used more frequently by otters than larger rivers. This is thought to be in part due to differences in fish density and preference for hunting in shallow water with areas of riffles and boulders. Many of these tributaries will be outside the SAC	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			boundary, but some lie in the adjacent Exmoor Heaths SAC or other parts of the SSSIs not included in the SACs.	
Supporting habitat: structure/function	Water flow	Maintain the natural flow regime of the river to that close to what would be expected in the absence of abstractions and discharges (the 'naturalised' flow).	Permanent or long-lasting reductions in flow may affect the availability and diversity of prey. This could lead to otters moving into new areas, increasing the likelihood of conflict with other otters. This may also alter the prey targeted by otters as they may hunt for low-preference food such as birds, rabbits, fish carrion or for frogs, depending on the time of year.	See River Basin Management Plans and Catchment Flood Management Plans for North Devon or West Somerset
Supporting habitat: structure/function	Water quality/quantity	Maintain water quality and quantity to a standard which provides the necessary conditions to support the feature.	<p>For many SAC features which are dependent on wetland habitats supported by surface and/or ground water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year during key stages of their life cycle. Poor water quality and inadequate quantities of water can adversely affect the availability and suitability of breeding, rearing and feeding habitats.</p> <p>Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD 2000/60/EC) will also be sufficient to support the SAC Conservation Objectives but in some cases more stringent standards may be needed to support the SAC feature. Further site-specific investigations may be required to establish appropriate standards for the SAC. The main impact of water chemistry on this feature is its effect on the food supply. For example, moderate levels of levels of eutrophication may increase certain fish populations, but excessive eutrophication can be detrimental.</p> <p>Excessive acidity in watercourses may also affect fish populations. Impacts from toxic pollutants can be devastating and were the major cause of otter population declines in the 50s, 60s and 70s.</p>	<p>See River Basin Management Plans and Catchment Flood Management Plans for North Devon or West Somerset</p> <p>Environment Agency. Pollution Incidents data, see http://apps.environment-agency.gov.uk/wiyby/37821.aspx</p>
Supporting processes (on which the feature and/or its supporting habitat relies)	Adaptation and resilience	Maintain the feature's ability, and that of its supporting habitat, to adapt or evolve to wider environmental change, either within or external to the site	<p>The overall vulnerability of this SAC to climate change has been assessed by Natural England (2015) as being low, taking into account the sensitivity, fragmentation, topography and management of the species' supporting habitats.</p> <p>This means that this site is considered to be vulnerable overall but are a lower priority for further assessment and action. Individual species may be more or less vulnerable than their</p>	Natural England, 2015

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>supporting habitat itself. In many cases, change will be inevitable so appropriate monitoring would be advisable.</p> <p>This recognises the increasing likelihood of natural habitat features needing to absorb or adapt to wider environmental changes. Resilience may be described as the ability of an ecological system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning.</p> <p>Such environmental changes may include changes in sea levels, precipitation and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site. The vulnerability and response of features to such changes will vary. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability.</p>	
Supporting processes (on which the feature and/or its supporting habitat relies)	Connectivity within and to the site	Ensure there are no significant artificial barriers to the safe passage and movement of otters into, within and away from the site	<p>Barriers such as roads, weirs etc. can generally increase the risk of harm to animals as they traverse or avoid them. If these barriers are considered a problem then mitigating measures could be taken. Otter populations within the SAC are dependent on the integrity of sections of river channel, riparian areas, freshwater still-waters, floodplains and transitional and marine waters that lie outside of the site boundary. Headwater areas and tributaries may not fall within the site boundary, yet otters may use these areas for feeding and these will be critical for sustaining populations within the site.</p> <p>Boundaries to river features on SACs often follow the first break of slope on the bank, with the result that much of the riparian habitat will lie outside the SAC, particularly if the river channel is operating under natural processes and moves laterally over time within the floodplain. It is possible that holts of otters that form part of the population for a SAC may lie on the adjacent floodplain out with the boundary of the SAC.</p>	
Supporting processes	Conservation measures	Maintain the management measures (either within and/or	Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further	Natural England, 2014

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
(on which the feature and/or its supporting habitat relies)		outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature and/or its supporting habitats.	<p>details about the necessary conservation measures for this site can be provided by contacting Natural England.</p> <p>This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, site management strategies or plans, the Views about Management Statement for the underpinning SSSI and/or management agreements.</p>	
Supporting processes (on which the feature and/or its supporting habitat relies)	Water quality : Toxic chemicals	Avoid the presence of pollutants affecting the site, which are potentially toxic to otters.	The major cause of the decline in otter populations in the 60s and 70s was toxic chemicals such as dieldrin and related pesticides. Contaminants that might have an effect on otters may have an indirect effect (e.g. on food supply - organic pollution, eutrophication, acidification from mine waste and acid rain), a mainly direct effect (e.g. oil spillage, radioactivity) or effects of bioaccumulation (e.g. metals, especially mercury, cadmium and lead; pesticides and PCBs). PCBs, organochlorine pesticides and heavy metals all being seen as detrimental to otters, although the use of many of these is now banned.	Environment Agency. Pollution Incidents data, see http://apps.environment-agency.gov.uk/wiyby/37821.aspx
Version Control: N/A				
Variations from national feature-framework of integrity-guidance: N/A				

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European Site Conservation Objectives for Hestercombe House Special Area of Conservation Site code: UK0030168



With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- The extent and distribution of the habitats of qualifying species
- The structure and function of the habitats of qualifying species
- The supporting processes on which the habitats of qualifying species rely
- The populations of qualifying species, and,
- The distribution of qualifying species within the site.

This document should be read in conjunction with the accompanying *Supplementary Advice* document, which provides more detailed advice and information to enable the application and achievement of the Objectives set out above.

Qualifying Features:

S1303. *Rhinolophus hipposideros*; Lesser horseshoe bat

Explanatory Notes: European Site Conservation Objectives

These Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2017 as amended from time to time (the “Habitats Regulations”). They must be considered when a competent authority is required to make a ‘Habitats Regulations Assessment’, including an Appropriate Assessment, under the relevant parts of this legislation.

These Conservation Objectives and the accompanying Supplementary Advice (where available) will also provide a framework to inform the measures needed to conserve or restore the European Site and the prevention of deterioration or significant disturbance of its qualifying features.

These Conservation Objectives are set for each habitat or species of a [Special Area of Conservation \(SAC\)](#). Where the objectives are met, the site will be considered to exhibit a high degree of integrity and to be contributing to achieving Favourable Conservation Status for that species or habitat type at a UK level. The term ‘favourable conservation status’ is defined in regulation 3 of the Habitats Regulations.

Publication date: 27 November 2018 (version 3). This document updates and replaces an earlier version dated 30 June 2014 to reflect the consolidation of the Habitats Regulations in 2017.



European Site Conservation Objectives: Supplementary advice on conserving and restoring site features

**Hestercombe House Special Area of Conservation (SAC)
Site Code: UK0030168**



Hestercombe House © yerffoeg2, Flickr

Date of Publication: 11 February 2019

About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to Hestercombe House SAC.

This advice should therefore be read together with the [SAC Conservation Objectives](#).

You should use the Conservation Objectives, this Supplementary Advice and any case-specific advice given by Natural England when developing, proposing or assessing an activity, plan or project that may affect this site.

This Supplementary Advice to the Conservation Objectives presents attributes which are ecological characteristics of the designated species and habitats within a site. The listed attributes are considered to be those that best describe the site's ecological integrity and which, if safeguarded, will enable achievement of the Conservation Objectives. Each attribute has a target which is either quantified or qualitative depending on the available evidence. The target identifies as far as possible the desired state to be achieved for the attribute.

The tables provided below bring together the findings of the best available scientific evidence relating to the site's qualifying features, which may be updated or supplemented in further publications from Natural England and other sources. The local evidence used in preparing this supplementary advice has been cited. The references to the national evidence used are available on request. Where evidence and references have not been indicated, Natural England has applied ecological knowledge and expert judgement. You may decide to use other additional sources of information.

In many cases, the attribute targets shown in the tables indicate whether the current objective is to 'maintain' or 'restore' the attribute. This is based on the best available information, including that gathered during monitoring of the feature's current condition. As new information on feature condition becomes available, this will be added so that the advice remains up to date.

The targets given for each attribute do not represent thresholds to assess the significance of any given impact in Habitats Regulations Assessments. You will need to assess this on a case-by-case basis using the most current information available.

Some, but not all, of these attributes can also be used for regular monitoring of the actual condition of the designated features. The attributes selected for monitoring the features, and the standards used to assess their condition, are listed in separate monitoring documents, which will be available from Natural England.

These tables do not give advice about SSSI features or other legally protected species which may also be present within the European Site.

If you have any comments or queries about this Supplementary Advice document please contact your local Natural England adviser or email HDIRConservationObjectivesNE@naturalengland.org.uk

About this site

European Site information

Name of European Site	Hestercombe House Special Area of Conservation (SAC)
Location	Somerset
Site Map	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	1 st April 2005
Qualifying Features	See section below
Designation Area	0.08 ha
Designation Changes	N/A
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	Hestercombe House SSSI. The SAC and SSSI boundary are the same.
Relationship with other European or International Site designations	N/A

Site background and geography

Hestercombe House SAC is a Grade II* listed former country house situated within an estate registered as a Grade I Registered Park and Garden. One mile south of the conurbation of Taunton in Somerset it lies between 35m and 120m AD on the south facing slopes of the foothills of the Quantock Hills Area of Outstanding Natural Beauty (AONB). Skirting the edge of the vale of Taunton Deane, within the *Vale of Taunton and Quantock fringes* National character Area ([NCA 146](#)), it commands extensive views across the vale and beyond to the Blackdowns AONB, c. 8km south. A landscape garden and woodlands occupy south facing combs with pasture occurring on the gentler slopes. Hestercombe's character is greatly influenced by its Geology and soils, with the majority of the site found lying over the Devonian Morte Slate Formation on free-draining, slightly acidic loam soils.

A colony of lesser horseshoe bats *Rhinolophus hipposideros* utilise two roof voids at Hestercombe. One can be found within a former stable block which has been purposefully converted to a roost for lesser horseshoe bats. The other is a domestic outbuilding connected to the main house. These roof voids are utilised as maternity (breeding) roosts during the summer months, with a small number of bats also using the space as hibernation sites during the winter. The maternity colony is the qualifying feature of the SAC. The boundary encompasses the maternity roosts, however supporting habitat, links to the wider countryside and a food source are also essential to sustain the population.

About the qualifying features of the SAC

The following section gives you additional, site-specific information about this SAC's qualifying features. These are the natural habitats and/or species for which this SAC has been designated.

Qualifying Species:

- **S1303 Lesser horseshoe bat, *Rhinolophus hipposideros***

The lesser horseshoe bat is one of the UK's smallest bats and is so named because of its characteristic horseshoe shaped flap of skin around its nose, a noseleaf which they use in echolocation. Its fur is grey-brown on its back and white on its underside and they have a wing span of 19-25cm, half that of a greater horseshoe. It is one of the UK's rarest bats with a total population of approximately 50,000 individuals in the UK. Historic population declines means it is now restricted in its distribution to Wales, the West Midlands and South West England.

Hestercombe House is a large lesser horseshoe bat maternity site in the vale of Taunton. Although this maternity roost represents only a small proportion of the UK's population, it has been selected as it is representative of the species in South West England. Mating typically occurs from September to November and females will form the maternity colony in late spring. Usually a single pup is born in June or July and is weaned and fully independent by the end of August.

Some lesser horseshoe bats also hibernate in the roof void of the building, along with utilising the many buildings and structures found across the wider estate, but the hibernating population is not a designated feature of the SAC. Lesser horseshoe bats are particularly sensitive to disturbance, especially in their maternity and winter roosts, which is why such sites need specific protection. They also rely on the surrounding woodlands and grazed pasture for foraging, commuting between areas using linear features such as hedgerows within the landscape. Lesser horseshoe bats feeding will rarely fly more than five metres above the ground and will forage close to summer roosts (up to 4.2km away). The bats will also spend around half of their peak activity time within a radius of 600m feeding on a variety of insects including dung and crane flies, small moths, caddis flies, lacewings, small beetles, parasitic wasps and spiders.

The Lesser Horseshoe bat is also fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of the Conservation of Habitats and Species Regulations 2010 (as amended), making it a 'European Protected Species'. A [licence](#) may therefore be required for any activities likely to harm or disturb lesser horseshoe bats.

Site-specific seasonality of SAC features

The table below highlights in grey those months in which significant numbers of the qualifying feature are most likely to be present at the SAC during a typical calendar year. This table is provided as a general guide only. The presence of the feature may vary depending on weather conditions.

Unless otherwise indicated, the months shown below are primarily based on information relating to the general months of occurrence of the feature in the UK. Where site-based evidence is available and has been used to indicate below that significant numbers of the feature are typically present at this SAC outside of the general period, the site-specific references have been added to indicate this.

Applicants considering projects and plans scheduled in the periods highlighted in grey would benefit from early consultation with Natural England given the greater scope for there to be likely significant effects that require consideration of mitigation to minimise impacts to qualifying features during the principal periods of site usage by the feature. The months which are *not* highlighted in grey are not ones in which the feature is necessarily absent, rather that the feature may be present in less significant numbers in typical years. Furthermore, in any given year, the feature may occur in significant numbers in months in which typically it does not. Thus, applicants should not conclude that projects or plans scheduled in months not highlighted in grey cannot have a significant effect on the feature. There may be a lower likelihood of significant effects in those months which nonetheless will also require prior consideration.

Any assessment of potential impacts on the feature must be based on up-to-date count data and take account of population trends evident from these data and any other available information. Additional site-based surveys may be required.

Feature	Season	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Site-specific references where available
Lesser horseshoe bat <i>Rhinolophus hipposideros</i>	Breeding													

Table 1: Supplementary Advice for Qualifying Features: S1303. *Rhinolophus hipposideros*; Lesser horseshoe bat

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Population (of the feature)	Population abundance-maternity colony	Restore the abundance of the breeding population of lesser horseshoe bats to a level which is above the baseline population-size of 200 individuals, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	<p>This will ensure there is a viable population of the feature which is being maintained at or increased to a level that contributes as appropriate to its Favourable Conservation Status across its natural range in the UK. Due to the dynamic nature of population change, the target-value given for the population size or presence of this feature is considered to be the minimum standard for conservation/restoration measures to achieve. This minimum-value may be revised where there is evidence to show that a population's size or presence has significantly changed as a result of natural factors or management measures and has been stable at or above a new level over a considerable period (generally at least 10 years). The values given here may also be updated in future to reflect any strategic objectives which may be set at a national level for this feature.</p> <p>Given the likely fluctuations in numbers over time, any impact-assessments should focus on the current size of the site's population, as derived from the latest known or estimated level established using the best available data. This advice accords with the obligation to avoid deterioration of the site or significant disturbance of the species for which the site is designated, and seeks to avoid plans or projects that may affect the site giving rise to the risk of deterioration. Similarly, where there is evidence to show that a feature has historically been more abundant than the stated minimum target and its current level, the ongoing capacity of the site to accommodate the feature at such higher levels in future should also be taken into account in any assessment.</p> <p>Unless otherwise stated, the population size or presence will be that measured using standard methods, such as peak mean counts or breeding surveys. This value is also provided recognising there will be inherent variability as a result of natural fluctuations and margins of error during data collection. Whilst we will endeavour to keep these values as up to date as</p>	<p>Hestercombe House SSSI Favourable Condition Table (FCT), available from Natural England on request.</p> <p>DUVERGE, L. 2009. <i>A Report on Bat Surveys carried out at Hestercombe Site of Special Scientific Interest, Taunton, Somerset in 2007 and 2008</i>. Kestrel Wildlife Consultants Ltd.</p> <p>COOKSON & TICKNER, 2018. <i>Hestercombe Parkland Management Plan Feasibility Study</i>. Available from the national archive of parkland management plans.</p> <p>NATURAL ENGLAND, 2015. <i>Hestercombe House SAC Site Improvement Plan (SIP)</i>. Available from: http://publications.naturalengland.org.uk/publication/5973745436983296</p> <p>Monitoring data is held by the Natural England Somerset Team and Taunton Deane Borough Council. Available on request.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>possible, local Natural England staff can advise whether the figures stated are the best available.</p> <p>One of the largest reported maternity colonies in Somerset with 200 bats using the site at the time of notification in 2005.</p> <p>Volunteers from the Somerset Bat Group have made annual summer counts of Lesser horseshoe bats from the two roost sites since 1987. Counts are made from the same locations each year but are not likely to record all of the bats existing the roosts, as radio tracking studies have shown that some bats leave from the main house in directions that are not counted.</p> <p>Total Lesser horseshoe bat counts for May/June recorded between 1987 and 2018 show a range of between 90 bats in June 2010 and 264 bats in June 1995. Lesser horseshoe bat numbers increased significantly after 1991, with 200+ bats counted annually between 1993 and 2002. The bat population has appeared to be declining since notification in 2005, with a significant drop to a low of 90 bats in 2010 thought to be a response to large scale habitat clearance which took place close to the roost in this year. Numbers have been gradually increasing year on year since 2010 and have reached an average count of 132 in 2018 still below that at notification.</p> <p>The definitive causes of the general decline in population abundance are unknown but likely to involve habitat change (to forage areas & flightlines), and may include human disturbance and the physical condition of the roost sites. A maternity roost site has also been identified at West Monkton which is less than 2km away. The possibility of re-location to this roost site at West Monkton also needs investigating.</p>	
Supporting habitat: extent and distribution	Extent of supporting habitat	Maintain the total extent of the lesser horseshoe bat colony and the habitats which support the lesser horseshoe bats during the breeding period.	In order to contribute towards the objective of achieving an overall favourable conservation status of the feature at a UK level, it is important to maintain or if appropriate restore the extent of supporting habitats and their range within this SAC. The information available on the extent and distribution of supporting habitat used by the feature may be approximate depending on the nature, age and accuracy of data collection,	DUVERGE, L. 2009. <i>A Report on Bat Surveys carried out at Hestercombe Site of Special Scientific Interest, Taunton, Somerset in 2007 and 2008.</i> Kestrel Wildlife Consultants Ltd.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>and may be subject to periodic review in light of improvements in data.</p> <p>The two roosts at Hestercombe play a major role as both a breeding roost, and an important night roost for this colony, accounting for 62% of all logged night time roosting of radio-tagged bats in August 2007, and 56% in May 2008.</p> <p>Outside of the boundary of the SAC, but also potentially of some importance to the colony, due to its proximity to the roof of the main maternity roost (outbuilding connected to the main house) is a connected building with a large interconnected roof space linked to the roost. A building inspection in 2018 identified two large and discrete piles of lesser horseshoe bat droppings, though no bats were present at the time of survey. The roof space is relatively light-filled in places which could be contributing to its more limited use.</p> <p>Evidence of lesser horseshoe night roosting has also been identified across the wider estate, with droppings found in four buildings and structures that include Combe House Stables, Combe house dogs kennels, the restored rustic seat and Charcoal burners hut.</p> <p>12 additional temporary night roosts, which were used extensively, were located during 2007 and 2008 surveys (Duverge, 2009). There does not appear to be any other significant day roosts used by the colony within the vicinity of the SAC.</p> <p>A subsidiary maternity roost also occurs at West Monkton, less than 2km from Hestercombe.</p>	<p>COOKSON & TICKNER, 2018. <i>Hestercombe Parkland Management Plan Feasibility Study</i>. Available from the national archive of parkland management plans.</p> <p>BURROWS, L. 2018. <i>Hestercombe House Special Area of Conservation (SAC) Guidance on Development</i>. Somerset Ecology Services, Planning Control, Somerset County Council.</p>
Supporting habitat: extent and distribution	Distribution of supporting habitat	Maintain the distribution and continuity of the lesser horseshoe bat colony and its supporting habitat.	A contraction in the range, or geographic spread, of the feature (and its component vegetation) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. Contraction may also reduce and break up the continuity of a habitat within a site and how well the species feature is able to occupy and use habitat within	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>the site. Such fragmentation may have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for this feature and this may affect its viability.</p> <p>See 'Supporting and Explanatory Notes' for the 'Extent of supporting habitat' attribute, above.</p>	
Supporting habitat: structure/function	External condition of building - maternity colony	Maintain the structural integrity and weatherproofing of the roof, walls and rainwater goods, with no significant shading of the main roost area by trees/vegetation or manmade structures.	<p>Damp, draught and increases in light levels are likely to have a negative effect on the temperature and humidity of the roost.</p> <p>There are plans to re-roof the main house in the future.</p>	<p>NATURAL ENGLAND, 2015. <i>Hestercombe House SAC Site Improvement Plan (SIP)</i>. Available from: http://publications.naturalengland.org.uk/publication/5973745436983296</p>
Supporting habitat: structure/function	Supporting off-site habitat (flightlines)	Restore the presence, structure and quality of any linear landscape features which function as flightlines. Flightlines should remain unlit, functioning as dark corridors.	<p>Lesser horseshoes tend to forage within 2.5km of their roost, though they can travel up to 4km from their roosts to suitable foraging grounds (Schofield, 2008). Lesser horseshoes commute and forage along linear features over wet grassland and woodland. Permanent pasture and ancient woodland linked with an abundance of tall bushy hedgerows is ideal supporting habitat for this species. Flightlines will extend beyond the designated site boundary into the wider local landscape.</p> <p>A number of flightlines have been recorded for the Hestercombe bat colony, linking distant regions of the colony's range and providing good foraging opportunities for commuting bats. The data shows that they fly along well-developed vegetated boundaries when commuting. These have been mapped for reference in the Hestercombe 2007-8 Lesser horseshoe bat survey report (Duverge, 2009).</p> <p>Earlier surveys suggest that individuals at the main house roost exit the roost and disperse to the formal landscape garden to access woodland to the east such as Gotten Wood. More recent observations suggest that the bats cross a driveway into</p>	<p>DUVERGE, L. 2009 <i>A Report on Bat Surveys carried out at Hestercombe Site of Special Scientific Interest, Taunton, Somerset in 2007 and 2008</i>. Kestrel Wildlife Consultants Ltd.</p> <p>MOTTE, G & LIBOIS, R 2002. <i>Conservation of the Lesser Horseshoe Bat (Rhinolophus hipposideros Bechstein, 1800) (Mammalia Chiroptera) in Belgium. A case study in feeding requirements</i>. Belgium Journey of Zoology 132: 47-52</p> <p>SCHOFIELD, H. 2008. <i>The Lesser Horseshoe Bat Conservation Handbook</i>. Vincent Wildlife Trust.</p> <p>SMITH, 2014. <i>Hestercombe</i></p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>shrubbery and commute along a series of ponds and cascades to the north of the site. This involves crossing an open area along the lower edge and weir of the 'Pear Pond'. This area has been opened up to restore a 'treasured viewpoint', from the gateway of the Dutch garden up across the Pear Pond to the Temple Arbour, which is part of the historic Lutyen garden design. Linking features are highly important to the survival of Lesser Horseshoe bats in a landscape of fragmented woodlands (Motte & Libois, 2002). Lesser Horseshoe bats wherever possible will avoid crossing open areas and are vulnerable to the loss of these corridors. A study in Belgium showed that bats were not recorded further than 1m from a feature (Motte & Libois, 2002). Lesser horseshoe bat numbers may be negatively affected by changes in emergence and flight patterns as a result of the loss of linking features.</p> <p>Hestercombe Gardens is a public access site and artificial lighting is in use but usually before bats emerge, with the occasional occurrence of special evening events. Lesser horseshoe bat numbers may be negatively affected by this disturbance.</p>	<i>Gardens Environmental Review, Appendix VI, Ecology & biodiversity – III, Conserving Hestercombe's Lesser horseshoe bats: an update.</i> Unpublished report for Hestercombe Gardens Trust by Farm & Countryside Liaison Services.
Supporting habitat: structure/function	Supporting off-site habitat (foraging areas)	<p>Maintain any core areas of feeding habitat outside of the SAC boundary that are critical to lesser horseshoe bats during their breeding period</p> <p>Consideration to be given to foraging habitat such as woodland, ponds, watercourses, hedgerows, woodland edges, tree lines, rough grass and pasture within a 6km Zone around the SAC.</p>	<p>Roost choice, and the presence of bats within the SAC, is likely to be influenced by the site's ability to provide bats with food and shelter. Key feeding areas around a roost, and the commuting routes (or flightlines) between them, will be an important element of sustaining the SAC population.</p> <p>Lesser horseshoes tend to forage within 2.5km of their summer roost, though they can travel up to 4km from these roosts to suitable foraging grounds (Schofield, 2008). Within the winter, their foraging range is reduced, with a mean foraging radius of 1.2 km around hibernation sites reported. Lesser horseshoes commute and forage along linear features over wet grassland and woodland. Permanent pasture and ancient woodland linked with an abundance of tall bushy hedgerows is ideal supporting habitat for this species (Billington, 2005). Flightlines should remain as unlit, dark corridors.</p> <p>Flightlines will extend beyond the designated site boundary into</p>	<p>BURROWS, L. 2018 <i>Hestercombe House Special Area of Conservation (SAC) Guidance on Development.</i> Somerset Ecology Services, Planning Control, Somerset County Council.</p> <p>BILLINGTON, G. 2005 <i>Radio Tracking Study of Lesser horseshoe bats at Hestercombe House Site of Special Scientific Interest.</i> Report to English Nature</p> <p>DUVERGE, L. 2009 <i>A Report on Bat Surveys carried out at Hestercombe Site of Special Scientific Interest, Taunton,</i></p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>the wider local landscape.</p> <p>The SAC designation encompasses maternity roosts and entrances, however to sustain the population, the provision of links to the wider countryside with supporting foraging habitat has to be sufficient.</p> <p>The lesser horseshoe bats at Hestercombe exhibit a broad diet and largely forage unselectively. They feed on a variety of insects including dung and crane flies, small moths, caddis flies, lacewings, small beetles, parasitic wasps and spiders.</p> <p>Early radio tracking studies of the lesser horseshoe bat population at Hestercombe have shown that the bats range up to 6km from the roost and utilise a variety of habitats for foraging, with bats recorded in open pasture, woodland, over arable fields, along woodland tracks, field edges, road verges, allotments, amenity grassland, marshy fields, ditches and lakes. Further studies in 2007 and 2008 found the majority of bats foraged within 1-4km of the roost, with the majority remaining within 2km.</p> <p>The current understanding of key roosts and supporting habitat associated with the SAC have been used to identify a 6km sustenance zone where Lesser horseshoe bats are likely to be present centred around the maternity roost at Hestercombe House. Bands within the zone reflect the likely importance of the habitat for bats and proximity to the maternity and other roost sites. Any development activity taking place within this Zone has the potential to impact on the Hestercombe House SAC. Special consideration is also to be given to habitat within 600m of the roost site, within the juvenile sustenance Zone. Feeding areas within this 600m zone are vitally important during spring and summer months for pregnant and lactating females, as well as their young, with bats spending about half their peak activity time within this zone.</p>	<p><i>Somerset in 2007 and 2008.</i> Kestrel Wildlife Consultants Ltd.</p> <p>SCHOFIELD, H. 2008. <i>The Lesser Horseshoe Bat Conservation Handbook.</i> Vincent Wildlife Trust.</p> <p>SOMERSET COUNTY COUNCIL, 2008. <i>Lesser Horseshoe Bat Diet Analysis, Hestercombe House, Taunton, Somerset.</i> Knight Ecology Ltd.</p>
Supporting habitat: structure/fun	Internal condition of building -	Restore humidity, temperature and ventilation. Maintain appropriate light levels.	The preferred internal temperature within a maternity roost for lesser horseshoe bats is approximately 34°C (Schofield, 2008).	COOKSON & TICKNER, 2018. <i>Hestercombe Parkland Management Plan Feasibility</i>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
ction	maternity		<p>Data logger temperature recordings taken from the two maternity roost sites over the May-August 2017 maternity period showed an average temperature in the stable roost of 24.5°C (range 14.5-50.5°C), with an average of 21.1°C in the main roost (range 13.0°C-27.5°C).</p> <p>It is likely that the main house roost is more susceptible to draughts due to its open rectangular internal shape and open loft hatch. It also does not benefit from passive building heat unlike the stable roost which is within an occupied heated building.</p>	<p><i>Study</i>. Available from the national archive of parkland management plans.</p> <p>SCHOFIELD, H. 2008. <i>The Lesser Horseshoe Bat Conservation Handbook</i>. Vincent Wildlife Trust.</p>
Supporting habitat: structure/function	Roost access	Maintain the number of access points to the roost at an optimal size and in an unlit and unobstructed state. Restore surrounding vegetation to provide sheltered flyways without obstructing accesses.	<p>This will prevent any negative internal climatic changes within the roost and maintain the ability of bats to freely enter and leave the roost as necessary. Normal minimum dimensions for lesser horseshoe access points: 300 x 200mm.</p> <p>Lesser horseshoe bat access to and from the roost in the domestic outbuilding appears to be via an open loft hatch. From the stable roost, bats access to and from the roost, via a purpose built louvered air vent on the north facing roof pitch which is the sole exit/entry point.</p> <p>Trees and shrubs close to roost exit points, have been removed over recent years. This includes extensive bush clearance immediately across the driveway from the emergence point at the main house. Lesser horseshoe bat numbers may be negatively affected by these changes and/or emergence and flight patterns may have changed as a result.</p> <p>Courtyard lighting is in place which has potential to inhibit the roost exit from the domestic outbuilding connected to the Main House.</p> <p>Security lighting is in place near the Stable block, this is a passive infrared sensor-triggered LED system which was approved through the planning process.</p>	<p>COOKSON & TICKNER, 2018. <i>Hestercombe Parkland Management Plan Feasibility Study</i>. Available from the national archive of parkland management plans.</p> <p>SMITH, 2014. <i>Hestercombe Gardens Environmental Review, Appendix VI, Ecology & biodiversity – III, Conserving Hestercombe's Lesser horseshoe bats: an update</i>. Unpublished report for Hestercombe Gardens Trust by Farm & Countryside Liaison Services.</p>
Supporting processes (on which the	Adaptation and resilience	Maintain the lesser horseshoe bat's ability, and that of its supporting habitat, to adapt or	This recognises the increasing likelihood of supporting habitat features to absorb or adapt to wider environmental changes. Resilience may be described as the ability of an ecological	NATURAL ENGLAND. 2015. <i>Climate Change Theme Plan and supporting National Biodiversity</i>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
feature and/or its supporting habitat relies)		evolve to wider environmental change, either within or external to the site	<p>system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning. Such environmental changes may include changes in sea levels, precipitation and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site. The vulnerability and response of features to such changes will vary. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability.</p> <p>The overall vulnerability of this SAC to climate change has been assessed by Natural England (2015) as being low, taking into account the sensitivity, fragmentation, topography and management of its supporting habitats. This means that this site is considered to be vulnerable overall but is a lower priority for further assessment and action. Individual species may be more or less vulnerable than their supporting habitat itself. In many cases, change will be inevitable so appropriate monitoring would be advisable.</p> <p>With reference to actual or expected climate change any increase in winter temperatures potentially could result in less time spent in torpor/hibernation e.g. more frequent awakening or earlier spring emergence. This would dictate the need for an earlier food source combined with frequent winter feeding. An increase in wet weather may also see a decrease in hunting ability, as bats avoid hunting in heavy rain due to increased energy costs.</p> <p>Changing vegetation around roost sites could potentially affect the humidity of sites and food availability during winter emergence. Wider landscape changes in vegetation may also affect food availability and flightlines between foraging areas. Climate change resilience will be aided by the protection, maintenance and restoration of quality foraging habitat close to the roost site to enable sufficient feeding to be undertaken in</p>	<p><i>Climate Change Vulnerability assessments ('NBCCVAs') for SACs and SPAs in England.</i> Available at: http://publications.naturalengland.org.uk/publication/4954594591375360</p> <p>SHERWIN, H.A., MONTGOMERY, W.I. & LUNDY, M.G. 2013. <i>The Impact and Implications of Climate Change for Bats</i>. Mammal Review 43: 171-182.</p> <p>VOIGT, C.C., SCHNEEBERGER, K., VOIGT-HEUCKE, S. & LEWANZIK, D. 2011. <i>Rain Increases the Energy Cost of Bat Flight</i>. Biology Letters 7: 793-795.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			sub-optimal weather conditions.	
Supporting processes (on which the feature and/or its supporting habitat relies)	Air quality	Restore concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	<p>The supporting habitat of this feature is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition (including food-plants) and reducing supporting habitat quality and population viability of this feature. Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH₃), oxides of nitrogen (NO_x) and sulphur dioxide (SO₂), and critical loads for nutrient nitrogen deposition and acid deposition. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis. Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales.</p> <p>Mixed woodland occupies West Combe, Middle Combe and Hestercombe, with also a number of outlier woodlands providing key foraging habitat close to the maternity roosts. Target set to Restore because the current levels of nitrogen deposition (APIS accessed on 10 January 2019) exceed the critical loads for this supporting foraging habitat of broadleaved, mixed and yew woodland. Exceedance impacts can include changes in soil processes, nutrient imbalance, altered composition of mycorrhiza and ground vegetation. Deposition of other measured pollutants such as Ammonia, Nitrogen Oxides, Sulphur Dioxide and Acid deposition are within the limits given for this habitat type.</p>	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).
Supporting processes (on which the	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as	Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site	BURROWS, L. 2018 <i>Hestercombe House Special Area of Conservation (SAC)</i>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
feature and/or its supporting habitat relies)		appropriate) which are necessary to Maintain the structure, functions and supporting processes associated with lesser horseshoe bats and/or its supporting habitats.	<p>can be provided by contacting Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, site management strategies or plans, the Views about Management Statement for the underpinning SSSI and/or management agreements.</p> <p>To maintain appropriate conditions for this maternity roost site consideration needs to be given to temperature and humidity regimes, access points, lighting and vegetation links where bats emerge. Lesser horseshoe bats also utilise different foraging areas at different times of year, the security of the colony at Hestercombe depends on the continued maintenance of supporting habitat and interconnecting links.</p> <p>Surrounding the SAC maternity roost, the series of wooded coombes and a wildflower meadow which has been created are being managed through a Countryside Stewardship agreement with appropriate management in place to maintain this important foraging habitat. A decoy pond is also to be restored which will support a good population of aquatic insects, a favoured food source of lesser horseshoe bats.</p> <p>Hestercombe Gardens Trust in October 2018 purchased an additional 129ha of parkland surrounding the SAC. Adopting sensitive management of the land with the assistance of Agri-Environment funding will help promote the sustainability of the lesser horseshoe bat population at Hestercombe. The current land use is primarily improved pasture supporting dairy cattle. There is scope to increase connectivity in the landscape whilst managing the existing network of hedgerow and trees for lesser horseshoe bats. The introduction of a sympathetic grazing regime with minimal use of insecticides should also be considered. There are also plans to create further areas of species-rich grassland which will attract higher densities of insects.</p>	<p><i>Guidance on Development</i>. Somerset Ecology Services, Planning Control, Somerset County Council.</p> <p>ENGLISH NATURE, 2004 <i>A statement of English Nature's views about the management of Hestercombe House Site of Special Scientific Interest (SSSI)</i>. Available from: https://designatedsites.naturalengland.org.uk/PDFsForWeb/VAM/2000424.pdf</p> <p>NATURAL ENGLAND, 2015. <i>Hestercombe House SAC Site Improvement Plan (SIP)</i>. Available from: http://publications.naturalengland.org.uk/publication/5973745436983296</p>
Supporting processes (on which the	Disturbance from human activity	Control and minimise human access to roost sites	Site should be secured against unauthorised access, which can result in disturbance to bats at critical times of year and which can affect their population viability and use of the site.	Bats: Protection and Licences, available from https://www.gov.uk/guidance/bats

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
feature and/or its supporting habitat relies)			<p>The roosts occupy roof spaces within the Main House and Stable Block, the only risk of disturbance is when either routine maintenance or the need for more substantial building works arises. This type of work would need to be completed under a Natural England Licence and Consented.</p> <p>An infra-red camera has been installed in the Stable Block roof void to provide visitors to Hestercombe with a view of the maternity colony. The camera requires ongoing maintenance repairs.</p>	-protection-surveys-and-licences
Supporting processes (on which the feature and/or its supporting habitat relies)	Water quantity/ quality	Maintain water quality and quantity of supporting habitats to a standard which provides the necessary conditions to support lesser horseshoe bat.	<p>For many SAC features which are dependent on wetland habitats supported by surface and/or ground water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year. Poor water quality and inadequate quantities of water can adversely affect the structure and function of this habitat type. Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD 2000/60/EC) will also be sufficient to support the achievement of SAC Conservation Objectives but in some cases more stringent standards may be needed to reflect the ecological needs of the species feature. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC.</p> <p>Bontadina <i>et al.</i> (2002) found that woodland associated with water was the most preferred habitat by lesser Horseshoe bats. A food supply is provided by mosquitoes, caddis fly larvae, gnat larvae and gnats and midges. There are a number of streams and ponds on the Hestercombe Estate which are associated with wooded combs close to the SAC roost.</p> <p>An assessment of tree cover along water courses and standing water bodies has been recommended by Knight Ecology Ltd (2008), to determine whether opportunities for foraging and planting exist.</p>	<p>BONTADINA, F. SCHOFIELD, H & NAEF-DAENZER, B. 2002. <i>Radio-tracking reveals that Lesser Horseshoe bats (Rhinolophus hipposideros) forage in woodland</i>. Journal of Ecology 252: 281-290.</p> <p>KNIGHT ECOLOGY LTD., 2008. <i>Lesser Horseshoe Bat Diet Analysis, Hestercombe House, Taunton, Somerset</i>. Report to Somerset County Council.</p>
Version Control Advice last updated: N/A				

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
<p>Variations from national feature-framework of integrity-guidance:</p> <ul style="list-style-type: none"> Removed the attribute 'External condition of underground site - maternity and hibernation'. The lesser horseshoe bats occupy roof void spaces and whilst they utilise underground sites for hibernation across the wider estate this is not part of the SAC designation. The attribute 'Disturbance from human activity': removed 'Grilles on site access points should be maintained where present' from 'Supporting and Explanatory notes' column as not applicable in this instance as bats occupy roof voids. Deleted 'Soils' attribute as a tenuous link to SAC feature through supporting habitat types and no specific evidence available. 			

European Site Conservation Objectives for Mendip Limestone Grasslands Special Area of Conservation Site code: UK0030203



With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

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

This document should be read in conjunction with the accompanying *Supplementary Advice* document, which provides more detailed advice and information to enable the application and achievement of the Objectives set out above.

Qualifying Features:

H4030. European dry heaths

H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*); Dry grasslands and scrublands on chalk or limestone

H8310. Caves not open to the public

H9180. *Tilio-Acerion* forests of slopes, screes and ravines; Mixed woodland on base-rich soils associated with rocky slopes*

S1304. *Rhinolophus ferrumequinum*; Greater horseshoe bat

* denotes a priority natural habitat or species (supporting explanatory text on following page)

*** Priority natural habitats or species**

Some of the natural habitats and species for which UK SACs have been selected are considered to be particular priorities for conservation at a European scale and are subject to special provisions in the Habitats Regulations. These priority natural habitats and species are denoted by an asterisk (*) in Annex I and II of the Habitats Directive. The term 'priority' is also used in other contexts, for example with reference to particular habitats or species that are prioritised in UK Biodiversity Action Plans. It is important to note however that these are not necessarily the priority natural habitats or species within the meaning of the Habitats Regulations.

Explanatory Notes: European Site Conservation Objectives

These Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2017 as amended from time to time (the "Habitats Regulations"). They must be considered when a competent authority is required to make a 'Habitats Regulations Assessment', including an Appropriate Assessment, under the relevant parts of this legislation.

These Conservation Objectives and the accompanying Supplementary Advice (where available) will also provide a framework to inform the measures needed to conserve or restore the European Site and the prevention of deterioration or significant disturbance of its qualifying features.

These Conservation Objectives are set for each habitat or species of a [Special Area of Conservation \(SAC\)](#). Where the objectives are met, the site will be considered to exhibit a high degree of integrity and to be contributing to achieving Favourable Conservation Status for that species or habitat type at a UK level. The term 'favourable conservation status' is defined in regulation 3 of the Habitats Regulations.

Publication date: 27 November 2018 (version 3). This document updates and replaces an earlier version dated 30 June 2014 to reflect the consolidation of the Habitats Regulations in 2017.

European Site Conservation Objectives for Mendip Woodlands Special Area of Conservation Site Code: UK0030048



With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

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

This document should be read in conjunction with the accompanying *Supplementary Advice* document, which provides more detailed advice and information to enable the application and achievement of the Objectives set out above.

Qualifying Features:

H9180. *Tilio-Acerion* forests of slopes, screes and ravines; Mixed woodland on base-rich soils associated with rocky slopes*

* denotes a priority natural habitat or species (supporting explanatory text on following page)

*** Priority natural habitats or species**

Some of the natural habitats and species for which UK SACs have been selected are considered to be particular priorities for conservation at a European scale and are subject to special provisions in the Habitats Regulations. These priority natural habitats and species are denoted by an asterisk (*) in Annex I and II of the Habitats Directive. The term 'priority' is also used in other contexts, for example with reference to particular habitats or species that are prioritised in UK Biodiversity Action Plans. It is important to note however that these are not necessarily the priority natural habitats or species within the meaning of the Habitats Regulations.

Explanatory Notes: European Site Conservation Objectives

These Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2017 as amended from time to time (the "Habitats Regulations"). They must be considered when a competent authority is required to make a 'Habitats Regulations Assessment', including an Appropriate Assessment, under the relevant parts of this legislation.

These Conservation Objectives and the accompanying Supplementary Advice (where available) will also provide a framework to inform the measures needed to conserve or restore the European Site and the prevention of deterioration or significant disturbance of its qualifying features.

These Conservation Objectives are set for each habitat or species of a [Special Area of Conservation \(SAC\)](#). Where the objectives are met, the site will be considered to exhibit a high degree of integrity and to be contributing to achieving Favourable Conservation Status for that species or habitat type at a UK level. The term 'favourable conservation status' is defined in regulation 3 of the Habitats Regulations.

Publication date: 27 November 2018 (version 3). This document updates and replaces an earlier version dated 30 June 2014 to reflect the consolidation of the Habitats Regulations in 2017.

European Site Conservation Objectives for North Somerset and Mendip Bats Special Area of Conservation Site Code: UK0030052



With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

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

This document should be read in conjunction with the accompanying *Supplementary Advice* document, which provides more detailed advice and information to enable the application and achievement of the Objectives set out above.

Qualifying Features:

H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*); Dry grasslands and scrublands on chalk or limestone

H8310. Caves not open to the public

H9180. *Tilio-Acerion* forests of slopes, screes and ravines; Mixed woodland on base-rich soils associated with rocky slopes*

S1303. *Rhinolophus hipposideros*; Lesser horseshoe bat

S1304. *Rhinolophus ferrumequinum*; Greater horseshoe bat

* denotes a priority natural habitat or species (supporting explanatory text on following page)

*** Priority natural habitats or species**

Some of the natural habitats and species for which UK SACs have been selected are considered to be particular priorities for conservation at a European scale and are subject to special provisions in the Habitats Regulations. These priority natural habitats and species are denoted by an asterisk (*) in Annex I and II of the Habitats Directive. The term 'priority' is also used in other contexts, for example with reference to particular habitats or species that are prioritised in UK Biodiversity Action Plans. It is important to note however that these are not necessarily the priority natural habitats or species within the meaning of the Habitats Regulations.

Explanatory Notes: European Site Conservation Objectives

These Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2017 as amended from time to time (the "Habitats Regulations"). They must be considered when a competent authority is required to make a 'Habitats Regulations Assessment', including an Appropriate Assessment, under the relevant parts of this legislation.

These Conservation Objectives and the accompanying Supplementary Advice (where available) will also provide a framework to inform the measures needed to conserve or restore the European Site and the prevention of deterioration or significant disturbance of its qualifying features.

These Conservation Objectives are set for each habitat or species of a [Special Area of Conservation \(SAC\)](#). Where the objectives are met, the site will be considered to exhibit a high degree of integrity and to be contributing to achieving Favourable Conservation Status for that species or habitat type at a UK level. The term 'favourable conservation status' is defined in regulation 3 of the Habitats Regulations.

Publication date: 27 November 2018 (version 3). This document updates and replaces an earlier version dated 30 June 2014 to reflect the consolidation of the Habitats Regulations in 2017.



European Site Conservation Objectives: Supplementary advice on conserving and restoring site features

**North Somerset and Mendip Bats Special Area of Conservation (SAC)
Site Code: UK0030052**



Greater horseshoe bats in limestone cave © Natural England/Michael Hammett

Date of Publication: 14 March 2019

About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to North Somerset and Mendip Bats SAC.

This advice should therefore be read together with the SAC Conservation Objectives available [here](#)

This advice replaces a draft version dated 21 January 2019 following the receipt of comments from the site's stakeholders.

You should use the Conservation Objectives, this Supplementary Advice and any case-specific advice given by Natural England when developing, proposing or assessing an activity, plan or project that may affect this site.

This Supplementary Advice to the Conservation Objectives presents attributes which are ecological characteristics of the designated species and habitats within a site. The listed attributes are considered to be those that best describe the site's ecological integrity and which, if safeguarded, will enable achievement of the Conservation Objectives. Each attribute has a target which is either quantified or qualitative depending on the available evidence. The target identifies as far as possible the desired state to be achieved for the attribute.

The tables provided below bring together the findings of the best available scientific evidence relating to the site's qualifying features, which may be updated or supplemented in further publications from Natural England and other sources. The local evidence used in preparing this supplementary advice has been cited. The references to the national evidence used are available on request. Where evidence and references have not been indicated, Natural England has applied ecological knowledge and expert judgement. You may decide to use other additional sources of information.

In many cases, the attribute targets shown in the tables indicate whether the current objective is to 'maintain' or 'restore' the attribute. This is based on the best available information, including that gathered during monitoring of the feature's current condition. As new information on feature condition becomes available, this will be added so that the advice remains up to date.

The targets given for each attribute do not represent thresholds to assess the significance of any given impact in Habitats Regulations Assessments. You will need to assess this on a case-by-case basis using the most current information available.

Some, but not all, of these attributes can also be used for regular monitoring of the actual condition of the designated features. The attributes selected for monitoring the features, and the standards used to assess their condition, are listed in separate monitoring documents, which will be available from Natural England.

These tables do not give advice about SSSI features or other legally protected species which may also be present within the European Site.

If you have any comments or queries about this Supplementary Advice document please contact your local Natural England adviser or email HDIRConservationObjectivesNE@naturalengland.org.uk

About this site

European Site information

Name of European Site	North Somerset and Mendip Bats Special Area of Conservation (SAC)
Location	Somerset (England) and the Unitary Authorities of North Somerset and Bath & North East Somerset (England)
Site Map	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	1 April 2005
Qualifying Features	See section below
Designation Area	561.19 hectares
Designation Changes	N/A
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	Banwell Caves SSSI, Banwell Ochre Caves SSSI, Brockley Hall Stables SSSI, Compton Martin Ochre Mine SSSI, King's Wood and Urchin Wood SSSI, The Cheddar Complex SSSI, Wookey Hole SSSI. All of these SSSIs except for The Cheddar Complex are fully within the SAC. Approximately 85% of the Cheddar complex is SAC.
Relationship with other European or International Site designations	This SAC is functionally linked with the Mendip Limestone Grassland SAC , Mendip Woodlands SAC , Mells Valley SAC , Bath and Bradford on Avon Bats SAC with the bats moving between these sites.

Site background and geography

An archipelago site incorporating individual components located mainly in the [Mendip Hills National Character Area](#) but also beyond this into the [Bristol, Avon Valleys and Ridges National Character Area](#) in North Somerset. The component sites are highly variable including one of the largest areas of ancient woodland in the former county of Avon; Cheddar Gorge and surrounding sites; as well as caves, mines and buildings in the surrounding areas. The SAC as a whole supports 3% of the UK population of Greater horseshoe bats and internationally significant populations of lesser horseshoe bats. The site also contains internationally important ravine woodland and calcareous grassland interest as supporting features of the bats and also in their own right.

About the qualifying features of the SAC

The following section gives you additional, site-specific information about this SAC's qualifying features. These are the natural habitats and/or species for which this SAC has been designated

Qualifying habitats:

- **H6210 Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia)**

The Cheddar complex and Wookey Hole areas support a wide range of semi-natural habitats including semi-natural dry grasslands. The principal community present is CG2 *Festuca ovina* – *Avenula pratensis* grassland which occurs on rock ledges and on steep slopes with shallow limestone soil, especially in the dry valleys and gorges and on the south-facing scarp of the Mendips. The site is also important for the large number of rare plants which are associated with Carboniferous limestone habitats. These include dwarf mouse-ear *Cerastium pumilum*, Cheddar pink *Dianthus gratianopolitanus* and rock stonecrop *Sedum forsterianum*, which occur on rocks, screes, cliffs and in open grassland. Transitions to and mosaics with limestone heath, calcareous screes, scrub and 9180 Tilio-Acerion forests are a particular feature of the Cheddar complex part of the site.

- **H9180 Tilio-Acerion forests of slopes, screes and ravines**

The main block of Tilio-Acerion forest at Kings and Urchin's Wood has developed over limestone which outcrops in parts of the site and forms a steep scarp to the south-east. Ash *Fraxinus excelsior* predominates in the canopy with small-leaved lime *Tilia cordata*, yew *Taxus baccata* and elm *Ulmus* spp., mostly formerly coppiced, but including some pollard limes. There is a rich ground flora including lily-of-the-valley *Convallaria majalis*, columbine *Aquilegia vulgaris*, angular Solomon's-seal *Polygonatum odoratum* and purple gromwell *Lithospermum purpureocaeruleum*. There is also a small amount of Tilio-Acerion forest within The Cheddar Complex and as well as lime there are also rare whitebeams (*Sorbus* spp.).

- **H8310 Caves not open to the public**

Caves are formed by the erosion of soluble rocks, such as limestones. They typically form the subterranean components of a distinctive 'karst' landscape, and are associated with various topographic features, including gorges, dry valleys, 8240 Limestone pavements, and dolines (surface depressions and hollows). Caves not open to the public is interpreted as referring to natural caves which are not routinely exploited for tourism, and which host specialist or endemic cave species or support important populations of Annex II species.

Caves lack natural illumination, and therefore support species which are adapted to living in the dark. Microclimatic conditions vary widely within and between caves, and this determines the composition of the fauna and flora. This site includes caves selected because they are important hibernation sites for bat species.

Only natural caves have been selected. Sites that are entirely artificial in origin, e.g. mines and tunnels, are excluded from the Annex I definition, even though in some cases the species present may be similar to those of more natural sites.

Caves within the Cheddar Complex and Wookey Hole SSSIs form some of the finest examples of deep phreatic (sub-water table) limestone caves in Britain. Badger Hole and Rhinoceros Hole are two dry caves on the slopes above the Wookey ravine near the Wookey Hole resurgence and contain *in situ* cave sediments laid down during the Ice Age. The sediments contain remains of fossil mammals and occasional human artefacts. This is the only site in the Mendips and one of the few in Britain at which a continuous sequence of sediments of this age can be examined.

Some caves within the site are included because they support S1303 lesser horseshoe and S1304 Greater horseshoe bat features, but not the H8310 Caves not open to the public feature. Some caves in wider the area are famously exploited for tourism and are excluded from selection.

Qualifying Species:

- **S1303 Lesser horseshoe bat *Rhinolophus hipposideros***

The lesser horseshoe bat is one of the smallest bats in the UK. During the summer they form maternity colonies in old buildings and emerge to hunt in nearby woodland. The species prefers sheltered valleys with extensive deciduous woods or dense scrub, close to roost sites. Where habitat is fragmented, linear features such as hedgerows are important corridors between roosts and foraging areas. Ideally, roost sites offer a range of temperature conditions in different parts of a single site, allowing the bats to change location; otherwise breeding females are likely to change site during the summer. In winter they hibernate in caves, mines and other cave-like places. Summer and winter roosts are usually less than 5-10 km apart. The bats are vulnerable to the loss or disturbance of both summer and winter roost sites and the removal of linear habitat corridors.

The lesser horseshoe bat is also fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of the Conservation of Habitats and Species Regulations 2017, making it a 'European Protected Species'. A [Licence](#) may therefore be required for any activities likely to harm or disturb lesser horseshoe bat.

- **S1304 Greater horseshoe bat *Rhinolophus ferrumequinum***

The greater horseshoe bat is one of the largest bats in the UK. During the summer, they form maternity colonies, generally in large old buildings, and forage in pasture, edges of mixed deciduous woodland and hedgerows. Such mixed land-use, especially on south-facing slopes, favours the beetles, moths and other insects on which the bats feed. In winter they depend on caves, abandoned mines and other underground sites for undisturbed hibernation. A system or series of sites is required, offering a range of temperatures and air-flow patterns. Summer and winter roosts are usually less than 20-30 km apart. The bats are vulnerable to the loss of insect food supplies due to insecticide use, changing farming practices and the loss of broad-leaved tree-cover, and to the loss or disturbance of underground roost sites.

This site in south-west England is selected on the basis of the size of population represented (3% of the UK greater horseshoe bat *Rhinolophus ferrumequinum* population) and its good conservation of structure and function, having both maternity and hibernation sites. This site contains an exceptionally good range of the sites used by the population, comprising two maternity sites in lowland north Somerset and a variety of cave and mine hibernation sites in the Mendip Hills.

The greater horseshoe bat is also fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of the Conservation of Habitats and Species Regulations 2017, making it a 'European Protected Species'. A [Licence](#) may therefore be required for any activities likely to harm or disturb greater horseshoe bat.

Site-specific seasonality of SAC features

The table below highlights in grey those months in which significant numbers of each qualifying feature are most likely to be present at the SAC during a typical calendar year. This table is provided as a general guide only. The presence of the features may vary depending on weather conditions.

Unless otherwise indicated, the months shown below are primarily based on information relating to the general months of occurrence of the feature in the UK. Where site-based evidence is available and has been used to indicate below that significant numbers of the feature are typically present at this SAC outside of the general period, the site-specific references have been added to indicate this.

Applicants considering projects and plans scheduled in the periods highlighted in grey would benefit from early consultation with Natural England given the greater scope for there to be likely significant effects that require consideration of mitigation to minimise impacts to qualifying features during the principal periods of site usage by those features. The months which are *not* highlighted in grey are not ones in which the features are necessarily absent, rather that features may be present in less significant numbers in typical years. Furthermore, in any given year, features may occur in significant numbers in months in which typically they do not. Thus, applicants should not conclude that projects or plans scheduled in months not highlighted in grey cannot have a significant effect on the features. There may be a lower likelihood of significant effects in those months which nonetheless will also require prior consideration.

Any assessment of potential impacts on the features must be based on up-to-date count data and take account of population trends evident from these data and any other available information. Additional site-based surveys may be required.

Feature	Season	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Site-specific references where available
Greater horseshoe bat	Breeding													
Lesser horseshoe bat	Breeding													
Greater horseshoe bat	Hibernation													
Lesser horseshoe bat	Hibernation													

Table A: Presence of qualifying SAC features within component SSSIs

SSSI	SAC feature				
	H6210 Dry grasslands and scrublands on chalk or limestone	H8310 Caves not open to the public	H9180 Mixed woodland on base-rich soils associated with rocky slopes	S1303 <i>Rhinolophus hipposideros</i> ; Lesser horseshoe bat	S1304 <i>Rhinolophus ferrumequinum</i> ; Greater horseshoe bat
Banwell Caves		X		X	X
Banwell Ochre Caves		X		X	X
Brockley Hall Stables					X
Compton Martin Ochre Mine					X
King's Wood and Urchin Wood		X	X		X
The Cheddar Complex	X	X		X	X
Wookey Hole		X			X

Table 1: Supplementary Advice for Qualifying Features: H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*); Dry grasslands and scrublands on chalk or limestone

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	Maintain and restore the total extent of the feature to approximately 151ha	<p>There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. The baseline-value of extent given has been generated using data gathered from the listed site-based surveys. Area measurements given may be approximate depending on the methods, age and accuracy of data collection, and as a result this value may be updated in future to reflect more accurate information.</p> <p>The extent of an Annex I habitat feature covers the sum extent of all of the component vegetation communities present and may include transitions and mosaics with other closely-associated habitat features. Where a feature is susceptible to natural dynamic processes, there may be acceptable variations in its extent through natural fluctuations. Where a reduction in the extent of a feature is considered necessary to meet the Conservation Objective for another Annex I feature, Natural England will advise on this on a case-by-case basis.</p> <p>Within the SAC, this feature is only found within The Cheddar Complex SSSI (137.57ha) and Wookey Hole SSSIs (14.2ha).</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>BURTON <i>et al.</i> 1983</p> <p>NATURAL ENGLAND. 2015b</p> <p>NATURE CONSERVANCY COUNCIL. 1988</p> <p>NATIONAL TRUST. 1995</p>
Extent and distribution of the feature	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	<p>A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species, plus transitional communities) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat.</p> <p>Smaller fragments of habitat can typically support smaller and</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Reference material as above.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>more isolated populations which are more vulnerable to extinction. These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature.</p> <p>The area above Cheddar Gorge is a mosaic of habitats with some calcareous grassland and other patches of mesotrophic and acid grassland</p> <p>Acid grassland is found mainly at Blackrock, with small patches above the Gorge and the rest is mainly towards the eastern end of the Cheddar Complex. Lowland heath (c25ha) is found near Ulbey, Warren & Charterhouse. Calaminarian grassland (c2ha) is focused on spoil heaps at Blackmoor reserve, Charterhouse.</p>	
Structure and function (including its typical species)	Adaptation and resilience	Restore the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	<p>This recognises the increasing likelihood of natural habitat features to absorb or adapt to wider environmental changes. Resilience may be described as the ability of an ecological system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning. Such environmental changes may include changes in sea levels, precipitation and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site. The vulnerability and response of features to such changes will vary. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability.</p> <p>The overall vulnerability of this SAC to climate change has been assessed by Natural England (2015) as being low, taking into account the sensitivity, fragmentation, topography and management of its habitats/supporting habitats. This means</p>	<p>NATURAL ENGLAND. 2015a</p> <p>Additional reference material as above.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			that this site is considered to be vulnerable overall but is a lower priority for further assessment and action. Individual species may be more or less vulnerable than their supporting habitat itself. In many cases, change will be inevitable so appropriate monitoring would be advisable.	
Structure and function (including its typical species)	Functional connectivity with wider landscape	Restore the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	<p>This recognises the potential need at this site to maintain or restore the connectivity of the site to its wider landscape in order to meet the conservation objectives. Structural connectivity refers to physical connections between habitat patches, often referred to as corridors, and functional connectivity is a measure of how easily species can move through the landscape and often relates to vegetation structure or management intensity. These connections can take the form of landscape features such as patches of habitat, hedges, watercourses and verges and will extend beyond the boundary of the designated sites. These features are critical for the migration, dispersal and genetic exchange of the species typically associated with the Annex 1 habitat features of the site.</p> <p>These features may also be important to the operation of the supporting ecological processes on which the designated site and its features may rely. In most cases increasing actual and functional landscape-scale connectivity would be beneficial. Where there is a lack of detailed knowledge of the connectivity requirements of the qualifying feature, Natural England will advise as to whether these are applicable on a case by case basis.</p>	<p>SOMERSET WILDLIFE TRUST. 2016.</p> <p>Additional reference material as above.</p>
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	<p>Maintain the abundance of the species listed to enable each of them to be a viable component of the Annex I habitat feature</p> <ul style="list-style-type: none"> The constant and preferential plants of the CG2 grassland NVC community which form a key 	<p>Some plant or animal species (or related groups of such species) make a particularly important contribution to the necessary structure, function and/or quality of an Annex I habitat feature at a particular site. These species will include;</p> <ul style="list-style-type: none"> Structural species which form a key part of the Annex I habitat's structure or help to define that habitat on a particular SAC (see also the attribute for 'vegetation community composition'). 	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Monitoring reports available from Natural England including surveys by:</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<p>component of a H6210 SAC habitat present on this site.</p> <ul style="list-style-type: none"> Vascular plant assemblage (see explanatory notes for further information) Variety of whitebeam trees <i>Sorbus</i> sp, including species which are endemic to the Gorge. <p>These include but may not be limited to: <i>Sorbus aria</i>; <i>Sorbus anglica</i>; <i>Sorbus eminens</i>, <i>Sorbus porrigentiformis</i>; <i>Sorbus cheddarensis</i>; <i>Sorbus eminentoides</i>; <i>Sorbus rupicoloides</i>.</p>	<ul style="list-style-type: none"> Influential species which are likely to have a key role affecting the structure and function of the habitat (such as bioturbators (mixers of soil/sediment), grazers, surface borers, predators or other species with a significant functional role linked to the habitat) Site-distinctive species which are considered to be a particularly special and distinguishing component of an Annex I habitat on a particular SAC. <p>There may be natural fluctuations in the frequency and cover of each of these species. The relative contribution made by them to the overall ecological integrity of a site may vary, and Natural England will provide bespoke advice on this as necessary. The list of species given here for this Annex I habitat feature at this SAC is not necessarily exhaustive. The list may evolve, and species may be added or deleted, as new information about this site becomes available.</p> <p>Vascular plant assemblage includes: Cheddar Pink (<i>Dianthus gratianopolitanus</i>); Slender Bedstraw (<i>Galium pumilum</i>); Little Robin (<i>Geranium purpureum</i>); Spring Cinquefoil (<i>Potentilla neumanniana</i>). Dwarf mouse-ear (<i>Cerastium pumilum</i>); Soft-leaved sedge (<i>Carex montata</i>); Rock stonecrop (<i>Sedum forsterianum</i>); Limestone Fern (<i>Gymnocarpium robertianum</i>); Spring sandwort (<i>Minuartia verna</i>); Slender Tare (<i>Vicia parviflora</i>); Bitter Wood-vetch (<i>Vicia orobus</i>); Narrow-lipped Helleborine (<i>Epipactis muelleri</i> ssp. <i>leptochila</i>);</p>	<p>ALDER ECOLOGY Ltd. 2010 HOUSTON. 2006</p> <p>HOUSTON. 2012</p> <p>McDONNELL. 1997</p> <p>WESSEX ECOLOGICAL CONSULTANTS. 2004</p> <p>CROUCH. 2016</p>
Structure and function (including its typical species)	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the habitat.	Soil is the foundation of basic ecosystem function and its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes	Additional reference material as above.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			associated with this Annex I feature.	
Structure and function (including its typical species)	Supporting off-site habitat	Maintain or where necessary restore the extent, quality and spatial configuration of land or habitat surrounding or adjacent to the site which is known to support the feature.	<p>This recognises that sites do not exist in isolation. The structure and function of the qualifying habitat, including its typical species, may rely upon the continued presence of areas which are outside the designated site boundary and changes in surrounding land-use may adversely (directly or indirectly) affect the functioning of the feature and its component species. This supporting habitat may be critical to the typical species of the feature to support their feeding, breeding, roosting, population dynamics ('metapopulations'), pollination or to prevent/reduce/absorb damaging impacts from adjacent land uses e.g. pesticide drift, nutrient enrichment.</p> <p>Recent ecological network mapping provides a useful picture of the potential high-quality habitats in and around The Cheddar Complex and Wookey Hole some of which support high quality calcareous grassland habitats. Many of the sites covered by The Mendip Limestone Grassland SAC along with various other key SSSIs including King and Middle Down SSSI (Somerset Wildlife Trust), Bubwith Acres / Bradley Cross (Somerset Wildlife Trust), Draycott Sleigh SSSI, The Perch SSSI, Axbridge and Frys Hill.</p> <p>The CORE toolbox developed by Forest Research and Somerset Wildlife Trust allows ecological network maps to be assessed for coherence and resilience. This method highlights where ecological networks are fragmented and where creation or restoration work could link up habitats such as species rich grassland and woodland.</p>	SOMERSET WILDLIFE TRUST. 2016.
Structure and function (including its typical species)	Vegetation community composition	<p>Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification type</p> <p>CG2 - <i>Festuca ovina</i>-<i>Avenula</i></p>	<p>This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC).</p> <p>Maintaining or restoring these characteristic and distinctive</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT), available from Natural</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<i>pratensis</i> grassland	vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature. This will also help to conserve their typical plant species (i.e. the constant and preferential species of a community), and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations).	England on request.
Structure and function (including its typical species)	Vegetation community transitions	Maintain the pattern of natural vegetation zonations/transitions	Transitions/zonations between adjacent but different vegetation communities are usually related to naturally-occurring changes in soil, aspect or slope. Such 'ecotones' retain characteristics of each bordering community and can add value in often containing species not found in the adjacent communities. Retaining such transitions can provide further diversity to the habitat feature, and support additional flora and fauna.	Additional reference material as above.
Structure and function (including its typical species)	Vegetation: proportion of herbs (including <i>Carex</i> spp)	Maintain the proportion of herbaceous species within the range 40%-90%	A high cover of characteristic herbs, including sedges (<i>Carex</i> species) is typical of the structure of this habitat type.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Vegetation: undesirable species	<p>Restore the frequency/cover of the following undesirable species to within acceptable levels and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread;</p> <p>No species/taxa more than occasional throughout the sward or singly or together more than 5% cover</p> <p>No more than 10% cover of Tor –grass (<i>Brachypodium pinnatum</i>) and Upright brome (<i>Bromopsis erecta</i>), in period</p>	<p>There will be a range of undesirable or uncharacteristic species which, if allowed to colonise and spread, are likely to have an adverse effect on the feature's structure and function, including its more desirable typical species. These may include invasive non-natives such as <i>Cotoneaster</i> spp, or coarse and aggressive native species which may uncharacteristically dominate the composition of the feature.</p> <p>Target set to Restore because invasive non-natives are widespread on the site. They include <i>Cotoneaster</i> spp. (<i>Cotoneaster</i>); Common lilac (<i>Syringa vulgaris</i>); Rose-of-Sharon (<i>Hypericum calycinum</i>); Turkey oak (<i>Quercus cerris</i>). Control measures have been put in place but further works are required to eradicate them from the SAC</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT), available from Natural England on request</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<p>May-July</p> <p>No more than 5% cover of tree and scrub cover</p> <p>Invasive non-native species should be absent.</p>		
Supporting processes (on which the feature relies)	Air quality	<p>Restore the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).</p>	<p>This habitat type is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it.</p> <p>Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH₃), oxides of nitrogen (NO_x) and sulphur dioxide (SO₂), and critical loads for nutrient nitrogen deposition and acid deposition. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis.</p> <p>Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales.</p> <p>Target set to Restore because current levels of nitrogen deposition (APIS accessed on 10 December 2018) are exceeding the critical load for H6210 grassland.</p>	<p>More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting processes (on which the feature relies)	Conservation measures	Restore the management measures (either within and/or outside the site boundary as appropriate) which are necessary to Restore the structure, functions and supporting processes associated with the feature	Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, Site Management Strategies or Plans, the Views about Management Statement for the underpinning SSSI and/or management agreements.	Additional reference material as above. ENGLISH NATURE, 2005a. ENGLISH NATURE, 2005b.
<p>Version Control Advice last updated: 19 February 2019 following stakeholder comments. ‘Functional connectivity with wider landscape’ attribute reference added and more detail added to clarify attribute in supporting and explanatory notes. More detail added to “Supporting off site habitat” to clarify attribute in supporting and explanatory notes including explanation of CORE toolbox designed by Somerset Wildlife Trust and Forest Research.</p> <p>Variations from national feature-framework of integrity-guidance: The targets for some attributes listed above include both ‘maintain’ or ‘restore’ objectives. This is because this SPA is an extensive complex of geographically-separate component sites which are currently in different states of condition. Overall, both objectives will be applicable to the SPA but these will differ between each component site depending on its particular circumstances. Natural England will be able to provide further specific advice on request.”</p>				

Table 2: Supplementary Advice for Qualifying Features: H8310. Caves not open to the public

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	Maintain the total extent of the feature	<p>See explanatory notes for this attribute in Table 1.</p> <p>2200m passages mentioned in the Geological Conservation Review for The Cheddar Complex SSSI, but this is known to not include significant areas of the interest.</p> <p>Plans showing the passages and their connectivity are available within the Geological Conservation Review which constitutes the best easily available indication of extent.</p>	<p>WALTHAM <i>et al.</i> 1997.</p> <p>JNCC SAC standard data form</p> <p>Anecdotal evidence, B Corns, T Lane 2018</p>
Structure and function (including its typical species)	Naturalness	Maintain the natural structure of the cave feature and ensure it can continue to evolve naturally.	<p>This should be interpreted as referring to natural caves which are not routinely exploited for tourism, and which host specialist or endemic cave species.</p> <p>Several notable caves outside of the SAC are already exploited for tourism, these areas should not be extended into areas with cave decoration (such as stalactites and stalagmites) or bats unless adequate measures are in place to protect them, and this would have to be agreed in advance with Natural England.</p>	
Structure and function (including its typical species)	Sedimentation	Old cave sediments are undisturbed and maintained in an unmodified form, and increased sediment loadings from alterations of inflowing watercourses are avoided.	<p>The Cheddar Complex represents a nationally important example of dated sediments in limestone caves.</p> <p>Elsewhere, sediment loading from ingress to the cave systems can damage interest features either directly or through the process of necessary removal/cleaning and should be reduced.</p>	WALTHAM <i>et al.</i> 1997.
Supporting processes (on which the feature relies)	Cave water quality	Avoid or reduce any metal-ion contamination into interstitial and cave waters	Though little data exists, there is some evidence which points to major impacts on the characteristic subterranean fauna from metal contamination. Impacts on the biofilms may be significant.	
Supporting processes (on which the feature relies)	Hydrology	At a site, unit and/or catchment level (as necessary, Maintain natural hydrological processes to provide the conditions necessary to sustain the feature within the	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the feature.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		site	<p>This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts. Important to maintain natural geomorphological processes and to provide supporting habitat for cave flora and fauna; use of groundwater monitoring may be used as a partial proxy for cave water quality.</p> <p>There is potential for hydraulic fracturing in this area.</p>	
Supporting processes (on which the feature relies)	Illumination	Maintain naturally-occurring light levels within the cave body, whilst minimising any artificial light.	Caves lack natural illumination, and therefore support species which have evolved or are adapted to living in the dark. Microclimatic conditions vary widely within and between caves, and this determines the composition of the fauna and flora at each site. Disturbance or modification of those patterns can influence numerous aspects of plant and animal behaviour. For example, light pollution (from direct glare, chronically increased illumination and/or temporary, unexpected fluctuations in lighting) can affect animal navigation, competitive interactions, predator-prey relations, and animal physiology.	
Supporting processes (on which the feature relies)	Water quality	<p>Where the feature is dependent on surface water and/or groundwater, Maintain water quality and quantity to a standard which provides the necessary conditions to support the feature.</p> <p>Where the feature is not dependent on surface water and/or groundwater, water quality and quantity should still be maintained to a level at which existing natural features should not be damaged and features that would be expected to develop naturally are not unreasonably inhibited</p>	<p>For many SAC features which are dependent on wetland habitats supported by surface and/or ground water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year. Poor water quality and inadequate quantities of water can adversely affect the structure and function of this habitat type.</p> <p>Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD 2000/60/EC) will also be sufficient to support the achievement of SAC Conservation Objectives but in some cases more stringent standards may be needed. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC. Although nutrients are critical to the fauna associated with this feature as effectively the only significant Nitrogen source, high initial inputs deplete the fauna, and whilst it subsequently recovers (and thrives) it raises the possibility of seriously damaging rare genotype</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			populations in the first nutrient wave. See notes regarding sedimentation.	
Version Control Advice last updated: 19 February 2019 Additional text added within 'Hydrology' attribute to identify potential of hydraulic fracturing within the geology following stakeholder feedback.				
Variations from national feature-framework of integrity-guidance: The site is not known to support any significant cave fauna or flora (anecdotal evidence, B Corns 2018) therefore the relevant typical species attribute has been removed. Similarly there is no known interest relating to woody debris, indeed there is a greater likelihood that woody debris would have caused a negative impact in increasing sedimentation, impeding monitoring/restoration, and increasing CO ₂ levels from decomposition so the woody debris attribute has similarly been removed.				

Table 3: Supplementary Advice for Qualifying Features: H9180. Tilio-Acerion forests of slopes, screes and ravines; Mixed woodland on base-rich soils associated with rocky slopes *

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	<p>Maintain the total extent of the features to approximately 158ha hectares</p> <p>King's Woods & Urchin Wood SSSI 128ha (combined W8 & W10) The Cheddar Complex SSSI 30ha</p>	<p>See explanatory notes for this attribute in Table 1</p> <p>For this feature tree roots (particularly of veteran trees) can extend a considerable distance beyond the boundary of the site - they can be impacted by soil compaction (such as caused by vehicles or construction works); agricultural operations or other soil disturbance (like trenches); and agro chemicals or other chemicals which get into the soil.</p> <p>Any loss of woodland area - whether at the edge or in the middle of a site will reduce the core woodland area where woodland conditions are found - these support significant assemblages of species dependent on woodland conditions (e.g. lichens and bryophytes - being one example). Loss of any woodland area which fragments a site into different parts will clearly disturb the movement of species between the remaining parts of the woodland.</p> <p>In the absence of specific site surveys tailored to identifying extents of Tilio-Acerion habitat, NVC community W8 has been used as a proxy to the Annex I habitat. This, in part, explains the discrepancy between the JNCC standard data form and the individual FCT figures (given the figure for King's Wood and Urchin Wood SSSI combining W8 & W10). Further survey effort is needed to determine the proper extent of the Annex 1 habitat (and/or its proxy community W8 as no NVC maps are known to exist) since there are specific areas known to exhibit features such as slopes, screes and ravines, but these are as yet unmapped and undefined</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT), available from Natural England on request.</p>
Extent and distribution of the feature	Spatial distribution of the feature within the site	Restore the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species, plus transitional communities) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to	This attribute will be periodically monitored as part of Natural England's site condition assessments .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>future environmental changes. This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat.</p> <p>Smaller fragments of habitat can typically support smaller and more isolated populations which are more vulnerable to extinction. These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature.</p> <p>See also notes for 'Extent' attribute.</p> <p>Restore the woodland by reducing the number of Sycamore.</p>	<p>Natural England component SSSI Favourable Condition Tables (FCT). Available on request from Natural England.</p> <p>NATURAL ENGLAND. 2015b</p>
Structure and function (including its typical species)	Adaptation and resilience	Maintain the resilience of the feature by ensuring a diversity of site-native trees (at least 4 site native tree species) e.g. ash/ small-leaved lime/ aspen/ alder/ sycamore/ rowan/ bird cherry/ birch) is present across the site.	<p>See explanatory notes for this attribute in Table 1</p> <p>Chalara Ash die back (<i>Hymenoscyphus fraxineus</i>) is a concern for this site and may in the future result in changes to the vegetation composition.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT). Available from Natural England on request.</p>
Structure and function (including its typical species)	Browsing and grazing by herbivores	Maintain browsing at a (low) level that allows well developed understorey with no obvious browse line, & lush ground vegetation with some grazing sensitive species evident (bramble, ivy, etc), and tree seedlings and sapling common in gaps.	<p>Herbivores, especially deer, are an integral part of woodland ecosystems. They are important in influencing woodland regeneration, composition and structure and therefore in shaping woodland wildlife communities. In general, both light grazing and browsing is desirable to promote both a diverse woodland structure and continuous seedling establishment.</p> <p>Short periods with no grazing at all can allow fresh natural regeneration of trees, but a long-term absence of herbivores can result in excessively dense thickets of young trees which</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT), Available on request from Natural England.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>shade out ground flora and lower plant species. However, heavy grazing by deer or sheep prevents woodland regeneration, and can cause excessive trampling and/or poaching damage, canopy fragmentation, heavy browsing, barkstripping and a heavily grazed sward.</p> <p>Feral goats are present in the Cheddar Complex SSSI which are highly beneficial in controlling scrub growth on grassland but could damage other interest features such as the woodland.</p>	
Structure and function (including its typical species)	Invasive, non-native and/or introduced species	<p>Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the feature</p> <p>At least 95% of canopy cover in any one layer of site-native or acceptable naturalised species.</p> <p>Death, destruction or replacement of native woodland species through effects of introduced fauna or other external unnatural factors not more than 10% by number or area in a five year period.</p>	<p>Invasive or introduced non-native species are a serious potential threat to the biodiversity of native and ancient woods, because they are able to exclude, damage or suppress the growth of native tree, shrub and ground species (and their associated typical species), reduce structural diversity and prevent the natural regeneration of characteristic site-native species.</p> <p>Once established, the measures to control such species may also impact negatively on the features of interest (e.g. use of broad spectrum pesticides). Such species can include Holm Oak, Turkey Oak, Laurel, Rhododendrons, snowberry, Japanese knotweed, giant hogweed and Himalayan balsam, for example. Similarly, this would include pheasants, rabbits and non-native invertebrate 'pest' species.</p> <p>The consideration of what is 'introduced non-native' has become more complex in the light of the likely impacts of Chalara ash dieback. It is likely that species such as Sycamore and Beech, whilst not usually considered a native component of ancient woodland in this area, may have to move to an accepted naturalised status to retain a broad enough mix of acceptable species and spread the risk of possible future diseases. A continuing watching brief should be the default on the status of Chalara and the possible impacts of these substitute species on individual sites. Other non-native spp. like Holm oak, Turkey oak, Rhododendron and Laurel are or could become an issue within the woodlands and work should be</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT). Available on request from Natural England.</p> <p>SAC Site Improvement Plan (SIP), available from https://designatedsites.naturalengland.org.uk/</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			completed to control and where possible eradicate them.	
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	<p>Maintain the abundance of the species listed to enable each of them to be a viable component of the Annex I habitat feature:</p> <p>Ash (<i>Fraxinus excelsior</i>) predominates in the canopy with small-leaved lime (<i>Tilia cordata</i>), yew (<i>Taxus baccata</i>) and elm (<i>Ulmus</i> spp.), mostly formerly coppiced, but including some pollard limes.</p> <p>Variety of whitebeam trees <i>Sorbus</i> sp, including species which are endemic to the Gorge.</p> <p>These include but may not be limited to: <i>Sorbus aria</i>; <i>Sorbus anglica</i>; <i>Sorbus eminens</i>, <i>Sorbus porrigentifformis</i>; <i>Sorbus cheddarensis</i>; <i>Sorbus eminentoides</i>; <i>Sorbus rupicoloides</i>.</p> <p>Greater Horseshoe bats <i>Rhinolophus ferrumequinum</i></p> <p>Common Dormouse <i>Muscardinus avellanarius</i></p>	<p>See explanatory notes for this attribute in Table 1.</p> <p>Both the Cheddar Complex and to a lesser extent King's Wood & Urchin Wood are known to support various species of whitebeam trees some of which are endemic to Cheddar Gorge.</p> <p>Chalara Ash die back (<i>Hymenoscyphus fraxineus</i>) is a concern for this site and may in the future result in changes to the species composition.</p>	<p>Natural England component SSSI Favourable Condition Tables (FCT). Available on request from Natural England</p> <p>CROUCH, H. 2016</p> <p>WESSEX ECOLOGICAL CONSULTANTS. 2004.</p>
Structure and function (including its typical species)	Regeneration potential	Maintain the potential for sufficient natural regeneration of desirable trees and shrubs; typically tree seedlings of desirable species (measured by seedlings and <1.3m saplings -	The regeneration potential of the woodland feature must be maintained if the wood is to be sustained and survive, both in terms of quantity of regeneration and in terms of appropriate species. This will include regeneration of the trees and shrubs from saplings or suckers, regrowth from coppice stools or pollards, and where appropriate planting. Browsing and grazing	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		above grazing and browsing height) should be visible in sufficient numbers in gaps, at the wood edge and/or as regrowth as appropriate	levels must permit regeneration at least in intervals of 5 years every 20. The density of regeneration considered sufficient is less in parkland sites than in high forest. Regeneration from pollarding of veteran trees should be included where this is happening.	Favourable Condition Tables (FCT). Available on request from Natural England.
Structure and function (including its typical species)	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the habitat.	Soil is the foundation of basic ecosystem function and a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature.	
Structure and function (including its typical species)	Vegetation community composition	<p>Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification type:</p> <p><i>W8 – Fraxinus excelsior – Acer campestre – Mercurialis perennis</i> woodland</p>	<p>This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC).</p> <p>Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature.</p> <p>Chalara Ash die back (<i>Hymenoscyphus fraxineus</i>) is a concern for this site and may in the future result in changes to the vegetation composition.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT). Available on request from Natural England</p>
Structure and function (including its typical species)	Vegetation structure - age class distribution	Maintain at least 3 age classes (pole stage/ medium/ mature) spread across the average life expectancy of the commonest trees.	A distribution of size and age classes of the major site-native tree and shrub species that indicate the woodland will continue in perpetuity, and will provide a variety of the woodland habitats and niches expected for this type of woodland at the site in question.	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT). Available on request from Natural England</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	Vegetation structure - canopy cover	Maintain an appropriate tree canopy cover across the feature, between 30-90% of the stand.	<p>Canopy cover is the overall proportion of vegetative cover consisting of any woody layer ranging from established regeneration to mature and veteran stages. Woodland canopy density and structure is important because it affects ecosystem function and in particular microclimate, litterfall, soil moisture, nutrient turnover and shading; this in turn influences the composition of plants and animals in lower vegetation layers and soil.</p> <p>Open canopies with just scattered trees will have less of a woodland character and reduced diversity of woodland-dependent species (although they may be still be important as a form of woodland-pasture). Completely closed canopies across the whole woodland are not ideal either however, as they cast heavier shade and support fewer species associated with edges, glades and open grown trees, and have little space where tree regeneration could occur. In general, the woodland canopy of this feature should provide a core of woodland interior conditions with some open and edge habitat as well.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT). Available on request from Natural England</p>
Structure and function (including its typical species)	Vegetation structure - dead wood	Maintain the continuity and abundance of standing or fallen dead and decaying wood, typically between 30 - 50 m ³ per hectare of standing or fallen timber or ≥3 fallen trees >20cm per hectare, and ≥4 standing dead trees per hectare	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context.	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT). Available on request from Natural England</p>
Structure and function (including its typical species)	Vegetation structure - old growth	Maintain the extent and continuity of undisturbed, mature/old growth stands (typically comprising at least 10% of the feature at any one time) and the assemblages of veteran and ancient trees (typically 5-10 trees per hectare).	Good woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context. For this habitat type, old or over-mature elements of the woodland are particularly characteristic and important features, and their continuity	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT). Available on request from Natural England</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			should be a priority.	
Structure and function (including its typical species)	Vegetation structure - open space	Maintain areas of permanent/temporary open space within the woodland feature at $\geq 10\%$ of area	<p>Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context.</p> <p>Having some open, sunlit and largely tree-less areas as part of the woodland community is often important to facilitate natural tree and shrub regeneration and also to provide supporting habitat for specialist woodland invertebrates, birds, vascular and lower plants. Such open space can be permanent or temporary and may consist of managed grazed areas, linear rides and glades, or naturally-produced gaps caused by disturbance events such as windthrow/fire/tree falling over/snow damage.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT). Available on request from Natural England</p>
Structure and function (including its typical species)	Vegetation structure - shrub layer	Maintain an understorey of shrubs (2-5m) cover $\geq 20\%$ of the stand area (this will vary with light levels and site objectives)	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context.	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT), available from https://designatedsites.naturalengland.org.uk/</p>
Structure and function (including its typical species)	Vegetation structure - woodland edge	Maintain a graduated woodland edge into adjacent semi-natural open habitats, other woodland/wood-pasture types or scrub.	<p>Woodland edge is defined as being the transitional zone between the forest feature and adjacent but different habitat types - the best woodland edges will have a varied structure in terms of height and cover. Many typical forest species make regular use of the edge habitats for feeding due to higher herb layer productivity and larger invertebrate populations.</p> <p>Grasslands / arable fields managed with high doses of agro-</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			chemicals could potentially not allow this gradation of woodland edge and could have other impacts on the integrity of the site (pollution/ nutrient enrichment etc).	
Supporting processes (on which the feature relies)	Air quality	Restore the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	See explanatory notes for this attribute in Table 1 Target set to Restore because current levels of nitrogen and acid deposition (APIS accessed on 11/12/2018) are exceeding the critical load for H9180 woodland.	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk). NATURAL ENGLAND. 2015. North Somerset and Mendip Bats SAC Site Improvement Plan (SIP)
Supporting processes (on which the feature relies)	Functional connectivity with wider landscape	Maintain the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	This recognises the potential need at this site to maintain or restore the connectivity of the site to its wider landscape in order to meet the conservation objectives. Structural connectivity refers to physical connections between habitat patches, often referred to as corridors, and functional connectivity is a measure of how easily species can move through the landscape and often relates to vegetation structure or management intensity. These connections can take the form of landscape features such as patches of habitat, hedges, watercourses and verges and will extend beyond the boundary of the designated sites. These features are critical for the migration, dispersal and genetic exchange of the species typically associated with the Annex 1 habitat features of the site. These features may also be important to the operation of the supporting ecological processes on which the designated site and its features may rely. In most cases increasing actual and functional landscape-scale connectivity would be beneficial. Where there is a lack of detailed knowledge of the connectivity requirements of the qualifying feature, Natural England will advise as to whether these are applicable on a case by case basis.	WEST OF ENGLAND PARTNERSHIP (WENP). 2013 SOMERSET WILDLIFE TRUST. 2016.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>Numerous exercises have been undertaken recently to map existing and prospective ecological networks.</p> <p>Land surrounding the sites, if managed sensitively, will buffer the site from damaging impacts and can provide other benefits such as providing species with places to feed, roost and spread into over time.</p>	
Supporting processes (on which the feature relies)	Hydrology	At a site, unit and/or catchment level (as necessary, Maintain natural hydrological processes to provide the conditions necessary to sustain the feature within the site	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts. This is included as disruption/ damage to hydrological processes could be caused by activities at some distance from the site boundary. E.g. through extraction of ground or surface waters; diverting or damming river channels; pollution of water source; channel alignment that disrupts natural geomorphological processes; tunnelling <i>etc.</i>	
Supporting processes (on which the feature relies)	Illumination	Ensure artificial light is Maintained at a level which is unlikely to affect natural phenological cycles and processes to the detriment of the feature and its typical species at this site.	<p>Woodland biodiversity has naturally evolved with natural patterns of light and darkness, so disturbance or modification of those patterns can influence numerous aspects of plant and animal behaviour. For example, light pollution (from direct glare, chronically increased illumination and/or temporary, unexpected fluctuations in lighting) can affect animal navigation, competitive interactions, predator-prey relations, and animal physiology. Flowering and development of trees and plants can also be modified by un-natural illumination which can disrupt natural seasonal responses.</p> <p>Potential for significant impact on bat populations supported by the woodland and its environs.</p>	
Version Control Advice last updated:				

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
<p>19 February 2019 following stakeholder comments. 'Functional connectivity with wider landscape' attribute reference added and more detail added to clarify attribute in supporting and explanatory notes including how the sensitive management of surrounding sites can offer some buffer to future impacts. Chalara Ash die back (<i>Hymenoscyphus fraxineus</i>) mentioned throughout in the supporting and explanatory notes as currently impacting vegetation composition within the site.</p>			
<p>Variations from national feature-framework of integrity-guidance: N/A</p>			

Table 4: Supplementary Advice for Qualifying Features: S1303. *Rhinolophus hipposideros*; Lesser horseshoe bat

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Population (of the feature)	Population abundance - hibernation site	Maintain the abundance of the population at a level of above 75 bats, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	<p>This will ensure there is a viable population of the feature which is being maintained at or increased to a level that contributes as appropriate to its Favourable Conservation Status across its natural range in the UK. Due to the dynamic nature of population change, the target-value given for the population size or presence of this feature is considered to be the minimum standard for conservation/restoration measures to achieve.</p> <p>This minimum-value may be revised where there is evidence to show that a population's size or presence has significantly changed as a result of natural factors or management measures and has been stable at or above a new level over a considerable period (generally at least 10 years). The values given here may also be updated in future to reflect any strategic objectives which may be set at a national level for this feature.</p> <p>Given the likely fluctuations in numbers over time, any impact-assessments should focus on the current size of the site's population, as derived from the latest known or estimated level established using the best available data. This advice accords with the obligation to avoid deterioration of the site or significant disturbance of the species for which the site is designated, and seeks to avoid plans or projects that may affect the site giving rise to the risk of deterioration. Similarly, where there is evidence to show that a feature has historically been more abundant than the stated minimum target and its current level, the ongoing capacity of the site to accommodate the feature at such higher levels in future should also be taken into account in any assessment.</p> <p>Unless otherwise stated, the population size or presence will be that measured using standard methods, such as peak mean counts or breeding surveys. This value is also provided recognising there will be inherent variability as a result of</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Monitoring information is held by the Natural England local area team. This information is sensitive and requests for it should be discussed with Natural England</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>natural fluctuations and margins of error during data collection. Whilst we will endeavour to keep these values as up to date as possible, local Natural England staff can advise that the figures stated are the best available.</p> <p>There are no counts for the SAC as a whole at a certain point in time. However, the following data has been collated:</p> <p>The hibernating population has been assessed over the years 2017 and 2018 at Cheddar Complex SSSI and are as follows: January 2017 – 133 March 2017 – 88 January 2018 – 53 March 2018 – 122</p> <p>The following SSSIs are part of the North Somerset and Mendip Bats SAC but do not have Lesser Horseshoe bats as a SSSI notified feature. They are however part of the North Somerset Bat assemblage:</p> <p>Banwell Caves SSSI – 20 (peak count) Banwell Ochre Mines SSSI – 88 (peak count)</p>	
Supporting habitat: extent and distribution	Distribution of supporting habitat	Maintain the distribution and continuity of the feature and its supporting habitat, including where applicable its component vegetation types and associated transitional vegetation types, across the site.	<p>A contraction in the range, or geographic spread, of the feature (and its component vegetation) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. Contraction can also fragment habitats within a site and disrupt the ability of the feature to move around the site and to occupy and use habitat patches. Fragmentation of habitats typically results in smaller and more isolated populations which are more vulnerable to extinction. This could undermine the ability of the feature to adapt to future environmental changes</p> <p>Such fragmentation may have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for this feature and this</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			may affect its viability.	
Supporting habitat: extent and distribution	Extent of supporting habitat	Maintain the total extent of the habitats which support the feature at/to: 446ha (Cheddar Caves Complex SSSI)	In order to contribute towards the objective of achieving an overall favourable conservation status of the feature at a UK level, it is important to maintain or if appropriate restore the extent of supporting habitats and their range within this SAC. The information available on the extent and distribution of supporting habitat used by the feature may be approximate depending on the nature, age and accuracy of data collection, and may be subject to periodic review in light of improvements in data.	This attribute will be periodically monitored as part of Natural England's site condition assessments . Natural England component Cheddar Caves Complex SSSI Favourable Condition Tables (FCT). Available on request from Natural England
Supporting habitat: structure/ function	Condition of underground site hibernation	Maintain the structural integrity of the roost space, with no recent collapses/falls or signs of geological instability.	Damp, draught and increases in light levels are likely to have a negative effect on the temperature and humidity of the roost.	
Supporting habitat: structure/ function	Flightlines from roost into surrounding habitat and foraging areas	Maintain the presence, structure and quality of any linear landscape features which function as flightlines. Flightlines should remain unlit, functioning as dark corridors.	Roost choice, and the presence of bats within the SAC, is likely to be influenced by the site's ability to provide bats with food and shelter. The provision of rich feeding areas around a roost, and the commuting routes (or flight-lines) to them, will be an important element in sustaining the SAC population. Lesser horseshoes tend to forage 2-3km from their roost, though they can travel up to 4km from their roosts to suitable foraging grounds. Lesser horseshoes commute and forage along linear features over grassland and woodland. They feed on flies (mainly midges), small moths, caddis flies, lacewings, beetles, small wasps and spiders. Permanent pasture and ancient woodland linked with an abundance of tall bushy hedgerows is ideal supporting habitat for this species (English Nature, 2003). Flightlines will extend beyond the designated site boundary into the wider local landscape. Flightlines should remain unlit, functioning as dark corridors.	WILLIAMS <i>et al.</i> 2011
Supporting	Supporting	Maintain any core areas of	This recognises that sites do not exist in isolation. The structure	BAT CONSERVATION TRUST.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
habitat: structure/ function	off-site habitat (foraging areas)	feeding habitat outside of the SAC boundary that are critical to Lesser Horseshoe bats during their [breeding OR hibernation] period	<p>and function of the qualifying habitat, including its typical species, may rely upon the continued presence of areas which are outside the designated site boundary and changes in surrounding land-use may adversely (directly or indirectly) affect the functioning of the feature and its component species.</p> <p>This supporting habitat may be critical to the feature to support, for example, their ability to feed, breed, roost and their population dynamics ('metapopulations'). Surrounding areas can also prevent, reduce or absorb damaging impacts from adjacent land uses such as pesticide drift.</p> <p>Roost choice, and the presence of bats within the SAC, is likely to be influenced by the site's ability to provide bats with food and shelter. Key feeding areas around a roost, and the commuting routes (or flight-lines) between them, will be an important element of sustaining the SAC population.</p> <p>Lesser horseshoes tend to forage within 2.5km of their summer roost, though they can travel up to 4km from these roosts to suitable foraging grounds (Schofield, 2008). Within the winter, their foraging range is reduced, with a mean foraging radius of 1.2 km around hibernation sites reported. Lesser horseshoes commute and forage along linear features over wet grassland and woodland. Permanent pasture and ancient woodland linked with an abundance of tall bushy hedgerows is ideal supporting habitat for this species. Flight-lines should remain as unlit, dark corridors.</p> <p>Flightlines will extend beyond the designated site boundary into the wider local landscape.</p> <p>During the winter, lesser horseshoes emerge from hibernacula about once every two weeks for water / food, therefore condition of habitat in the immediate vicinity of hibernacula is very important. Winter prey (e.g. crane-flies, winter gnats, midges, dung flies) is often associated with damp woodland with decaying wood, and grazed pasture with abundant dung. Feeding areas used by SAC bats may be outside of the SAC</p>	<p>2016</p> <p>NORTH SOMERSET COUNCIL <i>et al.</i> 2017</p> <p>SCHOFIELD. 2008</p> <p>SOMERSET WILDLIFE TRUST. 2016.</p> <p>WILLIAMS <i>et al.</i> 2011</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>boundary but be critical to successful hibernation (these undesignated areas are sometimes referred to as 'sustenance zones' or 'functionally-linked land').</p> <p>Hibernating bats need a water source close to the hibernation site. Freshwater is largely supplied by ponds and small streams. Measures to improve water retention, e.g. ponds, re-wetting bogs and slowing the flow of water from the land to the main rivers will help to maintain a fresh water supply for the bats.</p> <p>North Somerset Council <i>et al.</i> (2017) have published a guidance document for developers who are planning to build near to the SAC. This identifies zones around the SAC and bands within the zone reflect the likely importance of the habitat for bats and proximity to the maternity and other roost sites. Any development activity taking place within these zones may have the potential to impact on the SAC. Special consideration is also given to habitat within 600m of the roost site, within the juvenile Sustenance Zone. Feeding areas within this 600m zone are vitally important during spring and summer months for pregnant and lactating females, as well as their young, with bats spending about half their peak activity time within this zone.</p>	
Supporting habitat: structure/ function	Internal condition of underground site - maternity and hibernation	Maintain or as necessary restore appropriate light levels, humidity, temperature and ventilation.	Greater and lesser horseshoe bats roost mainly in underground sites during winter, often communally. The preferred temperature of lesser horseshoe bat hibernation sites is a stable 6-7°C, with humidity approaching 100%. Damp, draught and increases in light levels are likely to have a negative effect on the temperature and humidity of the roost. There should be no recent collapses/falls or signs of geological instability.	
Supporting habitat: structure/ function	Roost access	Maintain the number of access points to the roost at an optimal size and in an unlit and unobstructed state, with surrounding vegetation providing sheltered flyways without	<p>This will prevent any negative internal climatic changes within the roost and maintain the ability of bats to freely enter and leave the roost as necessary.</p> <p>Normal minima dimensions for horseshoe access points; lesser horseshoes 300 x 200mm.</p>	Surveys are carried out by licenced persons and organisations for Natural England – This information is sensitive and requests for it should be discussed with Natural England

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		obstructing access points.	<p>Vegetation is required close to the entrance to enable bats to feel secure enough to leave at dusk rather than delaying until fully dark. Any lights shining on the entrance are likely to deter the bats from leaving (Downs <i>et al.</i> 2003).</p> <p>No artificial lights should be shining on the entrance to the hibernation site.</p>	<p>DOWNS <i>et al.</i> 2003</p> <p>JNCC. 2004</p> <p>STONE <i>et al.</i> 2009</p>
Supporting processes (on which the feature and/or its supporting habitat relies)	Adaptation and resilience	Maintain the feature's ability, and that of its supporting habitat, to adapt or evolve to wider environmental change, either within or external to the site.	<p>See explanatory notes for this attribute in Table 1</p> <p>The Lesser Horseshoe bat in England is at the northern edge of its European range. With climate change it is expected that their range may move further north.</p> <p>In terms of lesser horseshoe bat response to climate change, increasing winter temperatures may result in less time in torpor/hibernation e.g. more frequent awakening or earlier spring emergence. This would require more frequent winter feeding and food to be available earlier in the year. The availability of both food and water may change. Water availability is particularly important for lactating females.</p> <p>Temperature regulation within roost/hibernation sites or the availability of roosts with a variety of temperature and humidity regimes is important to ensure the continued availability of suitable roosts. There may be a decrease in hunting ability with an increase in wet weather as bats avoid hunting in heavy rain due to increased energy costs.</p> <p>Changing vegetation around caves/mines may affect humidity of the hibernation site and the availability of food during winter emergence. Wider landscape changes in vegetation may also affect food availability and flightlines between foraging areas. Climate change resilience will be aided by the protection and maintenance/restoration of quality feeding habitat close to the roosts and the identification and protection of satellite roosts and their surrounding habitat to enable sufficient feeding to occur during sub-optimal weather conditions.</p>	<p>SHERWIN <i>et al.</i> 2013</p> <p>VOIGT <i>et al.</i> 2011.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting processes (on which the feature and/or its supporting habitat relies)	Air quality	Restore concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	See explanatory notes for this attribute in Table 1 Target set to Restore because current levels of nitrogen and acid deposition (APIS accessed on 12/12/2018) are exceeding the critical loads for woodland supporting habitat.	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).
Supporting processes (on which the feature and/or its supporting habitat relies)	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature and/or its supporting habitats.	Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, site management strategies or plans, the Views about Management Statement for the underpinning SSSI and/or management agreements. Management for this site includes maintaining grills to hibernation entrances, maintaining appropriate wooded cover around entrances, maintaining and restoring flight-lines and feeding grounds and protecting swarming sites associated with the SAC bat population.	Component SSSI Favourable Condition Tables (FCT). Available from Natural England on request. NATURAL ENGLAND. 2015. North Somerset and Mendip Bats SAC Site Improvement Plan (SIP) , DAVIDSON & THOMAS. 2017
Supporting processes (on which the feature and/or its supporting habitat relies)	Disturbance from human activity	Control and minimise unauthorised public access to roost sites.	Site should be secured against unauthorised access, which can result in disturbance to bats at critical times of year and which can affect their population viability and use of the site. Grilles on site access points should be maintained where present.	
Supporting processes (on which the feature and/or its supporting habitat relies)	Water quantity/ quality	Where the feature or its supporting habitat is dependent on surface water and/or groundwater, maintain water quality and quantity to a standard which provides the necessary conditions to support the feature	For many SAC features which are dependent on wetland habitats supported by surface and/or ground water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year. Poor water quality and inadequate quantities of water can adversely affect the structure and function of this habitat type. Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>Directive (WFD 2000/60/EC) will also be sufficient to support the achievement of SAC Conservation Objectives but in some cases more stringent standards may be needed to reflect the ecological needs of the species feature. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC.</p> <p>The SSSIs within the North Somerset Levels have water quality standards which are more stringent than the WFD standards.</p> <p>Bats in North Somerset are known to use the rhynes or ditches to navigate by and also as a place to forage. Good water quality ensures there is a good mix of plants with different structures, in turn providing a rich habitat for invertebrates as prey for the bats.</p> <p>Water availability is particularly important for lactating females. Hibernating bats also need a water source close to the hibernation site.</p>	

Version Control

Advice last updated:

28 February 2019 following stakeholder comments. '**Population abundance – hibernation**' attribute, Banwell Caves SSSI peak count updated with more recent survey data within supporting and explanatory notes. '**Distribution of supporting habitats**' and '**Supporting off-site habitats (foraging areas)**' attribute reference added and more detail added to clarify attribute in supporting and explanatory notes. Additional information added about the bat guidance for planning in North Somerset.

Variations from national feature-framework of integrity-guidance: The following attributes have been removed as they are considered not to be relevant the Lesser Horseshoe bat hibernation site at Cheddar: **Soils, substrate and nutrient recycling; External condition of the building – maternity colony; external condition of the building – hibernation site; Population abundance – maternity colony.**

Table 5: Supplementary Advice for Qualifying Features: S1304. *Rhinolophus ferrumequinum*; Greater horseshoe bat

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Population (of the feature)	Population abundance - hibernation site	<p>Maintain the abundance of the hibernating population at a level which is above 200 which is the known population at present.</p> <p>Avoid deterioration from its current level as indicated by the latest mean peak count or equivalent.</p>	<p>See explanatory notes for the Population Abundance attribute in Table 4.</p> <p>Numbers recorded at the March 2018 hibernation count at Cheddar Complex SSSI were 621.</p> <p>Wookey Hole 2010 – 60</p> <p>Banwell Caves SSSI peak counts were 32 in 2017</p> <p>Banwell Ochre Mines SSSI peak counts were 244 in 2017 with numbers increasing steadily from 58 in 2005</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>Monitoring data held by Natural England's Local Area Team This information is sensitive and requests for it should be discussed with Natural England</p>
Population (of the feature)	Population abundance - maternity colony	<p>Maintain the abundance of the breeding population at a level which is above 350</p> <p>Avoid deterioration from its current level as indicated by the latest mean peak count or equivalent.</p>	<p>See explanatory notes for the Population Abundance attribute in Table 4.</p> <p>Cheddar Complex SSSI: A maternity roost is recorded in Gough's Caves. Numbers unknown</p> <p>The peak emergence count at King's Wood and Urchinwood SSSI in 2006 was 52. Monitoring ceased due to health and safety reasons but re-started in 2017 when a peak emergence count was 135.</p> <p>Brockley Hall Stables peak count in 2018 was approximately 500 adults and 250 young.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p> <p>English Nature, 1999. Radio Tracking study of Greater Horseshoe bats at Cheddar, North Somerset. Unpublished report</p>
Supporting habitat: extent and distribution	Distribution of supporting habitat	<p>Maintain the distribution and continuity of the feature and its supporting habitat, including where applicable its component vegetation types and associated transitional vegetation types, across the site.</p>	<p>A contraction in the range, or geographic spread, of the feature (and its component vegetation) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. Contraction may also reduce and break up the continuity of a habitat within a site and how well the species feature is able to occupy and use habitat within the site. Such fragmentation may have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to</p>	<p>NATURAL ENGLAND. 2015b</p> <p>WEST OF ENGLAND PARTNERSHIP (WENP). 2013</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>its interior. These conditions may not be suitable for this feature and this may affect its viability.</p> <p>A summary of the sites is given below: Banwell Caves – cave – hibernation Banwell Ochre Caves – cave – hibernation, possible maternity? Brockley Hall Stables – building – maternity Compton Martin Ochre mines – cave – hibernation King's Wood and Urchinwood – mines – hibernation and maternity Cheddar – cave – hibernation and maternity Wookey Hole – cave – hibernation and maternity</p> <p>See notes for 'Extent of supporting habitat' attribute which are also valid for the distribution of supporting habitat, with particular importance placed on the location of suitable foraging habitat directly around and close to maternity sites.</p>	
Supporting habitat: extent and distribution	Extent of supporting habitat	Maintain the total extent of the habitats which support the feature at 561 hectares	<p>In order to contribute towards the objective of achieving an overall favourable conservation status of the feature at a UK level, it is important to maintain or if appropriate restore the extent of supporting habitats and their range within this SAC. The information available on the extent and distribution of supporting habitat used by the feature may be approximate depending on the nature, age and accuracy of data collection, and may be subject to periodic review in light of improvements in data.</p> <p>The woodland surrounding the underground mines is important for the maintenance of optimal humidity conditions inside the mine system and also as foraging areas. The woodland structure should be maintained.</p> <p>For the maternity site at Cheddar Caves, much of their supporting habitat is included in the species rich SAC grassland and woodland surrounding the caves. It is not however, known whether the bats use the whole area of the SSSI.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat: structure/ function	External condition of building - maternity colony	Maintain the structural integrity and weatherproofing of roof, walls etc, with no significant shading of the main roost area by trees/vegetation or manmade structures.	Damp, draught and increases in light levels are likely to have a negative effect on the temperature and humidity of the roost.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting habitat: structure/ function	External condition of underground site - maternity and hibernation	Maintain the structural integrity of the roost space, with no recent collapses/falls or signs of geological instability.	Damp, draught and increases in light levels are likely to have a negative effect on the temperature and humidity of the roost.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting habitat: structure/ function	Internal condition of underground site – maternity and hibernation	Maintain the structural integrity of the roost space to provide consistently cool (8-12°C) and dark conditions suitable for hibernation with a relative humidity of over 90%	<p>Damp, draught and increases in light levels are likely to have a negative effect on the temperature and humidity of the roost. There should be no recent collapses/falls or signs of geological instability.</p> <p>The variation between hibernation sites and the strong adherence of the bats to their traditional sites makes it important to refer to file notes on the condition of the site.</p> <p>Greater and lesser horseshoe bats roost mainly in underground sites during winter, often communally, however, they are also known to use some caves in this SAC as a maternity roost. They are usually found in hibernation sites with a relative humidity over 90%</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting habitat: structure/ function	Internal condition of building - maternity	Maintain appropriate light levels, humidity, temperature and ventilation	<p>Changes to light levels, through-draught, ventilation, noise levels, vibration and water penetration may adversely alter the necessary roost conditions.</p> <p>Damp, draught and increases in light levels are likely to have a negative effect on the temperature and humidity of the roost.</p>	
Supporting habitat: structure/	Roost access	Maintain the number of access points to the roost at an optimal size and in an unlit and	This will prevent any negative internal climatic changes within the roost and maintain the ability of bats to freely enter and leave the roost as necessary.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
function		<p>unobstructed state, with surrounding vegetation providing sheltered flyways without obstructing access points</p> <p>Maintain vegetation close to the entrances but not obstructing it.</p>	<p>Normal minima dimensions for horseshoe access points: Greater horseshoe bats: 400 x 300mm</p> <p>Vegetation is required close to the entrances to enable bats to feel secure enough to leave at dusk rather than delaying until fully dark. Any lights shining on the entrances are likely to deter the bats from leaving (Downs <i>et al.</i> 2003; Stone, Jones & Harris 2009).</p>	
Supporting habitat: structure/ function	Supporting off-site habitat flightlines from the roost into surrounding habitat and foraging areas	Maintain the presence, structure and quality of any linear landscape features which function as flightlines between the SAC and the surrounding foraging areas used by Greater Horseshoe bats. Flightlines should remain unlit, functioning as dark corridors.	<p>This recognises that sites do not exist in isolation. The structure and function of the qualifying habitat, including its typical species, may rely upon the continued presence of areas which are outside the designated site boundary and changes in surrounding land-use may adversely (directly or indirectly) affect the functioning of the feature and its component species.</p> <p>This supporting habitat may be critical to the feature to support, for example, their ability to feed, breed, roost and their population dynamics ('metapopulations'). Surrounding areas can also prevent, reduce or absorb damaging impacts from adjacent land uses such as pesticide drift.</p> <p>Roost choice, and the presence of bats within the SAC, is likely to be influenced by the site's ability to provide bats with food and shelter. The provision of rich feeding areas around a roost, and the commuting routes (or flight-lines) to them, will be an important element in sustaining the SAC population.</p> <p>The concept of Core Sustenance Zones (North Somerset Council <i>et al.</i>, 2017) can be used to take account of the supporting habitat within the area of highest bat activity surrounding the roost. North Somerset Council <i>et al.</i> (2017), have published guidance which identifies zones around the SAC which reflect the likely importance of the habitat for bats and proximity to maternity and other roost sites. Special consideration is also to be given to habitat within 8km of the roost site, within the juvenile Sustenance Zone. Feeding areas within this 2.2km zone are vitally important during spring and</p>	<p>BAT CONSERVATION TRUST. 2016</p> <p>CLARKE WEBB. 2003</p> <p>ENGLISH NATURE. 2001</p> <p>ENGLISH NATURE. 1999</p> <p>FROIDEVAUX <i>et al.</i> 2017</p> <p>NATURAL ENGLAND. 2015b</p> <p>NORTH SOMERSET COUNCIL <i>et al.</i> 2017</p> <p>SOMERSET WILDLIFE TRUST. 2016.</p> <p>WEST OF ENGLAND PARTNERSHIP (WENP). 2013</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>summer months for pregnant and lactating females, as well as their young, with bats spending about half their peak activity time within this zone.</p> <p>Greater horseshoe bats commute and forage along linear features, over grazed pasture and in woodland. Permanent pasture and ancient woodland linked with an abundance of tall bushy hedgerows is ideal supporting habitat for this species.</p> <p>Flightlines should remain unlit, functioning as dark corridors. They will extend beyond the designated site boundary into the wider local landscape and are especially important as a link between summer and winter roost sites e.g. Brockley Hall Stables SSSI maternity roost and King's Wood and Urchin Wood which does have a maternity roost but also supports a hibernating population of bats.</p> <p>It has been concluded that the conservation of photophobic bat species such as the Greater Horseshoe bat should concentrate on both the improvement of foraging/commuting habitats as well as the creation of dark areas. (Froidevaux <i>et al.</i> 2017)</p> <p>Connectivity between sites is important as the bats navigate using linear features particularly such as hedgelines, walls and ditches. They use many caves within Somerset and migrate quite large distances including flying to and from Gloucestershire and Devon. It was found that the Greater Horseshoe Bats used 76 different sites on Mendip in one year, (Clarke Webb 2003)</p> <p>Mapping has been undertaken to find where the distribution of ecological networks are fragmented to enable bodies to find funding to work on linking up habitats such as species rich grassland and woodland, Somerset Wildlife Trust 2016</p> <p>In North Somerset, the radio tracking study of Greater Horseshoe bats from Brockley Hall Stables were found to have flown over 210 square km, using a total of 20 main foraging areas. They regularly commuted between the stables and the</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>caves at King's Wood an Urchinwood SSSI.</p> <p>Studies have also shown that Greater Horseshoe Bats use hedges, walls and ditches to navigate around the area of North Somerset, foraging over grassland which is grazed by animals, providing insects such as dung beetles</p>	
Supporting habitat: structure/function	Supporting off-site habitat (foraging areas)	Maintain any core areas of feeding habitat outside of the SAC boundary that are critical to Greater Horseshoe bats during their breeding and hibernation period	<p>Roost choice, and the presence of bats within the SAC, is likely to be influenced by the site's ability to provide bats with food and shelter. Key feeding areas around a roost, and the commuting routes (or flight-lines) between them, will be an important element of sustaining the SAC population.</p> <p>Greater horseshoes tend to forage within 2.5km of their summer roost, though they can travel up to 4km from these roosts to suitable foraging grounds (Schofield, 2008). Within the winter, their foraging range is reduced, with a mean foraging radius of 1.2 km around hibernation sites reported.</p> <p>Greater horseshoes commute and forage along linear features over wet grassland and woodland. Permanent pasture and ancient woodland linked with an abundance of tall bushy hedgerows is ideal supporting habitat for this species (English Nature, 2003). Flight-lines should remain as unlit, dark corridors.</p> <p>Flightlines will extend beyond the designated site boundary into the wider local landscape.</p> <p>During the winter, greater horseshoes emerge from hibernacula about once every two weeks for water / food, therefore condition of habitat in the immediate vicinity of hibernacula is very important. Winter prey (e.g. crane-flies, winter gnats, midges, dung flies) is often associated with damp woodland with decaying wood, and grazed pasture with abundant dung. Feeding areas used by SAC bats may be outside of the SAC boundary but be critical to successful hibernation (these undesignated areas are sometimes referred to as 'sustenance zones' or 'functionally-linked land').</p>	<p>CLARKE WEBB. 2003</p> <p>ENGLISH NATURE. 2001</p> <p>SOMERSET WILDLIFE TRUST. 2016</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>Although the SAC includes the SSSIs noted here, their supporting habitat includes a large range of sites surrounding their maternity and hibernation roosts. It is generally agreed that the juvenile sustenance zones are in the 1-2 km surrounding maternity roosts and are especially important in providing foraging habitats close to the roost for the adults. It is especially important that grazing of this area particularly with cattle continues to provide invertebrates for the bats to eat. Adult bats are known to forage over a larger area, for example, over the Somerset Levels from the roosts at Cheddar and Wookey Hole.</p> <p>Greater Horseshoe bats are known to shift their foraging sites over several nights so that any radio tracking survey at one point in time is not necessarily representative of the bats' foraging range. A circular radius is therefore too simplistic to be very accurate but gives an indication of their potential habitat.</p>	
Supporting processes (on which the feature and/or its supporting habitat relies)	Adaptation and resilience	Maintain the feature's ability, and that of its supporting habitat, to adapt or evolve to wider environmental change, either within or external to the site	<p>See explanatory notes for this attribute in Table 1.</p> <p>The Greater Horseshoe bat in England is at the northern edge of its European range. With climate change it is expected that its range boundary may move further north.</p> <p>It has been shown that the population expansion of the Greater Horseshoe bat in the UK has been driven by climate change rather than any conservation or habitat management. (Froidevaux <i>et al.</i> 2017).</p> <p>Temperature regulation within roost/hibernation sites or the availability of roosts with a variety of temperature and humidity regimes is important to ensure the continued availability of suitable roosts. There may be a decrease in hunting ability with an increase in wet weather as bats avoid hunting in heavy rain due to increased energy costs.</p> <p>Changing vegetation around caves/mines may affect humidity</p>	<p>FROIDEVAUX <i>et. al.</i> 2017</p> <p>SHERWIN <i>et al.</i> 2013.</p> <p>VOIGT <i>et al.</i> 2011.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			of the hibernation site and the availability of food during winter emergence. Wider landscape changes in vegetation may also affect food availability and flightlines between foraging areas. Climate change resilience will be aided by the protection and maintenance/restoration of quality feeding habitat close to the roosts and the identification and protection of satellite roosts and their surrounding habitat to enable sufficient feeding to occur during sub-optimal weather conditions.	
Supporting processes (on which the feature and/or its supporting habitat relies)	Air quality	Restore concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	See explanatory notes for this attribute in Table 1. Target set to Restore because current levels of nitrogen and acid deposition (APIS accessed on 14/12/2018) are exceeding the critical loads for woodland supporting habitat.	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).
Supporting processes (on which the feature and/or its supporting habitat relies)	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to Maintain the structure, functions and supporting processes associated with the feature and/or its supporting habitats.	Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, site management strategies or plans, the Views about Management Statement for the underpinning SSSI and/or management agreements. Management for this SAC includes maintaining grills to hibernation entrances, maintaining appropriate wooded cover around entrances, maintaining and restoring flightlines and feeding grounds and protecting swarming sites associated with the SAC bat population and flightlines to swarming sites. Management of the wider landscape is also integral to the condition of the SAC, such as keeping farmland in appropriate management to support the food supplies for the bat population (maintain grazing, particularly cattle) A heater was installed in the Cheddar Complex caves in 1998 to provide optimum conditions for the maternity colony and this	Natural England component SSSI Views About Management (VAM), available from https://designatedsites.naturalengland.org.uk/

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>needs to be maintained.</p> <p>A number of Greater horseshoe bat nocturnal roosts have been identified on site and the importance of these roosts is being increasingly recognised and understood through a number of projects (Batscapes, Devon Greater Horseshoe Bat Project and Beacons for Bats).</p>	
Supporting processes (on which the feature and/or its supporting habitat relies)	Disturbance from human activity	Control and minimise unauthorised public access to roost sites	<p>Site should be secured against unauthorised access, which can result in disturbance to bats at critical times of year and which can affect their population viability and use of the site. Grilles on site access points should be maintained where present.</p> <p>Wooden safety fences are to be installed around the cave entrances at Banwell Ochre Caves SSSI by the landowner who was carrying out forestry works. These are to be placed to avoid any people falling into the cave entrances and also to provide a buffer around the cave entrances.</p> <p>Most of the mine entrances at King's Wood and Urchin Wood SSSI have also been fenced off for safety reasons.</p>	
Supporting processes (on which the feature and/or its supporting habitat relies)	Water quantity/ quality	Where the feature or its supporting habitat is dependent on surface water and/or groundwater, maintain water quality and quantity within the associated bat foraging areas including those areas outside of the SAC designation to a standard which provides the necessary conditions to support the feature.	<p>For many SAC features which are dependent on wetland habitats supported by surface and/or ground water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year. Poor water quality and inadequate quantities of water can adversely affect the structure and function of this habitat type. Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD 2000/60/EC) will also be sufficient to support the achievement of SAC Conservation Objectives but in some cases more stringent standards may be needed to reflect the ecological needs of the species feature. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC.</p> <p>The SSSIs within the North Somerset Levels have water quality standards which are more stringent than the WFD standards.</p>	<p>See FCT for Tickenham, Nailsea and Kenn SSSI.</p> <p>Natural England component SSSI Favourable Condition Tables (FCT). Available from Natural England on request.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>Bats in North Somerset are known to use the rhynes or ditches to navigate by and also as a place to forage. Good water quality ensures there is a good mix of plants with different structures, in turn providing a rich habitat for invertebrates as prey for the bats.</p> <p>Water availability is particularly important for lactating females. Hibernating bats also need a water source close to the hibernation site.</p>	
<p>Version Control Advice last updated: 28 February 2019 following stakeholder comments. 'Population abundance – hibernation' attribute, peak count updated with more recent survey data within supporting and explanatory notes. 'Supporting off-site habitat flightlines from the roost into surrounding habitat and foraging areas' attribute reference added and more detail added to clarify attribute in supporting and explanatory notes. 'Conservation measures' attribute the importance of bat night roosts mentioned in supporting and explanatory notes. Further information added regarding North Somerset Council Bat Guidance and core sustenance zones.</p> <p>Variations from national feature-framework of integrity-guidance: The following attributes were removed as they are not considered relevant to the Greater Horseshoe bats within this SAC: Soils substrate and nutrient recycling; External condition of the building – hibernation site.</p>				

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European Site Conservation Objectives for Severn Estuary Special Protection Area Site Code: UK9015022



With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

- **The extent and distribution of the habitats of the qualifying features**
- **The structure and function of the habitats of the qualifying features**
- **The supporting processes on which the habitats of the qualifying features rely**
- **The population of each of the qualifying features, and,**
- **The distribution of the qualifying features within the site.**

This document should be read in conjunction with the accompanying Conservation Advice document, which provides more detailed advice and information to enable the application and achievement of the Objectives set out above.

Qualifying Features:

A037 *Cygnus columbianus bewickii*; Bewick's swan (Non-breeding)

A048 *Tadorna tadorna*; Common shelduck (Non-breeding)

A051 *Anas strepera*; Gadwall (Non-breeding)

A149 *Calidris alpina alpina*; Dunlin (Non-breeding)

A162 *Tringa totanus*; Common redshank (Non-breeding)

A394 *Anser albifrons albifrons*; Greater white-fronted goose (Non-breeding)

Waterbird assemblage

This is a cross border site

This site crosses the border between England and Wales. Some features may only occur in one Country. The advice of [Natural Resources Wales](#) should therefore be sought separately.

This is a European Marine Site

This SPA is a part of the Severn Estuary European Marine Site (EMS). These Conservation Objectives should be used in conjunction with the Conservation Advice document for the EMS.

Natural England's formal Conservation Advice for European Marine Sites can be found via [GOV.UK](#).

Explanatory Notes: European Site Conservation Objectives

These Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2017 (as amended) ('the Habitats Regulations'). They must be considered when a competent authority is required to make a 'Habitats Regulations Assessment' including an Appropriate Assessment, under the relevant parts of this legislation.

These Conservation Objectives, and the accompanying Supplementary Advice (where this is available), will also provide a framework to inform the management of the European Site and the prevention of deterioration of habitats and significant disturbance of its qualifying features.

These Conservation Objectives are set for each bird feature for a [Special Protection Area \(SPA\)](#).

Where these objectives are being met, the site will be considered to exhibit a high degree of integrity and to be contributing to achieving the aims of the Wild Birds Directive.

Publication date: 21 February 2019 (version 4). This document updates and replaces an earlier version dated 5 February 2016 to reflect the consolidation of the Habitats Regulations in 2017.

European Site Conservation Objectives for Somerset Levels and Moors Special Protection Area Site Code: UK9010031



With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

- **The extent and distribution of the habitats of the qualifying features**
- **The structure and function of the habitats of the qualifying features**
- **The supporting processes on which the habitats of the qualifying features rely**
- **The population of each of the qualifying features, and,**
- **The distribution of the qualifying features within the site.**

This document should be read in conjunction with the accompanying *Supplementary Advice* document, which provides more detailed advice and information to enable the application and achievement of the Objectives set out above.

Qualifying Features:

A037 *Cygnus columbianus bewickii*; Bewick's swan (Non-breeding)

A052 *Anas crecca*; Eurasian teal (Non-breeding)

A140 *Pluvialis apricaria*; European golden plover (Non-breeding)

A142 *Vanellus vanellus*; Northern lapwing (Non-breeding)

Waterbird assemblage

Explanatory Notes: European Site Conservation Objectives

These Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2017 (as amended) ('the Habitats Regulations'). They must be considered when a competent authority is required to make a 'Habitats Regulations Assessment' including an Appropriate Assessment, under the relevant parts of this legislation.

These Conservation Objectives, and the accompanying Supplementary Advice (where this is available), will also provide a framework to inform the management of the European Site and the prevention of deterioration of habitats and significant disturbance of its qualifying features

These Conservation Objectives are set for each bird feature for a [Special Protection Area \(SPA\)](#).

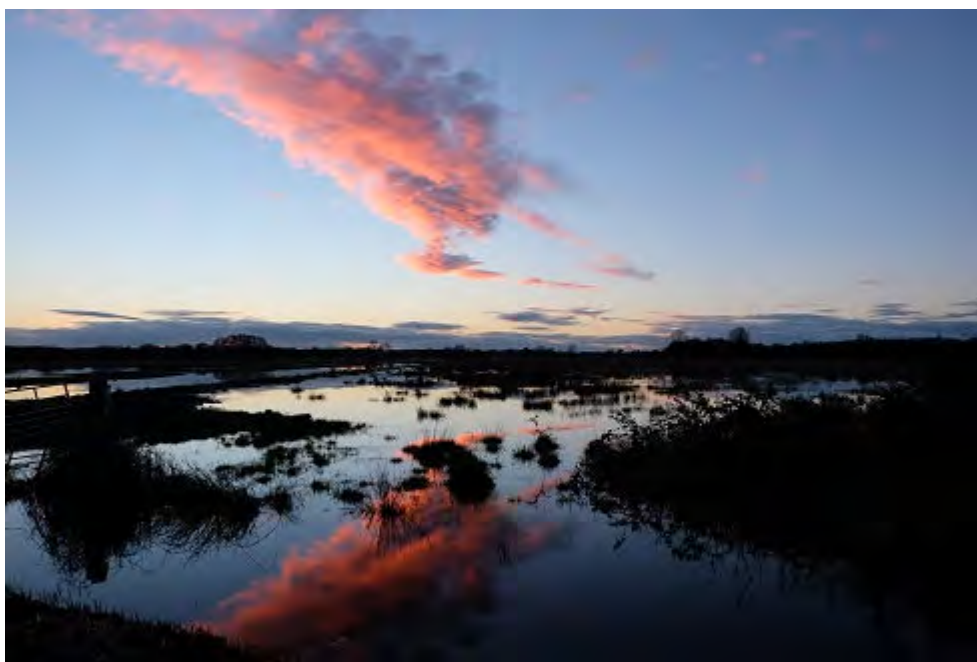
Where these objectives are being met, the site will be considered to exhibit a high degree of integrity and to be contributing to achieving the aims of the Wild Birds Directive.

Publication date: 21 February 2019 (version 3). This document updates and replaces an earlier version dated 30 June 2014 to reflect the consolidation of the Habitats Regulations in 2017.



European Site Conservation Objectives: Supplementary advice on conserving and restoring site features

**Somerset Levels and Moors
Special Protection Area (SPA)
Site Code: UK9010031**



Westhay Moor SSSI in winter. (Photo: Barry Phillips)

Date of Publication: 4 February 2019

About this document

This document provides Natural England's supplementary advice for the European Site Conservation Objectives relating to Somerset Levels and Moors SPA. This advice should therefore be read together with the SPA Conservation Objectives available [here](#).

You should use the Conservation Objectives, this Supplementary Advice and any case-specific advice given by Natural England when developing, proposing or assessing an activity, plan or project that may affect this site.

This Supplementary Advice to the Conservation Objectives presents attributes which are ecological characteristics of the designated species and habitats within a site. The listed attributes are considered to be those that best describe the site's ecological integrity and which, if safeguarded, will enable achievement of the Conservation Objectives. Each attribute has a target which is either quantified or qualitative depending on the available evidence. The target identifies as far as possible the desired state to be achieved for the attribute.

The tables provided below bring together the findings of the best available scientific evidence relating to the site's qualifying features, which may be updated or supplemented in further publications from Natural England and other sources. The local evidence used in preparing this supplementary advice has been cited. The references to the national evidence used are available on request. Where evidence and references have not been indicated, Natural England has applied ecological knowledge and expert judgement. You may decide to use other additional sources of information.

In many cases, the attribute targets shown in the tables indicate whether the current objective is to 'maintain' or 'restore' the attribute. This is based on the best available information, including that gathered during monitoring of the feature's current condition. As new information on feature condition becomes available, this will be added so that the advice remains up to date.

The targets given for each attribute do not represent thresholds to assess the significance of any given impact in Habitats Regulations Assessments. You will need to assess this on a case-by-case basis using the most current information available.

Some, but not all, of these attributes can also be used for regular monitoring of the actual condition of the designated features. The attributes selected for monitoring the features, and the standards used to assess their condition, are listed in separate monitoring documents, which will be available from Natural England.

These tables do not give advice about SSSI features or other legally protected species which may also be present within the European Site.

If you have any comments or queries about this Supplementary Advice document please contact your local Natural England adviser or email HDIRConservationObjectivesNE@naturalengland.org.uk

About this site

European Site information

Name of European Site	Somerset Levels and Moors Special Protection Area (SPA)
Location	Somerset
Site Map	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	26 June 1997
Qualifying Features	<p>Non-breeding (overwintering):</p> <ul style="list-style-type: none">• Bewick's Swan <i>Cygnus columbianus bewickii</i> A037• Eurasian Teal <i>Anas crecca</i> A052• European Golden Plover <i>Pluvialis apricaria</i> A140• Northern Lapwing <i>Vanellus vanellus</i> A142• Waterbird assemblage
Designation Area	6394.18 ha
Designation Changes	None
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	Catcott Edington and Chilton Moors SSSI Curry and Hay Moors SSSI King's Sedgemoor SSSI Moorlinch SSSI Shapwick Heath SSSI Southlake Moor SSSI Tealham and Tadham Moors SSSI West Moor SSSI West Sedgemoor SSSI Westhay Heath SSSI Westhay Moor SSSI Wet Moor SSSI
Relationship with other European or International Site designations	<p>The boundary of this SPA coincides with the Somerset Levels and Moors Ramsar Site (Site Code: UK11064)</p> <p>This SPA is ecologically linked to the Severn Estuary SPA with bird species notified as mobile qualifying features using either the inland or coastal European Sites as alternative winter feeding grounds according to weather conditions.</p>

Site background and geography

The SPA is comprised of 12 SSSIs located across the Somerset Levels and Moors floodplain. Five are in the Brue Valley to the north of the low ridge of the Polden Hills, while the remainder are on the floodplains of the Rivers Parrett and Tone to the south.

The Somerset Levels and Moors is a unique landscape in the British Isles and has achieved widespread recognition in the public mind for its extensive flatness and frequent floods. The open expanse of grasslands broken up by isolated hills and ridges is some of the lowest land in the UK, with large areas lying below the level of the highest tides. Water dominates the landscape and a complex network of watercourses is evidence of a long history of drainage to reclaim productive farmland from marshland. It remains largely pastoral and was once renowned for its dairy herds. Today, beef production is the most common enterprise but its future is uncertain in some areas as structural reform in the agricultural industry, market pressures and social changes render marginal areas less viable even for extensive farming. The peat-cutting industry of the Brue Valley in the north of the floodplain has declined dramatically in recent years, and worked-out areas are now reverting to biodiversity-rich wetland habitats. A detailed description of the area's natural and cultural features can be read in the Somerset Levels & Moors National Character Area profile ([NCA Profile 142](#))

Its nature as a floodplain means that the Levels and Moors will always be a landscape in transition. The rivers drain to the Bristol Channel, which has the second highest tidal range in the world. Ground levels on inland moors can be up to 6 metres below peak tide levels. Over the centuries, a complex system of sea walls, elevated river banks and pumping stations developed in a piecemeal way to protect settlements and farmland. More intensive farming was made possible by pump-drainage, which inevitably compromised the survival of wetland biodiversity.

Today, the Somerset Levels and Moors contain the largest area of lowland wet grassland in England: 21% of the resource. Huge flocks of migratory waterfowl arrive in winter; more than at any other inland site in the UK. Its importance is year-round as it is one of the UK's most important breeding areas for Lapwing, Curlew, Redshank and Snipe: wading birds that depend on extensively grazed wet grassland. Meadows with more than 60 species in a single field and ditches supporting a unique assemblage of rare invertebrates add to its diversity.

The floodplain's surviving biodiversity is recognised by a series of statutory designations. There are 17 Sites of Special Scientific Interest reflecting the national importance of 7,300 ha for lowland wet grassland, breeding wader populations and aquatic invertebrates. Twelve of the SSSIs, covering almost 6,400 ha, have been classified as important for wintering wildfowl and designated a Special Protection Area under the EC Birds Directive. The tiers of conservation designations are completed by recognition under the Ramsar Convention that the best habitats on the floodplain are notable for rare aquatic invertebrates and wintering waterbirds, making it one of the world's premier wetlands.

The accumulation of designations makes it easy to lose sight of the fact that together they cover only 12% of the area of the floodplain. While they have helped attract limited investment to protect their biodiversity, little attention and few resources are given to the remainder, optimistically known as the "wider wetland". Much of the area outside the designated sites is a farmed grassland monoculture: too dry at critical times of the year to support wetland wildlife. This does not mean that it will always be of substantially lower value for wildlife. Promoting sustainable flood management and farming practices tailored to a wetland environment would rapidly reverse past losses and provide greater protection for the SPA.

About the qualifying features of the SPA

The following section gives you additional, site-specific information about this SPA's qualifying features.

These are the individual species of wild birds listed on Annex I of the European Wild Birds Directive, and/or the individual regularly-occurring migratory species, and/or the assemblages (groups of different species occurring together) of wild birds for which the SPA was classified for.

Qualifying individual species listed in Annex I of the Wild Birds Directive (Article 4.1)

During the non-breeding season the SPA regularly supports:

- **Bewick's Swan *Cygnus columbianus bewickii* (non-breeding) A037**

When the SPA was notified it supported a peak mean of 310 individuals in the five-year period from 1989/90 to 1993/94. This number represented at least 4.4% of the British and 1.8% of the North-west European overwintering population.

Since notification there has been a dramatic decline in numbers visiting the SPA with a 5-year peak mean of 5 individuals in the period 2012/13 to 2016/17. This reflects national and international trends since the mid-1990s. WeBS (Wetland Birds Survey) High Alerts have been issued for the medium (-80%) and long (-89%) terms.

The reasons behind the decline remain unclear. Unfavourable conditions on breeding grounds, staging areas and overwintering sites are all possible reasons. Fewer birds now cross the North Sea in mild winters, and this phenomenon partly explains the recent decline in numbers visiting Great Britain. Populations can also fluctuate from year to year in relation to the severity of winters. Numbers visiting the Somerset Levels and Moors had already declined in the years before the SPA was notified at a time when the national population had increased. The reason was not identified, but it was speculated that it may have been due to a reduction in winter floods.

In winter Bewick's Swan are found on flooded grassland, large waterbodies and estuaries, where they roost on water and feed on grasses and submerged vegetation. It also forages on waste root crops, grain stubbles and winter cereals. This species is very sensitive to disturbance.

- **European Golden Plover *Pluvialis apricaria* (non-breeding) A140**

When the SPA was notified it supported a peak mean of 3,110 individuals in the five-year period from 1989/90 to 1993/94. This number represented at least 1.2% of the British population.

Since notification there has been a substantial increase in numbers with a 5-year peak mean of 14,024 individuals in the period 2012/13 to 2016/17.

Golden Plover is an Annex 1 species and recent numbers of overwintering birds on the Somerset Levels and Moors exceed the threshold required for international importance. There is widespread variation in numbers at site, regional and national scales making analysis of trends difficult.

In winter Golden Plover have similar habitat requirements to Lapwing and these species are frequently found associating on inland and coastal sites. Flocks are highly mobile responding to prevailing weather conditions, available food resources and levels of disturbance. It is less dependent than most waders on shallow flood events to provide favourable feeding conditions.

Qualifying individual species not listed in Annex I of the Wild Birds Directive (Article 4.2)

During the non-breeding season the SPA regularly supports:

- **Eurasian Teal *Anas crecca* (non-breeding) A052**

When the SPA was notified it supported a peak mean of 7,476 individuals in the five-year period from 1989/90 to 1993/94. This number represented at least 5.3% of the British and 1.9% of the North-west European overwintering population.

Since notification there has been a substantial increase in numbers with a peak mean of 21,918 individuals in the period 2012/13 to 2016/17. The Somerset Levels and Moors is now the most important overwintering site for Teal in Great Britain.

The rate of increase in the Somerset Levels and Moors SPA has been higher than regional and national trends, emphasising its exceptional importance as a refuge for this species. Numbers usually peak in January or February with the majority of birds (70%) concentrated on West Sedgemoor SSSI, part of which is an RSPB reserve.

The disproportionately high numbers recorded on RSPB reserves on the Somerset Levels and Moors applies to other species, and demonstrates what can be achieved when the primary objective is to provide undisturbed feeding and roosting conditions for wetland birds. It must be noted that counts are made during the daytime when birds are mainly roosting. At night, they may disperse to other parts of the SPA and land of functional importance outside it to feed (Chown, 2001). The scale of movements over the course of the day is not known.

Parts of some component SSSIs, such as King's Sedgemoor (West) and Aller Moor are sub-optimal for Teal because of interrupted sightlines and disturbance. It is not known why numbers remain very low on King's Sedgemoor East when a Raised Water Level Area is maintained over 159 ha.

The neighbouring Severn Estuary SPA also supports an internationally significant number of Teal: a peak mean of 6,210 in the period 2012/13 to 2016/17.

In winter Teal prefer shallow water conditions in a wide range of wetland habitats including flooded grassland, bays of large waterbodies and estuaries. It is extremely sensitive to disturbance, and particularly vulnerable to severe cold weather. Maintenance of extensive areas of shallow water across the SPA is essential to support the population at its current level.

- **Northern Lapwing *Vanellus vanellus* (non-breeding) A142**

When the SPA was notified it supported a peak mean of 36,565 individuals in the five-year period from 1989/90 to 1993/94.

Since notification there has been a decline in numbers with a peak mean of 32,896 individuals in the period 2012/13 to 2016/17. A WeBS (Wetland Birds Survey) Medium Alert has been issued for the medium term (-31%). The overwintering population in Great Britain has also declined significantly since the 1990s.

In winter Lapwing frequent a wide variety of habitats, both coastal and inland. Flocks can be highly mobile responding to prevailing weather conditions, available food resources and levels of disturbance. Although mainly associated with wet grassland throughout the year they are often found on ploughed land and frequently roost at coastal sites.

The majority of the overwintering population (59%) on the Somerset Levels and Moors are supported on two RSPB reserves: West Sedgemoor SSSI within the SPA, and Greylake Reserve, which is outside but links two SPA component SSSIs (Moorlinch and King's Sedgemoor). Like Teal and other overwintering waterbirds, Lapwing will fly from these refuges at night to feed on land inside and outside the SPA boundaries (Chown, 2001). The scale of movements over the course of the day is not known.

Qualifying assemblage of species (Article 4.2)

In winter the SPA regularly supports an assemblage of waterfowl of more than 20,000 birds. When the SPA was notified the 5-year peak mean for the five-year period from 1989/90 to 1993/94 was 58,093, comprising 41,442 waders and 16,651 wildfowl.

In addition to the Annex 1 and 2 species featured above (Bewick's Swan *Cygnus columbianus bewickii*, Golden Plover *Pluvialis apricaria*, Teal *Anas crecca* and Lapwing *Vanellus vanellus*), the assemblage included Gadwall *Anas strepera*, Wigeon *Anas penelope*, Shoveler *Anas clypeata*, Pintail *Anas acuta*, Snipe *Gallinago gallinago* and Whimbrel *Numenius phaeopus*.

Since notification there has been a substantial increase in numbers with a 5-year peak mean of 90,205 individuals in the period 2012/13 to 2016/17. The representation of species exceeding national and international population thresholds in the assemblage has changed with eight species exceeding the international threshold (Golden Plover *Pluvialis apricaria*, Teal *Anas crecca*, Lapwing *Vanellus vanellus*, Gadwall *Anas strepera*, Wigeon *Anas penelope*, Shoveler *Anas clypeata*, Pintail *Anas acuta* and Mute Swan *Cygnus olor*), and five exceeding the national threshold (Bittern *Botaurus stellaris*, Little Egret *Egretta garzetta*, Ruff *Philomachus pugnax* and Green Sandpiper *Tringa ochropus*).

Gadwall *Anas strepera*

When the SPA was notified it supported a peak mean of 94 individuals in the five-year period from 1989/90 to 1993/94, which represented 1.2% of the British population.

Since notification numbers have increased with a 5-year peak mean of 618 individuals in the period 2012/13 to 2016/17. However, there are indications of a decline in overwintering numbers on the SPA with WeBS Medium Alerts issued for the short (-42%) and medium (-40%) terms.

In winter Gadwall prefer large waterbodies, including permanently flooded voids on former peat excavation sites in the Brue Valley and are less likely to be found on shallow flooded grassland.

Pintail *Anas acuta*

When the SPA was notified it supported a peak mean of 148 individuals in the five-year period from 1989/90 to 1993/94.

Since notification there has been a substantial increase in numbers with a 5-year peak mean of 922 individuals in the period 2012/13 to 2016/17.

This highly mobile species occurs in small numbers across the floodplain. It is mainly found dabbling in open water, but it also grazes on pastures and marsh and forages for spilt grain on cereal fields.

Wigeon *Anas Penelope*

When the SPA was notified it supported a peak mean of 5,927 individuals in the five-year period from 1989/90 to 1993/94, which represented 2.1% of the British population.

Since notification there has been a substantial increase in numbers with a 5-year peak mean of 23,543 individuals in the period 2012/13 to 2016/17, which exceeds the international threshold. The Somerset Levels and Moors is the third most important overwintering site in Great Britain after the Ribble Estuary and Ouse Washes.

In winter Wigeon are found predominantly on estuarine mudflats, saltmarshes and coastal pastures. About 20% of the national population overwinter on inland sites where they feed on short swards and sometimes crops. Large areas of un-flooded but wet grassland need to be maintained to sustain this species.

Numbers of Wigeon on the Somerset Levels and Moors usually peak in January or February. The highest concentration of birds is on West Sedgemoor with 11, 375 individuals: 42% of the total. Daytime counts confirm the value of West Sedgemoor and other safe roosts, but it is known that at night birds disperse from them to feed elsewhere in the SPA and land of functional importance outside it (Cheung, 2001). Extensive and prolonged deep water floods are detrimental to its presence on the Somerset Levels and Moors.

Shoveler *Anas clypeata*

When the SPA was notified it supported a peak mean of 217 individuals in the five-year period from 1989/90 to 1993/94, which represented 2.1% of the British population.

Since notification there has been an increase in numbers with a 5-year peak mean of 1380 individuals in the period 2012/13 to 2016/17, which exceeds the international threshold. Numbers within the SPA have increased at a faster rate than at the regional and national scales. In winter, Shoveler depend on shallow areas of open water and flooded grassland. When flooded, West Sedgemoor is particularly important within the SPA with a 5-year peak mean of 372 individuals.

It is a dabbling duck which prefers larger bodies of permanent water, although it will also feed on flooded grassland.

Snipe *Gallinago gallinago*

The five-year peak mean for the period 1991/92 to 1995/96 (selected to include the earliest reported year for this species on the SPA) was 1768 individuals.

A peak mean of 1,254 individuals was recorded in the period 2012/13 to 2016/17. The Somerset Levels and Moors remains the most important overwintering site for Snipe in Great Britain. A combination of perfect camouflage and secretive behaviour makes this species notoriously difficult to count accurately, and the overwintering population will be higher.

Snipe depend on soft, wet ground to feed, and will move to the coast to escape freezing conditions inland.

Notable non-qualifying species of birds on the Somerset Levels and Moors

The SSSIs within the SPA and NNRs and reserves outside it also support an important assemblage of breeding and wintering birds. In addition to the species mentioned above, the Annex 1 species Bittern *Botaurus stellaris*, Little Egret *Egretta garzetta*, Great White Egret *Ardea alba* and Marsh Harrier *Circus aeruginosus* breed and overwinter. Other regular Annex 1 winter visitors are Merlin *Falco columbarius*, Peregrine *Falco peregrinus*, Hen Harrier *Circus cyaneus* and Short-eared Owl *Asio flammeus*. The Somerset Levels and Moors remains nationally important for its breeding wader assemblage (principally Lapwing *Vanellus vanellus*, Snipe *Gallinago gallinago*, Redshank *Tringa totanus* and Curlew *Numenius arquata*), but numbers have declined significantly and its future has become increasingly dependent on raised water level areas in SSSIs acting as refugia.

References:

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Site-specific seasonality of SPA features

The table below highlights in grey those months in which significant numbers of each mobile qualifying feature are most likely to be present at the SPA during a typical calendar year. This table is provided as a general guide only.

Unless otherwise indicated, the months shown below are primarily based on information relating to the general months of occurrence of the feature in the UK. Where site-based evidence is available and has been used to indicate below that significant numbers of the feature are typically present at this SPA outside of the general period, the site-specific references have been added to indicate this.

Applicants considering projects and plans scheduled in the periods highlighted in grey would benefit from early consultation with Natural England given the greater scope for there to be likely significant effects that require consideration of mitigation to minimise impacts to qualifying bird features during the principal periods of site usage by those features. The months which are *not* highlighted in grey are not ones in which the features are necessarily absent, rather that features may be present in less significant numbers in typical years. Furthermore, in any given year, features may occur in significant numbers in months in which typically they do not. Thus, applicants should not conclude that projects or plans scheduled in months not highlighted in grey cannot have a significant effect on the features. There may be a lower likelihood of significant effects in those months which nonetheless will also require prior consideration.

Any assessment of potential impacts on the features must be based on up-to-date count data and take account of population trends evident from these data and any other available information. Additional site-based surveys may be required. Non-breeding water bird monthly maxima data gathered for this site through the Wetland Bird Survey ('WeBS') may be available upon request from the [British Trust for Ornithology](#).

Feature	Season	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Site-specific references where available
Bewick's Swan	Non-breeding	Winter													
Golden Plover	Non-breeding	Winter													
Teal	Non-breeding	Winter													
Lapwing	Non-breeding	Winter													
Waterbird Assemblage	Non-breeding	Winter													

Guide to terms:

Breeding – present on a site during the normal breeding period for that species

Non-breeding - present on a site outside of the normal breeding period for that species (includes passage and winter periods).

Summer – the period generally from April to July inclusive

Passage - the periods during the autumn and spring when migratory birds are moving between breeding areas and wintering areas. These periods are not strictly defined but generally include the months of July – October inclusive (autumn passage) and March – April inclusive (spring passage).

Winter - the period generally from November to February inclusive.

Table 1: Supplementary Advice for Non-breeding Qualifying Features: Bewick's Swan *Cygnus columbianus bewickii* (A037), European Golden Plover *Pluvialis apricaria* (A140), Eurasian Teal *Anas crecca* (A052), Northern Lapwing *Vanellus vanellus* (A142) and Waterbird Assemblage

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Non-breeding population	Population abundance	<p>Bewick's Swan</p> <p>Restore the size of the non-breeding population to a level which is at or above 310 individuals (calculated at a 5-year peak mean at time of notification), while avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.</p> <p>Golden Plover</p> <p>Maintain the size of the non-breeding population at a level which is at or above 3,110 individuals (calculated at a 5-year peak mean at time of notification), while avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.</p> <p>Teal</p> <p>Maintain the size of the non-breeding population at a level which is at or above 7,476 individuals (calculated at a 5-year peak mean at time of notification), while avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.</p>	<p>This will sustain the site's population and contribute to a viable local, national and bio-geographic population.</p> <p>Due to the mobility of birds and the dynamic nature of population change, the target-value given for the abundance of this feature is considered to be the minimum standard for conservation/restoration measures to achieve. This minimum-value may be revised where there is evidence to show that a population's abundance has significantly changed as a result of natural factors or management measures and has been stable at or above a new level over a considerable period (generally at least 10 years). The values given here may also be updated in future to reflect any strategic objectives which may be set at a national level for this feature.</p> <p>Given the likely fluctuations in numbers over time, any impact-assessments should focus on the current abundance of the site's population, as derived from the latest known or estimated level established using the best available data. This advice accords with the obligation to avoid deterioration of the site or significant disturbance of the species for which the site is classified, and seeks to avoid plans or projects that may affect the site giving rise to the risk of deterioration.</p> <p>Similarly, where there is evidence to show that a feature has historically been more abundant than the stated minimum target and its current level, the ongoing capacity of the site to accommodate the feature at such higher levels in future should also be taken into account.</p> <p>Maintaining or restoring bird abundance depends on the suitability of the site. However, factors affecting suitability can also determine other demographic rates of birds using the site including survival (dependent on factors such as body condition which influences the ability to breed or make foraging and/or</p>	<p>The latest data can be requested via the BTO (British Trust for Ornithology) website.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<p>Lapwing</p> <p>Restore the size of the non-breeding population at a level which is at or above 36,565 individuals (calculated at a 5-year peak mean at time of notification), while avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.</p>	<p>migration movements) and breeding productivity. Adverse anthropogenic impacts on either of these rates may precede changes in population abundance (e.g. by changing proportions of birds of different ages) but eventually may negatively affect abundance. These rates can be measured/estimated to inform judgements of likely impacts on abundance targets.</p> <p>Unless otherwise stated, the population size will be that measured using standard methods such as peak mean counts or breeding surveys. This value is also provided recognising there will be inherent variability as a result of natural fluctuations and margins of error during data collection. Whilst we will endeavour to keep these values as up to date as possible, local Natural England staff can advise on whether the figures stated are the best available.</p>	
Assemblage of species	Assemblage abundance	<p>Assemblage of Waterfowl</p> <p>Maintain the overall abundance of the non-breeding assemblage at a level which is above 20,000 individual wintering wetland birds, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.</p> <p>The non-breeding assemblage of waterfowl was 58,093 individuals (calculated at a 5-year peak mean) at time of notification.</p>	<p>This will sustain the assemblage population and contribute to viable local, national and bio-geographic populations of its component species. Assemblage abundance is the annual sum of peak counts of each assemblage component species (at any time of year, though peaks tend to occur in the non-breeding season), unless otherwise stated. Five year peak means are the average of these annual peak sums for the relevant period. An assemblage component is any waterbird using the site.</p> <p>Due to the dynamic nature of assemblage component populations, this target may be subject to periodic review. However, the target assemblage abundance is considered to be the minimum standard for conservation or restoration measures and therefore where at any time the assemblage abundance is greater than the target value given, any measure or impact assessment should take account of the greater abundance. This meets with the obligation to avoid deterioration of a European site or significant disturbance of the species for which the site is classified, and seeks to avoid plans or projects giving rise to the risk of such deterioration or disturbance.</p>	<p>JNCC SPA description</p> <p>Somerset Levels and Moors SPA citation document (March 1995). Available here: http://publications.naturalengland.org.uk/publication/4598158654963712</p> <p>The latest data can be requested via the BTO (British Trust for Ornithology) website.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>Similarly, where there is evidence to show that a feature has historically been more abundant than the stated minimum target and its current level, the ongoing capacity of the site to accommodate the feature at such higher levels in future should also be taken into account.</p> <p>Whether to maintain or restore depends on the overall assemblage abundance (i.e. the peak mean derived from the summed peak counts of components), and should only change in response to this value, excepting natural change. Fluctuations of individual assemblage component species alone should not necessarily change the target.</p> <p>Assemblage abundance is linked to the demographic rates of assemblage components, including survival (dependent on factors such as body condition which influences the ability to breed or make foraging and/or migration movements) and breeding productivity. Adverse anthropogenic impacts on either of these rates may precede changes in population abundance (e.g. by changing proportions of birds of different ages) but eventually may negatively affect abundance. These rates can be measured/estimated (particularly for the main or named components) to inform judgements of likely changes to the assemblage and associated impacts on abundance targets. Whilst we will endeavour to keep these values as up to date as possible, local Natural England staff can advise on whether the figures stated are the best available.</p>	
Assemblage of species	Diversity of species	Assemblage of Waterfowl Maintain the species diversity of the bird assemblage.	<p>This will ensure the bird assemblage reflects the diversity of species the SPA supports. Assemblage diversity is a product of species richness (the number of different species present), abundance (population size of each assemblage component species) and relative 'importance' (an assessment of the conservation status of each assemblage component, described below).</p> <p>Each component makes a different contribution to the diversity of the assemblage, and changes to some components may be</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>considered to affect diversity more than others. Negative changes to small numbers of relatively important assemblage components may have a similar overall effect to negative changes in larger numbers of less important components.</p> <p>To meet the target, the populations of each of the 'main component' assemblage species to be maintained or restored are i) those present in nationally important numbers ($\geq 1\%$ GB population); ii) migratory species present in internationally important numbers ($\geq 1\%$ biogeographic population); iii) those species comprising $\geq 2,000$ individuals ($\geq 10\%$ of the minimum qualifying threshold for an internationally-important assemblage); and iv) 'named components' otherwise listed on the SPA citation.</p> <p>In addition to the main components, other components should be considered as these contribute collectively to the assemblage diversity, in particular proportionally abundant populations of species of conservation importance. Examples are those 'red-listed' as Birds of Conservation Concern and/or those listed on Sections 41/42 of the Natural Environment and Rural Communities Act 2006.</p> <p>The species composition of an assemblage may change over time. However, to meet this target, the total number of all native waterbird species contributing to the assemblage species richness should not decline significantly.</p>	
Supporting habitat (both within and outside the SPA): extent and distribution	Extent and distribution of supporting non-breeding habitat	Maintain the extent and distribution of suitable habitat within and outside the SPA boundary) which supports the qualifying features for all necessary stages of the non-breeding/wintering period (moulting, roosting, loafing, feeding)	<p>Conserving or restoring the extent of supporting habitats and their range will be key to maintaining the site's ability and capacity to support the SPA population.</p> <p>The information available on the extent and distribution of supporting habitat used by the feature may be approximate depending to the nature, age and accuracy of data collection. This target also applies to supporting habitat (habitats of functional importance for qualifying features) which lies outside the SPA boundary.</p>	<p>More detailed information for each component part of the SPA may be available from Natural England.</p> <p>Somerset Levels and Moors Natural Area. A nature conservation profile. English Nature (1997).</p> <p>Natural England 2014</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<p>Land and open water: 6394.18 ha.</p> <p>Within the SPA boundary: grazing marsh, fen, reedbeds, species-rich and species poor neutral grassland, open water, rivers, artificial drainage channels and ditches.</p> <p>Outside the SPA boundary: an unquantified area of land of functional importance for qualifying features.</p>	<p>The grassland community types within each component SSSI are a complex mosaic of species-rich and species-poor neutral grassland, fen, mire and swamp communities.</p> <p>Land of functional importance on the floodplain outside the SPA boundary includes arable land, species-poor grassland, species-rich grassland and a variety of wetland habitats in nature conservation reserves, such as the RSPB reserves at Ham Wall and Greylake.</p> <p>The SPA's capacity to support and sustain an assemblage comprising a very large number of birds (in excess of 20,000) made up of a diverse mix of species will be reliant on the overall quality and diversity of the habitats that support them. The feeding and roosting habitats which support the assemblage occur within and outside the site boundary. This target is applicable to both circumstances. Due to the large number of species and natural fluctuations in the overall composition of an assemblage, it is not practical to provide specific targets relating to each supporting habitat relevant to the assemblage. Generally speaking, the specific attributes of each supporting habitat may include vegetation characteristics and structure, water depth, food availability, connectivity between nesting, roosting and feeding areas both within and outside the SPA. Further advice will be provided by Natural England on a case by case basis.</p>	Site Improvement Plan: Somerset Levels and Moors
Supporting habitat (both within and outside the SPA): function/ supporting process	Water quantity	<p>Maintain the supply of water to a standard which provides the necessary conditions to support the qualifying features of the SPA.</p> <p>In winter the flood regime must provide a mixture of splash, shallow and deep flooded areas.</p>	<p>For many SPA features which are dependent on wetland habitats supported by surface water, maintaining the quantity of water supply will be critical, especially at certain times of year during key stages of their life cycle.</p> <p>The presence of overwintering SPA birds on the floodplain depends on a complex integrated approach to water level and flood risk management.</p> <p>Raised Water Level Areas (RWLAs) provide a safety net to ensure the presence of qualifying features, but the continuation</p>	<p>"Conservation Requirements for the Somerset Levels and Moors SPA/Ramsar/SSSI and Wider Wetland." English Nature (1999).</p> <p>Water level management on component SSSIs is implemented in line with 10 Water Level Management Plans (WLMPs) approved by Natural England, the Environment Agency and the</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<p>Continue to facilitate a pattern of natural low level flood events across the floodplain each winter.</p> <p>Favourable water levels must be maintained from 1 December to the end of February.</p> <p>Target conditions across the SPA:</p> <p>Splash conditions (field level to 10 cm deep) should occur over at least 30% of the SPA and the majority of component SSSIs.</p> <p>Shallow conditions (10 to 30 cm deep) should occur over 10 to 25% of the SPA and the majority of component SSSIs. Ideally, shallow flooding should occur over at least 20 ha when combined with at least 20 ha of deep flooding.</p> <p>Deeper conditions (25 to 75 cm deep) should occur over at least 5 to 10% of the SPA, but not necessarily every component SSSI. Ideally, deep flooding should occur over at least 20 ha when combined with at least 20 ha of shallow flooding.</p> <p>Target conditions at field scale:</p>	<p>of natural low-level flood events across the floodplain each winter is essential to for the survival of qualifying features within and outside the SPA boundary.</p> <p>During the winter months, the number of waterfowl present is influenced by the extent of controlled and uncontrolled flooding. This becomes critical when freezing conditions elsewhere displace more birds to the Somerset Levels and Moors. Maintenance of favourable water levels is essential to attract wintering waterfowl.</p> <p>The extent of shallow flooding should be achieved by the first week in December and reduced gradually from the end of February until it is gone by mid-March. Areas managed for deep flooding should be ready by mid-December and water removed gradually from mid-February until it is gone by early March. Achievement of the target in November and March will be influenced by prevailing weather conditions, particularly droughts and flood events.</p> <p>Splash flooding provides conditions for Wigeon and Teal to feed, and after receding leaves damp ground that attracts Snipe, Lapwing and Golden Plover.</p> <p>Shallow flooding is necessary to provide undisturbed feeding areas and roosting sites for ducks and roosting sites for waders. Areas of shallow or deep flooding covering at least 20 ha need to be close to areas of at least 20 ha of splash, shallow or deep flooding to act as a minimum refuge size for waterfowl. At the time of writing, the extent of shallow flooding is a little less than required.</p> <p>Deep flooding is necessary to provide feeding areas and roosting sites for Bewick's Swan and ducks. Water levels in excess of the defined range can be evacuated, when and where possible. Sometimes, more water may need to be</p>	<p>Parrett Internal Drainage Board inn July 2011:</p> <p>Bridgwater & Pawlett WLMP (2009) Othery, Middlezoy, Westonzoyland & Chedzoy WLMP (2009) West Sedgemoor WLMP (2009) North Drain WLMP (2010) South Drain WLMP (2010) Wet Moor WLMP (2010) West Moor WLMP (2010) King's Sedgemoor & Aller Moor (2010) North Moor & Salt Moor (2010) Curry Moor (2011)</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<p>Early winter (from mid-November): water levels should rise gradually to create extensive pools covering 20 to 50% of most fields with the lowest lying fields being close to 50% inundated.</p> <p>Mid-winter (1 December to the end of February): extensive areas of splash flooding and shallow pools up to 25 cm deep covering at least 50% of most fields with deep water roost sites covering at least 60 ha with water 25 to 75 cm deep.</p> <p>Late winter to early spring (31 March): water levels should be lowered gradually to leave splash conditions with shallow pools in the lowest lying fields.</p>	<p>removed to prevent anoxic conditions from developing during mild weather or when shallow or deeper water has been present continuously between December and February. Prolonged deep water flooding can reduce the extent and quality of feeding habitat because probing waders are unable to reach food sources.</p> <p>At the time of writing, the area of deep water exceeds the target. Sufficient deep water for safe roosts exists in the Brue Valley in the form of flooded peat excavations at Shapwick and Westhay SSSIs, and on the Parrett floodplain at West Sedgemoor and Southlake. In severe cold weather, the wider water courses, and in particular the King's Sedgemoor Drain, are used as ice-free roost sites.</p>	
<p>Supporting habitat (both within and outside the SPA):</p> <p>Function /supporting process</p>	Water quality	<p>Water quality target</p> <p>The SPA qualifying features are relatively insensitive to organic and nutrient pollution. The current water quality of the Somerset Levels and Moors is likely to be adequate to support the SPA qualifying features.</p>	<p>Poor water quality can adversely affect the availability and suitability of feeding and roosting habitats.</p> <p>Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD 2000/60/EC) will also be sufficient to support the SPA Conservation Objectives but in some cases more stringent standards may be needed to support the SPA feature.</p> <p>The main source of lowered water quality through the Somerset Levels and Moors is diffuse water pollution, caused primarily by high phosphate levels from nutrient enrichment (inorganic and organic agricultural fertilisers, soil loss from arable land and overflows from private septic tanks). Point sources of pollution mainly occur at sewage treatment works.</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>Although water quality is unlikely to pose a risk to the SPA qualifying features, it is relevant that the ditch aquatic plant and invertebrate communities of the coincident Ramsar Site are suffering from the effects of hyper-eutrophication. Measures to reverse this are in place through PR19 (Ofwat), CSF (Catchment Sensitive Farming Programme) and the Somerset Levels and Moors Ramsar Diffuse Water Pollution from Agriculture Plan. These measures are forecast to improve water quality.</p> <p>The Environment Agency has also undertaken nutrient modelling to identify the relative importance of diffuse and point sources to nutrient enrichment in the catchment and is working with the water companies to reduce nutrient discharges from sewage treatment works.</p> <p>Acute problems associated with catastrophic pollution events need to be dealt with on a case-by-case basis.</p>	
Supporting habitat (both within and outside the SPA): function/supporting process	Conservation measures	<p>Maintain management or other measures (whether within and/or outside the site boundary as appropriate) necessary to maintain the structure, function and/or the supporting processes associated with the feature and its supporting habitats.</p> <p>Grassland used by SPA birds should be managed by grazing, or mowing and removing field-dried hay followed by aftermath grazing. By November, the sward should be a mixture of grass tussocks and areas of</p>	<p>Active and ongoing conservation management is often needed to protect, maintain or restore this feature at this site. Other measures may also be required, and in some cases, these measures may apply to areas outside of the designated site boundary in order to achieve this target.</p> <p>Further details about the necessary conservation measures for this site will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, Site Management Strategies or Plans, the Views about Management Statement for the underpinning SSSI and/or management agreements.</p> <p>The suite of conservation management measures necessary to support overwintering SPA birds encompasses mowing and grazing low input meadows, maintaining the extensive ditch system to supply and remove water, sympathetically managing ditches to maintain the plant and invertebrate assemblages, controlling water levels across component SSSIs, maintaining artificial Raised Water Level Areas (RWLAs) designed to</p>	<p>“Conservation Requirements for the Somerset Levels and Moors SPA/Ramsar/SSSI and Wider Wetland.” English Nature (1999).</p> <p>Water level management on component SSSIs is implemented in line with 10 Water Level Management Plans (WLMPs) approved by Natural England, the Environment Agency and the Parrett Internal Drainage Board in July 2011:</p> <p>Bridgwater & Pawlett WLMP (2009) Othery, Middlezoy, Westonzoyland & Chedzoy WLMP (2009) West Sedgemoor WLMP (2009)</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<p>shorter grass from 5 to 15 cm in height. Livestock should be removed by the end of November.</p> <p>Fields should support a mixture of grasses and herbs with some patches of rushes and sedges to provide vegetation and seeds for ducks and swans to eat in winter.</p> <p>Habitats within the SPA should support abundant populations of aquatic and soil invertebrates for ducks and waders to eat in winter.</p> <p>The landscape should remain relatively free of tall trees and scrub to provide sightlines for birds of over 200 m to reduce excessive predation in feeding areas and roost sites.</p> <p>In winter (1 December to 31 March), water in ditches (locally called "rhynes") must be at least 30 cm deep.</p>	<p>provide appropriate water levels for SPA birds, maintaining flooded voids in the peat production zone, controlling invasive plant species and minimising the level of disturbance caused by human activities.</p> <p>Land management measures in most of the SPA are currently delivered through voluntary agri-environment scheme agreements. A succession of schemes have secured the short-term future for qualifying features, but changes in requirements as schemes evolve and uptake varies makes it difficult to guarantee the long-term integrity of privately-owned Raised Water Level Areas (RWLAs). Outside the SPA, uptake of new agreements is low and there is an increasing risk that agricultural intensification will affect land of functional importance for qualifying features. Landowners always have the option of ending agreements at the 5-year break point, which contributes to uncertainty over the future.</p> <p>Water level management measures are delivered through Water Level Management Plans (WLMPs).</p>	<p>North Drain WLMP (2010) South Drain WLMP (2010) Wet Moor WLMP (2010) West Moor WLMP (2010) King's Sedgemoor & Aller Moor (2010) North Moor & Salt Moor (2010) Curry Moor (2011)</p>
Supporting habitat (both within and outside the SPA): function/ supporting process	Air quality	<p>Maintain concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System.</p> <p>Maintain concentrations and deposition of air pollutants to at or below the site-relevant Critical</p>	<p>The structure and function of habitats which support this SPA feature may be sensitive to changes in air quality. Exceeding critical values for air pollutants may result in changes to the chemical status of its habitat substrate, accelerating or damaging plant growth, altering vegetation structure and composition and thereby affecting the quality and availability of nesting, feeding or roosting habitats.</p> <p>Critical Loads and Levels are thresholds below which such harmful effects on sensitive UK habitats will not occur to a</p>	<p>More information about site-relevant Critical Loads and Levels for this SPA is available by using the 'search by site' tool on the Air Pollution Information System.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	<p>noteworthy level, according to current levels of scientific understanding. There are critical levels for ammonia (NH₃), oxides of nitrogen (NO_x) and sulphur dioxide (SO₂), and critical loads for nutrient nitrogen deposition and acid deposition.</p> <p>It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis. Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development.</p>	
Supporting habitat (both within and outside the SPA): minimising disturbance	Minimising disturbance caused by human activity	Reduce the frequency, duration and/or intensity of disturbance within close proximity of affecting roosting, foraging, feeding, moulting and/or loafing birds so that the qualifying features are not significantly disturbed	<p>The nature, scale, timing and duration of some human activities can result in the disturbance of birds at a level that may substantially affect their behaviour, and consequently affect the long-term viability of the population.</p> <p>Such disturbing effects can for example result in changes to feeding or roosting behaviour, increases in energy expenditure due to increased flight, and desertion of supporting habitat (both within or outside the designated site boundary where appropriate). This may undermine successful feeding and/or roosting, and/or may reduce the availability of suitable habitat as birds are displaced and their distribution within the site contracts.</p> <p>Disturbance associated with human activity may take a variety of forms including noise, light, sound, vibration, trampling, and presence of people, animals and structures.</p> <p>Daytime use of feeding areas and roost sites by SPA birds will be minimal if the level of disturbance is an issue.</p> <p>Management of public access, through pedestrian and vehicle access strategies, visitor management plans and promoting</p>	Natural England 2014 Site Improvement Plan: Somerset Levels and Moors

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>awareness of the sensitivity of particular areas, can reduce disturbance to over wintering bird populations</p> <p>Development of settlements and a corresponding increase in the human population on and around the floodplain may lead to an increase in levels of disturbance to qualifying features on some parts of the SPA and associated functional land. Measures to reduce the impact of recreational disturbance might include provision of greenspace within settlements and educational information on the sensitivity of birds to disturbance</p>	
Supporting habitat (both within and outside the SPA): structure	Landscape	Maintain open and unobstructed terrain within and around roosting and feeding areas with no overall decrease in field sizes	<p>The qualifying features favour large areas of open terrain, largely free of obstructions in and around roosting and feeding areas to detect approaching predators.</p> <p>Bewick's Swan requires an unimpeded sightline of 500 m at feeding, roosting and refuge sites.*</p> <p>The other qualifying features require an unimpeded sightline of 200 m at feeding, roosting and refuge sites.*</p>	*Natural England & the Countryside Council for Wales' advice for the Seven Estuary European Marine Site given under Regulation 33(2) (a) of the Conservation (Natural Habitats, &c.) Regulations 1994, as amended (June 2009).
Supporting habitat (both within and outside the SPA): function/supporting process	Connectivity with supporting habitats	Maintain the safe passage of birds moving between roosting and feeding areas within and outside the component SSSIs and between the Somerset Levels and Moors and Severn Estuary SPAs.	<p>The ability of the feature to safely and successfully move to and from feeding and roosting areas is critical to their breeding success and to the adult fitness and survival. This target will apply within the site boundary and where birds regularly move to and from off-site habitat where this is relevant.</p> <p>Structures and wind-turbines located between component SSSIs, functionally-linked land on the floodplain and in the flyway between the Somerset Levels and Moors and Severn Estuary SPAs may lead to increased mortality of SPA birds through collisions and displacement from feeding habitats and roost sites.</p> <p>Research into the role of the flyway between the estuary and inland moors and the extent and importance of functionally-linked land outside the SPA boundary is required.</p>	Natural England 2014 Site Improvement Plan: Somerset Levels and Moors

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat (both within and outside the SPA): function/ supporting process	Food availability within supporting habitat	<p>Bewick's Swan</p> <p>Maintain the availability of cereal grains, rape, potatoes and sugar beet, where these sources are locally important to feeding flocks.</p> <p>Golden Plover and Lapwing</p> <p>Maintain the availability of key invertebrate prey species (e.g. earthworms and beetles) of preferred prey sizes.</p> <p>Teal</p> <p>Maintain the cover/abundance of preferred food plants (e.g. <i>Polygonum</i>, <i>Eleocharis</i>, <i>Rumex</i>, <i>Ranunculus</i>, and <i>Juncus</i>).</p> <p>Assemblage</p> <p>Maintain the cover/abundance of preferred food plants and availability of key invertebrate prey species.</p>	<p>The availability of an abundant food supply is critically important for successful breeding, adult fitness and survival and the overall sustainability of the population. As a result, inappropriate management and direct or indirect impacts which may affect the distribution, abundance and availability of prey may adversely affect the population.</p> <p>In winter, Bewick's Swans forage mainly by day feeding on grasses, aquatic plants, leftover grains and other crops, such as potatoes and beets. The serious decline in the overwintering population on the Somerset Levels and Moors makes it difficult to recommend the extent of feeding habitat necessary restore it to the level when the SPA was notified. Research is needed on the extent and suitability of arable land outside the SPA boundary that has the potential to support this species. An increase in the extent of arable land on the floodplain is not seen as necessary to reverse the population decline.</p> <p>Golden Plover and Lapwing feed primarily on earthworms and insects and their larvae. In winter, these species feed across the floodplain mainly by day, but sometimes at night.</p> <p>Teal prefer to feed at night in winter to avoid disturbance, but can be in active in the day in quiet locations. It mainly forages for seeds on grassland in winter but can feed on stubble.</p> <p>Research is needed to establish the scale of nocturnal use of land outside the SPA by foraging qualifying species.</p>	
Version Control Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: N/A				

ANNEX 7

Letter from Natural England regarding the impact of
Phosphate on the Somerset Levels and Moors SPA /
Ramsar Site

Date: 17 August 2020



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Dear Sir/Madam

Matters regarding development in relation to the Somerset Levels and Moors Ramsar Site

Background

Natural England is writing to your Authority regarding the implications of the CJEU case known as the “Dutch N” (Joined Cases C-293/17 and C-294/17 Coöperatie Mobilisation for the Environment UA and Others v College van gedeputeerde staten van Limburg and Others) in relation to planning applications that may affect the Somerset Levels and Moors Ramsar protected site.

Dutch-N concerns agricultural N-pollution affecting protected heathland sites. However, the general principles involved are applicable to other pollutants or other receptors – the essential point being that where the conservation status of a protected natural habitat is unfavourable, the possibility of authorising activities which may subsequently compromise the ability to restore the site to favourable condition and achieve the conservation objectives is “necessarily limited”.

The ruling has resulted in greater scrutiny of plans or projects that will result in increased nutrient loads that may have an effect on:

- Special Protection Areas (SPA) designated under the Habitat Regulations 2017
- Special Areas of Conservation (SAC) designated under the Habitat Regulations 2017
- Sites designated under the Ramsar Convention, which as a matter of national policy¹ are afforded the same protection as if they were designated under the Habitat Regulations 2017

By informing the way in which Reg. 63 of the Habitats Regulations 2017 should apply to pollution-related matters Dutch-N has resulted in the need for greater scrutiny of the effects of plans or projects that are likely to, either directly or indirectly, increase nutrient loads to internationally important sites (i.e. SACs, SPAs and Ramsar Sites) where a reason for unfavourable condition is an

¹ NPPF para. 176.

excess of a specific pollutant. Following the Dutch N ruling, the legal difficulty in authorising plans or projects that lead to further inputs of that pollutant is clear.

Somerset Levels and Moors Protected Site(s)

The Somerset Levels and Moors are designated as an SPA under the Habitat Regulations 2017 and listed as a Ramsar Site under the Ramsar Convention. The Ramsar Site broadly covers the same area as the Somerset Levels and Moors SPA. While the SPA is designated for its international waterbird communities, the Ramsar Site is designated for its internationally important wetland features including the floristic and invertebrate diversity and species of its ditches, which is shared as a designated feature of the underpinning Sites of Special Scientific Interest (SSSIs). Further information relating to the unfavourable condition of the Ramsar Site and the underpinning SSSIs designated under the Wildlife & Countryside Act 1981 (as amended) is provided at Annex 1.

In relation to the Somerset Levels and Moors SPA, based on our current understanding, Natural England is satisfied that additional nutrients from typical new developments described in this letter are unlikely, either alone or in combination, to have a likely significant effect on the internationally important bird communities for which the site is designated. On this basis, Natural England is satisfied that the effects of additional nutrients from development on the SPA can normally be screened out of further assessment.

However, the interest features of the Somerset Levels and Moors Ramsar Site are considered unfavourable, or at risk, from the effects of eutrophication caused by excessive phosphates. Further, although improvements to the Sewage Treatment Works, along with more minor measures to tackle agricultural pollution have been secured, these will not reduce phosphate levels sufficiently to restore the condition of the Ramsar Site features. The scope for permitting further development that would add additional phosphate either directly or indirectly to the site, and thus erode the improvements secured, is necessarily limited.

Listed Wetlands of International Importance under the Ramsar Convention (Ramsar) are protected as a matter of Government policy (National Planning Policy Framework paragraph 176). Therefore in line with national policy, Natural England advises that your Authority, as the competent authority under the Habitats Regulations 2017, considers the implications of these matters on the Ramsar Site through an appropriate assessment of the implications of the plan or project in view of that site's conservation objectives. Having carried out that assessment, permission for the plan or project may only be given if the assessment allows you to ascertain that it will not have an adverse effect on the integrity of the site.

Conservation Objectives for Ramsar Sites

Site specific conservation objectives for Ramsar Sites have not been published. However, the following generic Conservation Objectives for all Ramsar Sites have previously been signed off by Natural England:

“With regard to the Ramsar Site and the wetland habitats, individual species and/or groups of species for which the site has been listed (its ‘Qualifying Features’), and subject to natural change;

Ensure that the integrity of the [Ramsar] site is maintained or restored as appropriate, and ensure that the site contributes to achieving the wise use of wetlands across the UK, by maintaining or restoring;

- The extent and distribution of qualifying habitats and habitats of qualifying species
- The structure and function of qualifying habitats and habitats of qualifying species
- The supporting processes on which qualifying habitats and habitats of qualifying species rely
- The populations of each qualifying species, and,
- The distribution of each qualifying species within the site.”

The conservation objectives for the Ramsar Site should also ensure consistency with the published conservation objectives for the Somerset Levels and Moors SPA.

Implications for development within the hydrological catchment of the Somerset Levels and Moors Ramsar Site

Natural England advises that, in light of the unfavourable condition of the Somerset Levels and Moors Ramsar Site, before determining a planning application that may give rise to additional phosphates within the catchment, competent authorities should undertake a Habitats Regulations Assessment proceeding to an appropriate assessment where a likely significant effect cannot be ruled out, even where the development contains pollution mitigation provisions. Note the need for an appropriate assessment of proposals that include mitigation measures designed to avoid an adverse impact is established in domestic case law² and European case law³. The appropriate assessment must rule out any reasonable doubt as to the likelihood of an adverse impact on the integrity of the site, having regard to its conservation objectives.

It has been established that a 'nutrient neutrality' approach to development is likely to be a lawfully robust solution to enable the grant of permissions that give rise to an appreciable effect. Examples of multi authority catchment solutions include the [nutrient neutrality methodology in the Solent](#), the River Avon Local Authorities phosphorous interim delivery plan to deliver phosphate neutrality, the River Axe (Devon) Nutrient Management Plan (currently in draft) and [Nitrogen Reduction in Poole Harbour Supplementary Planning Document](#). Your authority may wish to consider this approach to enable developments to proceed in the catchment that will result in additional phosphates. It is however emphasised that for such an approach to be lawful, it is likely that the measures used to offset such impacts should not compromise the ability to restore the designated site to favourable condition and achieve the conservation objectives.

Development types affected

1. Additional residential units and commercial development

Additional residential units within the catchment are likely add phosphate to the designated site via the waste water treatment effluent, thus contributing to the existing unfavourable condition and further preventing the site in achieving its conservation objectives. Natural England therefore advises that your authority carry out an appropriate assessment of planning applications that will result in a net increase in population served by a wastewater system, including new homes, student and tourist accommodation.

Provided the competent authority is satisfied that new commercial development will not significantly increase loadings at the catchment's waste water treatment works then they may be screened out from further assessment on the basis that people living in the catchment are also likely to work and use facilities in the catchment, and therefore wastewater generated by that person can be calculated using the population increase from new homes and other accommodation.

Tourism attractions (e.g. theme parks) are normally considered exceptions as these land uses attract people into the catchment and generate additional wastewater within the Somerset Levels and Moors catchment. There may also be cases where planning applications for new commercial or industrial development could result in the release of additional phosphates into the system, for

² *Gladman Developments Limited v S of S for Housing, Communities and Local Government and another* [2019] EWHC 2001 (Admin)

³ *Sweetman vs Coillte Teoranta CJEU C-323/17* ("People over Wind")

example through processes that add phosphates, or significant volumes of additional waste water to the sewage treatment works.

Where applicable, the appropriate assessment should consider the improvements to Wessex Water's sewage treatment works secured under PR19. Once up and running these improvements will significantly reduce (although not remove) the offsetting requirements for new residential development in perpetuity. However, additional more temporary measures may be required to take account of the increased nutrient loads in the interim period.

2. Infrastructure that supports agricultural intensification

Increased agricultural intensification within the catchment of the Somerset Levels and Moors Ramsar Site will also lead to increased nutrient loading. For example, planning applications for new or expanded livestock housing (e.g. cattle sheds, chicken, or pig farm facilities, etc.) are all forms of agricultural intensification that if located within the catchment are likely to increase nutrient loads to the designated site and should be subject to an appropriate assessment.

Additional considerations relating to slurry storage

The Water Resources (Control of Pollution) (Silage, Slurry and Agricultural Fuel Oil) (England) Regulations 2010, abbreviated to the SSAFO regulations, require agricultural holdings to provide storage infrastructure for silage, slurry and agricultural fuel oil to a given standards, sizes and lifespan to prevent water pollution. The size of a slurry store needed by a holding is determined by factors including the number of livestock, area of uncovered yard, presence of a separator, volumes of parlour washings etc. The installation of a new slurry store, or in some cases the enlargement of an existing slurry store, requires planning permission.

Natural England advises that when your Authority is seeking to determine applications for new or enlarged slurry stores on agricultural holdings within the catchment of the Somerset Levels and Moors Ramsar Site it should, in accordance with Reg. 63 of the Habitats Regulations 2017, consider the plan or project that underlies the application for planning permission. The need for a new slurry store will in many cases be part of a broader plan or project, namely an increase in livestock numbers on the holding in question, with the slurry store being a legally necessary means of enabling that plan or project. The grant of planning permission for a new slurry store is likely to unlock the ability to intensify the use of the holding in question.

When carrying out an appropriate assessment of this sort, Natural England advises that a competent authority should proceed on the basis of an analysis of the added livestock capacity that a new slurry store would unlock. This principle has been established in decision making (see Torridge Council Appropriate Assessment under the Habitats Regulations of Planning Application 1/1041/2015/FULM: Land at Beckland Farm, Hartland).

3. Anaerobic digesters

Natural England has particular concerns relating to the potential impacts of additional anaerobic digester (AD) plants within the Somerset Levels and Moors catchment. AD plants require the input of organic matter, often in the form of farmyard manure and arable plant matter. Livestock and arable crops within the catchment are significant contributors to the elevated phosphate and unfavourable condition of the designated sites, in particular at locations where there are runoff pathways. New (or increased capacity) of AD is therefore likely to be driving local land use changes such as the production of maize, which is known to be a significant contributor to diffuse water pollution.

It follows that permitting new, or increasing the capacity of existing, AD plants through the grant of planning permission is likely to unlock land use change which is known to contribute phosphorous and sediment to the catchment watercourses. Natural England advises that the competent authorities should consider new or enlarged AD facilities as simply one aspect of a plan or project of land use change. In this regard, when an application for a new or extension to an existing AD plant is within (or within close proximity) to the catchment of the Somerset Levels and Moors Ramsar

Site, your authority should consider the risk that the development will indirectly increase the amount of phosphates entering the designated site. If an increase in the catchment's phosphate loads is considered likely then the implications of the proposals, along with any measures that may be implemented to alleviate that risk, should also be considered through an appropriate assessment.

4. Other development types

We have focused here on the main types of development that result in additional phosphates in the Somerset Levels and Moors catchment. There may be other types of development that fall into that bracket and we would welcome further discussion in that respect.

Mitigation options

Nutrient offsetting mitigation should be in place so as to avoid either permanent, or temporary increases in phosphate loads to the designated site and must be effective for the duration of the effect. In the case of new housing the duration of the effect is typically taken as in perpetuity, with the costs of maintaining, monitoring and enforcing mitigation calculated for a minimum of 80 – 125 years. It does not, however, follow that mitigation is not needed after that period, rather the expectation is the mitigation will continue indefinitely (e.g. through securing appropriate permanent land use change). In contrast, phosphate offsetting measures for agricultural intensification or AD plants need only be effective for the duration of the operation facilitated by the permission and therefore less permanent mitigation measures may be appropriate. Natural England would be happy to discuss potential phosphate mitigation options for different types of development in due course.

Note

This is the opinion of Natural England as statutory consultee to local planning authorities in relation to nature conservation and impacts of plans or projects on designated sites. It is up to individual planning authorities to take their own legal advice when exercising their statutory functions.

Natural England is keen to help your authority to understand the scope of the issues discussed above and to establish solutions which do not undermine the delivery of your plan policies. There are a number of mitigation measures which may be available to enable developments to proceed, whether on-site or off-site. We are also happy to engage directly with applicants on bespoke solutions through our Discretionary Advice Service.

If you have any queries relating to the advice in this letter please contact me on 07900 608072.

Yours sincerely

Simon Stonehouse, Natural England Wessex Team

Annex 1

Further information on the Somerset Levels and Moors Ramsar Site and SSSIs

The favourable condition of the ditches of the designated sites is in part dependent on the water quality within them. In freshwater habitats it is often the case that the abundance of nutrients, especially phosphorus (P), is a key limiting factor of excessive primary productivity, particularly algae. Excessive nutrients leading to such adverse biological effects is known as “hyper-eutrophication”. In lowland ditch systems such as the Somerset Levels and Moors, these effects are typified by the excessive growth of filamentous algal, particularly in the form of large mats on the water surface, and a massive proliferation of certain species of *Lemna*. This can adversely affect the ditch invertebrate and plant communities through a variety of mechanisms including shading, smothering and anoxia, leading to a dominance of plant species better able to deal with these conditions, with negative competitive effects on others. This can lead to a significant negative shift in habitat quality and structure which in turn affects invertebrate communities.

The vast majority of the ditches within the Ramsar Site and the underpinning SSSI's are classified as being in unfavourable condition due to excessive P and the resultant ecological response, or at risk from this process.

The sources of P, commonly assessed in the form of phosphates, derive from diffuse water pollution (such as agricultural leaching) and point discharges (such as from Waste Water Treatment Works) within the catchment. Phosphorus levels are frequently 2-3 times higher than the target for total phosphorus set out within the Conservation Objectives underpinning the Ramsar Site. There is widespread evidence of biological harm linked to eutrophication in the form of increasing blooms of *Lemna* and filamentous algae that are threatening the integrity of the biological communities that should be specially protected under the Ramsar designation. This view is reinforced by the Environment Agency's Water Framework Directive (WFD) assessment of water bodies across the Somerset Moors, which is that many are at significantly less than 'Good' status for phosphate. Specifically, Water Framework Directive (WFD) phosphate limits of 100µg/l are exceeded across the Somerset Levels and Moors Catchment. River catchments which lie within the wider Somerset Levels are currently classified as *Poor Ecological Status* under the WFD.

Somerset Levels and Moors Sites of Special Scientific Interest

[Catcott Edington and Chilton Moors SSSI](#) [Curry and Hay Moors SSSI](#) [King's Sedgemoor SSSI](#) [Moorlinch SSSI](#) [Shapwick Heath SSSI](#) [Southlake Moor SSSI](#) [Tealham and Tadham Moors SSSI](#) [West Moor SSSI](#) [West Sedgemoor SSSI](#) [Westhay Heath SSSI](#) [Westhay Moor SSSI](#) [Wet Moor SSSI](#)

ANNEX 8

Guidance published by Somerset County Council in
relation to Bat SAC Consultation Zones

Barbastelle Bats
Exmoor and Quantocks Oak Woodlands
Special Area of Conservation (SAC)

Guidance on Development

Version 1.2 – April 2018





This guidance was prepared by Larry Burrows, Ecologist, Somerset Ecology Services, Planning Control, Somerset County Council working in partnership with Natural England

Acknowledgements

I wish to thank the following for their input into the development of the guidelines for the North Somerset and Mendip Bats SAC. The methodology developed for the guidance on the North Somerset and Mendip Bats SAC. Which was endorsed by Natural England, is used for Barbastelle bats and modified to take account of their spatial ecology in this guidance.

Henry Andrews, Andrews Ecology
Phil Anelay, North Somerset Council
Geoff Billington, Greena Ecological Consultants
Tom Clarkson, Clarkson Woods Ecologists
Jan Collins, Bat Conservation Trust
Matt Cowley, EAD Ecology
Sarah Forsyth, North Somerset Council
Amanda Grundy, Natural England
Laura Horner, Somerset County Council
Alison Howell, Natural England
John Mellor, FPCR Environment and Design Ltd
Susan Stangroom, North Somerset Council
Simon Stonehouse, Natural England
Carol Williams, Bat Conservation Trust
Roger Willmot, North Somerset Council
Gareth Withers, North Somerset Council

For data: Natural England; Bat Conservation Trust; Somerset Environmental Records Centre; Radio tracking reports by Greena Ecological Consultants; various reports from Council websites

Cover Photo: Frank Greenaway. Courtesy Vincent Wildlife Trust (<http://www.vwt.org.uk/>)

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EXMOOR AND QUANTOCKS OAK WOODLANDS
SPECIAL AREA OF CONSERVATION (SAC): GUIDANCE ON DEVELOPMENT

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Exmoor and Quantocks Oak Woodlands Special Area of Conservation (SAC)

PART A

Non-technical guidance

1. Who is the guidance aimed at and why?

- 1.1 This advice is aimed at developers, consultants, and planners involved in planning and assessing development proposals in the landscapes surrounding in Sedgemoor used by Barbastelle bats from the North Exmoor and Quantocks component sites of the Exmoor and Quantocks Oak Woodlands SAC.
- 1.2 The overall aim is for a clearer approach to considering impacts of development on the SAC. The guidance provides a consistent basis for understanding how rare Barbastelle bats use the landscape and where there is likely to be greater risk or opportunity for development. This will help inform strategic planning for the area's future housing needs.
- 1.3 The guidance will comprise a component of the development management process, to be considered in line with relevant policies, such as policy DM8 (Nature Conservation) of the Sedgemoor District Council Local Plan; NH3 of the West Somerset District Council Local Plan; Policy CE-S3 of the Exmoor National Park Authority Local Plan; and Policy DM2: Biodiversity and Geodiversity of the Somerset County Council Minerals Plan; and Policy DM3: Impacts on the environment and local communities in the Somerset County Council Waste Core Strategy
- 1.4 At project level the guidance will help identify key issues at pre-application stage that can inform the location and sensitive design of development proposals and minimise delays and uncertainty. Within the areas identified, there will be clear requirements for survey information and a strong emphasis on retaining and enhancing key habitat for bats and effective mitigation where required. This will demonstrate that development proposals avoid harm to the designated bat populations and support them where possible.
- 1.5 The guidance explains how development activities can impact the SAC and the steps required to avoid or mitigate any impacts. It applies to development proposals that could affect the SAC and trigger the requirements of the Habitats Regulations (see Annex 8). The local planning authority will consider, on the basis of evidence available, whether proposals (planning applications) are likely to impact on Barbastelle bats and hence require screening for Habitats Regulations Assessment (HRA). Those are the proposals to which the guidance will be applied. This will reduce the likelihood that it would be applied to minor developments which would not have an impact on the SAC

- 1.6 The guidance brings together best practice and learning from areas with similar approaches, such as Somerset County Council and South Hams, and the best scientific information available at the time of writing. It will be kept under review by Sedgemoor District Council and Somerset County Council and their partners and is fully endorsed by Natural England. The planning guidance is part of a wider approach that is being pursued by partner organisations to safeguard and improve habitat for rare bats that includes farm management. The guidance is also consistent with Natural England's Site Improvement Plan for the SACs.

2. What is the Bats SAC?

- 2.1 Special Areas of Conservation (SAC) are European sites of international importance for wildlife. The Exmoor and Quantocks Oak Woodlands SAC is important for two bat species, Barbastelle and Bechstein's bats present in the both the North Exmoor and the Quantocks SSSI components of the SAC. Bechstein's bats are a woodland species that are likely to be restricted to the SAC designated woodlands.
- 2.2 However, the landscapes around the SAC itself are also important in providing foraging habitat needed to maintain in particular the favourable conservation status of Barbastelle bats. Therefore the guidance makes strong requirements for consultation, survey information and appropriate mitigation, to demonstrate that development proposals will not adversely impact on the designated bat populations.

3. Juvenile Sustenance Zones

- 3.1 The guidance identifies the Juvenile Sustenance Zones of 1 kilometre (km) around the maternity roosts. New build development on green field sites should be avoided in the Juvenile Sustenance Zones (JSZs) in view of their sensitivity and importance as suitable habitat as foraging areas for young bats.

4. Bat Consultation Zone

- 4.1 The guidance also identifies the "Bat Consultation Zone" where Barbastelle bats may be found, divided into bands A, B and C, reflecting the likely importance of the habitat for the bats and proximity to maternity and other roosts.
- 4.2 Within the Consultation Zone development may be permitted but is likely to be subject to particular requirements, depending on the sensitivity of the site.

5. Need for early consultation

- 5.1 Section 3 of Part B of the guidance stresses the need for pre-application consultation for development proposals.
- 5.2 Within bands A or B of the Consultation Zone, proposals with the potential to affect features important to bats (identified in Section B paragraph 3.2 below) should be discussed with the local authority and/or Natural England as necessary.
- 5.3 Within band C developers should take advice from their consultant ecologist.

6. Survey requirements

- 6.1 Section 3 and Annex 4 of the guidance sets out the survey requirements normally applying to development proposals within the Bat Consultation Zone. Outside the Bat Consultation Zone development proposals may still have impacts on bats, and developers should have regard to best practice guidelines, such as Bat Conservation Trust survey guidelines and [Natural England's Standing Advice for Bats](#).
- 6.2 For proposals within the Consultation Zone (all Bands) developers must employ a consultant ecologist at an early stage to identify and assess any impacts.
- 6.3 For proposals within bands A and B of the Bat Consultation Zone, full season surveys will be needed (unless minor impacts can be demonstrated), and must include automated bat detector surveys. Survey results are crucial for understanding how bats use the site, and therefore how impacts on Barbastelle bats can be avoided, minimised or mitigated. Where mitigation is needed the survey results will inform the metric for calculating the amount of habitat needed (see Annex 6).
- 6.4 Within band C survey effort required will depend on the suitability habitat to support prey species hunted by Barbastelle bats.

7. Proposed developments with minor impacts

- 7.1 In some circumstances a developer may be able to clearly demonstrate (from their qualified ecologist's site visit and report) that the impacts of a proposed development are proven to be minor and can be mitigated (or do not require mitigation) without an impact on SAC bat habitat, so a full season's survey is not needed. This should be substantiated in a suitably robust statement submitted as part of the development proposals.

8. Need for mitigation, possibly including provision of replacement habitat

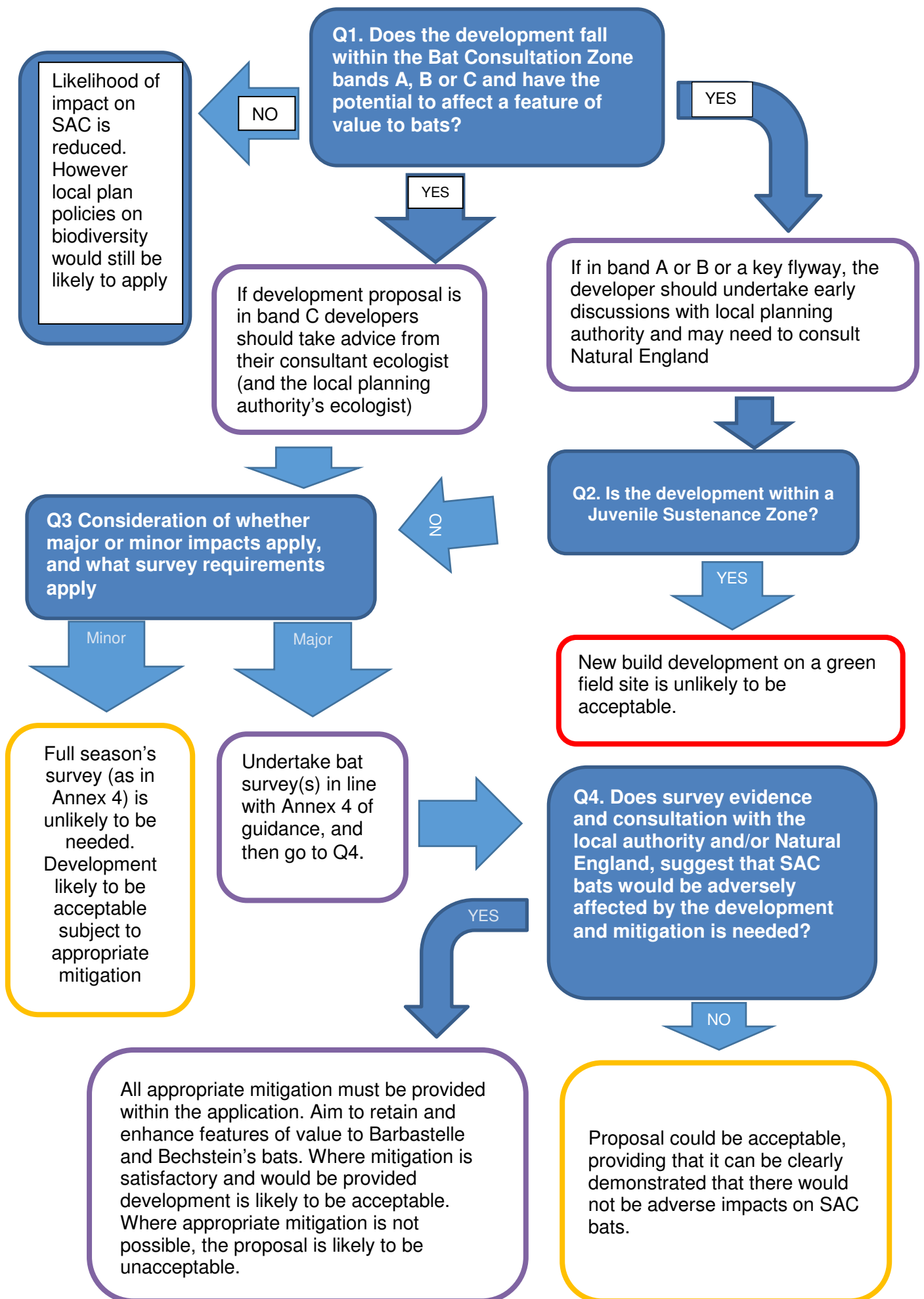
- 8.1 Within the Bat Consultation Zone (all Bands), where SAC bats could be adversely affected by development appropriate mitigation will be required.
- 8.2 Development proposals should seek to retain and enhance existing habitats and / or features of value to bats such as those listed in paragraph 3.2 of Part B in this guidance. Where this is not, or is only partially possible appropriate mitigation such as the provision of replacement habitat will be required. The council's ecologist will have regard to relevant considerations in determining the mitigation requirements, including survey results and calculations relating to quantity of replacement habitat. Annex 6 sets out the methodology and metric for calculating how much replacement habitat should be provided¹.

¹ In the Somerset County area developers may ask the Local Planning Authority to carry out the calculation for the amount of habitat required to replace the value of that lost to Barbastelle bats prior to the application being submitted, to check that the proposed master plan for the site has adequate land dedicated to the purpose. A charge may be levied for this service.

- 8.3 Any replacement habitat must be accessible to the Barbastelle bat population affected.
- 8.4 Where the replacement provision is to be made on land off-site (outside the red line development boundary for the planning application) any existing value of that land as bat habitat will also have to be factored in to the calculation.
- 8.5 Where the replacement provision is to be off site, and land in a different ownership is involved, legal agreements are likely to be needed to ensure that the mitigation is secured in perpetuity.
- 8.6 An Ecological Management Plan for the site must be provided setting out how the site will be managed for SAC bats in perpetuity.
- 8.7 Where appropriate a Monitoring Strategy must also be provided to ensure continued use of the site by SAC bats, and include measures to rectify the situation if negative results occur.



Barbastelle Bat. Photo: Henry Schofield. Courtesy Vincent Wildlife Trust



Technical Guidance

1. Introduction

- 1.1. The Exmoor and Quantocks Oak Woodlands SAC is designated under the Habitats Directive 92/43/EEC, which is transposed into UK law under the Conservation of Habitats and Species Regulations 2010 (as amended) ('Habitat Regulations'). This means that the populations of bats supported by this site are of international importance and therefore afforded high levels of protection, placing significant legal duties on decision-makers to prevent damage to bat roosts, feeding areas and the routes used by bats to travel between these locations. ;
- 1.2. Amongst the qualifying features for the SAC are two Annex II species:
 - the Barbastelle bat *Barbastella barbastellus*; and
 - the Bechstein's bat *Myotis bechsteinii*
- 1.3. Bechstein's bats are present in the Exmoor component site at Horner Wood only. However, longer range dispersal of Bechstein's bats is likely to benefit from habitat structure used by the Barbastelle bat and therefore the conservation and provision of such structure is given emphasis in the guidance. The 'Precautionary Principle' dictates that if their requirements are met, then the other SAC bat species is also likely to be protected. For more detail on the SAC see Annex 1.
- 1.4. The Conservation Objectives for the SAC² are: With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' which include the bat species listed above), and subject to natural change, ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:
 - The extent and distribution of qualifying natural habitats and habitats of qualifying species;
 - The structure and function (including typical species) of qualifying natural habitats;
 - The structure and function of the habitats of qualifying species;
 - The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;
 - The populations of qualifying species; and,
 - The distribution of qualifying species within the site.
- 1.5. Therefore, planners and prospective developers need to be aware that the habitats and features which support the populations of SAC bats outside the designated site are a material consideration in ensuring the integrity of the designated site.
- 1.6. The purpose of this advice is not to duplicate or override existing legal requirements for protected bat species or their roosts. These aspects are well governed by the Natural

² <http://publications.naturalengland.org.uk/publication/5696090506526720?category=5374002071601152>

England licensing procedures (Wildlife Management and Licensing Unit) for protected species.

- 1.7. This document should serve as an evidence base and provide guidance on the planning implications for development control in the relevant local planning authority (LPA). There are opportunities beyond the scope of this document to use this evidence base to inform the preparation of land use plans through the local plans.
- 1.8. This advice is aimed at applicants, agents, consultants and planners involved in producing and assessing development proposals in the landscapes surrounding the SAC. Within these areas there will be a strong requirement for survey information, mitigation and compensation for bats and their habitat in order to demonstrate that development proposals will not impact on the designated bat populations.
- 1.9. The guidance explains how development activities can impact the SAC and the steps required to avoid or mitigate any impacts. It applies to development proposals that could affect the SAC and trigger the requirements of the Habitats Regulations³ (see Annex 8). The local planning authority will consider, on the basis of evidence available, whether proposals (planning applications) are likely to impact on SAC bats and hence require screening for Habitats Regulations Assessment (HRA). Those are the proposals to which the guidance will be applied. This will reduce the likelihood that it would be applied to minor developments which would not have an impact on the SAC.
- 1.10. An important objective of the advice is to identify areas in which development proposals might impact on the designated populations at an early stage of the planning process, in order to inform sensitive siting and design, and to avoid unnecessary delays to project plans by raising potential issues at the outset.
- 1.11. This technical guidance is based on the advice from experts and ecological consultants⁴, current best practice and the best scientific information available at the time of writing. It will be kept under review by Somerset County Council, Exmoor National Park Authority and Natural England.

2. Sensitive Zones for Barbastelle Bats

Introduction

- 2.1 To facilitate decision making and in order to provide key information for potential developers at an early stage, using the best available data a Bat Consultation Zone affecting West Somerset and Sedgemoor districts and Exmoor National Park, and Juvenile Sustenance Zones affecting West Somerset and the National Park (See Plans 1 to 4 below) have been identified. This is an accumulation of known data, beginning with the 2000 radio tracking study of the Horner Wood colony and the 2012 Quantocks radio tracking studies of Barbastelle bat roosts.⁵ The data is constantly being added to and updated. Therefore the Plans reflect the current understanding of key roosts and habitat associated with the SAC.

³ Conservation of Habitats and Species Regulations 2010, SI 2716, Regulation 61

⁴ See acknowledgements

⁵ Rush, T. & Billington, G. 2012. *Report on a radio tracking study of Barbastelle bats at Hinkley Point C*. Witham Friary: Greena Ecological Consultants.

Bat Consultation Zone (orange, yellow and pale yellow shading on Plans 1 and 2 below)

- 2.2 Barbastelle bats are spread very thinly in the landscape. At the Ebernoe roost in Sussex the density of bats in late summer was rather less than one female or juvenile to six square kilometres. This area would include very large areas of land that are not or seldom used consisting of arable fields, The hunting territories themselves form a select and vulnerable set of more stable and productive habitats; a small percentage of the total area, but rich in diversity.⁶
- 2.3 The Bat Consultation Zone illustrates the area where Barbastelle bats may be found. It is divided into three bands, A, B and C reflecting the density at which Barbastelle bats may be found at a distance from a roost site. The basis for these distances is set out in Annex 2 and is based on the distances recorded through radio tracking studies at Horner Wood on Exmoor, in the Quantocks, Dartmoor and at Mottisfont in Wiltshire; field survey records; and research into the spatial use of the home range by the species. Note that the radio tracking studies only recorded the movements of a small number of bats from each of the maternity roosts and therefore it is likely that any area within the Bat Consultation Zone could be exploited by Barbastelle bats. The zone's band widths are set out in Table 1 below and in Annex 2.

Table 1: Band Widths for Barbastelle Bat (from Maternity Woodlands)

Band	Distance (metres)
A	7000
B	10100
C	15500

- 2.4 The Bat Consultation Zone radius circle is centred on the maternity roosts around Alfoxton and Waltham's Wood in the Quantocks and around Horner Wood on Exmoor. The Consultation Zone is further defined by the coastline east of the Quantocks and at Porlock and by forming a buffered Minimum Convex Polygon on the extents of recorded occurrences of the species to produce the broad directional dispersal of Barbastelle bats through a colony's home range. (See Annex 2)
- 2.5 Band A is shown in orange shading, Band B in yellow and Band C in pale yellow reflecting the decreasing density at which Barbastelle bats are likely to occur away from the home roost. However, if foraging activity or a key flyway is recorded in Band B or C then they should be treated as for Band A (see Annexes 3 and 6).

Juvenile Sustenance Zones (for information only and shown by red shading on Plans 3 and 4 below)

- 2.6 Juvenile Sustenance Zones are formed around woodland containing maternity roosts to a distance of 1 kilometre (km) for Barbastelle bats. Although patches closest to the roost area are usually shared by the colony members these may seasonally be left clear by adults as exclusive juvenile foraging zones. Most colonies seem to have one large productive foraging zone very close to the roost woodlands to fulfil the juvenile

⁶ Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat* *Barbastella barbastellus*. Peterborough: English Nature

and shared requirement. The availability of productive habitat producing abundant prey close to the roost in this period is a major key to the success of any bat colony. Examples of such foraging areas are small woodland floodplains and ponds or small river systems with a plentiful shrubby growth of species like willows. These foraging areas also need to be on the adult female bats' flyway.⁷

3. Consultation and Surveys

- 3.1 Where a proposal within the Consultation Zone has the potential to affect the features identified below early discussions with the local planning authority (who will consult Natural England as necessary) are also essential.
- Known bat roost
 - On or adjacent to a Site of Special Scientific Interest (SSSI)
 - Linear features: watercourses, hedgerows, tree lines
 - Riparian, broadleaved woodland, unimproved grassland, improved grassland, mixed woodland, coniferous woodland, scrub, and gorse habitats
 - Wetland habitat: ponds, rivers, streams, rhynes
 - New wind turbine proposals (in respect of displacement)⁸
 - Development which introduces new lighting
- 3.2 Early discussion refers to pre application stage prior to submission of a planning application; and, essentially, *before* any Master Plan proposals are submitted or finalised. This will ensure that adequate survey data is obtained. Please note that early discussions will also help inform likely mitigation requirements, and ensure, for example, that proposals seek to retain and enhance key features and habitats, and that sufficient land can be allocated for such avoidance and/or mitigation measures as may be required. This should result in appropriate bespoke mitigation measures that are designed in at an appropriately early stage. A site lighting plan with existing (pre-development) night time lux levels should also be provided.
- 3.3 In Band C developers should take advice from their consultant ecologist and planners from their ecologist colleagues.
- 3.4 Failure to provide the necessary information in support of an application is likely to lead to delays in registration and determination, and the application may need to be withdrawn. If insufficient information is submitted to allow the local planning authority to assess the application in accordance with the Habitats Regulations, the application is likely to be considered unacceptable.
- 3.5 For proposals within the Bat Consultation Zone (all Bands) an ecological consultant⁹ should be commissioned at an early stage to identify and assess any impacts the proposals may have.

⁷ Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat* *Barbastella barbastellus*. Peterborough: English Nature ; Greenaway, F. & Hill, D. 2005. *Woodland management advice for Bechstein's bat and barbastelle bat*. Peterborough, English Nature.

⁸ Barbastelle bat casualties are very rare with only four casualties being recorded in Europe over the ten year period 2003 to 2013. (Eurobats. 2014. *Report of the Intercessional Working Group on Wind Turbines and Bat Populations*. EUROBATs.StC9-AC19.12)

⁹ Consultants should be members of CIEEM www.cieem.net or taken from the Environmental Consultants Directory www.endsdirectory.com

- 3.6 Surveys should determine the use of the site by Barbastelle bats, whether the site is being used as a commuting route or contains hunting territories or both. Survey results inform the metric for calculating the amount of replacement habitat required in the methodology set out in Annex 6. Consideration should be given to the site within the wider landscape.
- 3.7 Surveys should be carried out in accordance with the Survey Specification at Annex 4. Exact survey requirements will reflect the sensitivity of the site, and the nature and scale of the proposals. The ecological consultant will advise on detailed requirements following a preliminary site assessment and desk study.
- 3.8 It is essential to note that bat surveys are seasonally constrained. For proposals which have the potential to impact on the SAC, a full season (April to August inclusive plus October) will be required, but this may not be necessary in certain circumstances, where this is demonstrable to the council's ecologist. (See Section B paragraphs 4.14 to 4.15 on minor impacts.) This will need to be included in the plan for project delivery at an early stage to avoid a potential 12-month delay to allow appropriate surveys to be undertaken.
- 3.9 Outside the Bat Consultation Zone, development proposals may still have impacts on bats. All species of bat and their roosts are protected by the Wildlife and Countryside Act (1981, as amended) and the Habitats Regulations. Further advice on potential impacts to bats is contained in [Natural England's Standing Advice for Development Impacts on Bats](#), English Nature's Bat Mitigation Guidelines (2004) and the Bat Conservation Trust Bat Survey Guidelines for Professionals.¹⁰

4. Mitigation within the Consultation Zone

- 4.1 Within the Bat Consultation Zone, where SAC bats would be affected or potentially affected by development appropriate mitigation will be required. The aim should be to retain and enhance habitat and features of value to Barbastelle bats, such as those listed in paragraph 3.2 of Part B of this guidance. Where this is not possible replacement habitat may be needed. The council's ecologist will have regard to relevant considerations in determining the mitigation requirements, including survey results and calculations relating to replacement habitat. (See the methodology and metric in Annex 6) The developer's ecologist should carry out the calculations when requested by the council's ecologist. Replacement habitat should always aim to be the optimal for the species affected
- 4.2 The following are examples of habitats to which the above principles will apply:
- Hunting habitat such as grassland; hedgerows; woodland; scrub; riparian vegetation; tree lines; arable margins; and ponds. They also need water to drink from.

¹⁰ <http://www.naturalengland.org.uk/ourwork/planningdevelopment/spatialplanning/standingadvice/default.aspx> ; Collins, J. (ed). 2016. *Bat Survey Guidelines for Professional Ecologists: Good Practice Guidelines*. (3rd Edition). London: Bat Conservation Trust; Mitchell-Jones, A. J. 2004. *Bat Mitigation Guidelines*. Peterborough: English Nature.

- Connecting habitat, which is important to ensure continued functionality of commuting habitats including both sides of a track where it occurs. (Proposals must seek to retain existing linear commuting features as replacement of hedgerows is likely to require a significant period to establish). Note that strategic or key flyways are important to barbastelle bats and are used by several members of a colony whilst dispersing to individual feeding areas (See Annex 3).

4.3 The following are also important principles:

- Seek to maintain the quality of all semi-natural habitats and design the development around enhancing existing habitats to replace the value of that lost making sure that they remain accessible to the affected bats

4.4 Loss of habitat refers not only to physical removal but also from the effects of lighting. A development proposal will be expected to demonstrate that bats will not be prevented from using features by the introduction of new lighting or a change in lighting levels. Reference to specific lux levels will be expected. Lighting refers to both external and internal light sources. Applicants will be expected to demonstrate that considerations of site design, including building orientation; and the latest techniques in lighting design have been employed in order to, ideally, avoid light spill to retained bat habitats. Applicants will similarly be expected to demonstrate use of the latest techniques to avoid or reduce light spill from within buildings.

4.5 Where replacement habitat provision is necessary, the type(s) of habitat to be provided shall be agreed with the local authority's ecologist and/or Natural England as appropriate.

4.6 Where replacement habitat is required off site in mitigation the land should not be a designated Site of Special Scientific Interest, be contributing already to supporting conservation features or in countryside stewardship to enhance for bats.

4.7 Replacement habitat should aim to be the optimal for the species affected (See Annex 7). The following are examples of habitats of value to Barbastelle bats and which are likely to be required in the replacement provision.

- Hedgerows with trees – tall, bushy hedgerows at least 3 metres wide and 3 metres tall
- Unimproved grassland / wildflower meadow - managed for moths, e.g. Long swards¹¹.
- Scrub including gorse
- Riparian vegetation
- Wide field margins at least 6 metres wide
- Ponds - for drinking

4.8 The method for checking the adequacy of replacement habitat provided with an application or then in Master Planning of a proposed development, is given in Annex 6.

¹¹ Ransome, R. D. 1996. *The management of feeding areas for Greater Horseshoe bats*. Peterborough: English Nature; Ransome, R. D. 1997. *The management for Greater Horseshoe bat feeding areas to enhance population levels*: English Nature Research Reports Number 241. Peterborough: English Nature. Noctuid moths form a large element of Barbastelle bat diet

- 4.9 It is important that provision of the replacement habitat is carried out to timescales to be agreed by the local authority and/or Natural England as appropriate.
- 4.10 In the case of quarries, waste sites or other large scale sites where restoration is proposed this should not be considered as mitigation for habitat lost to Barbastelle bats. The timescale to when these restorations are likely to be implemented, i.e. 40 years after the quarry has been worked, is too long to provide any replacement to maintain the existing population at the time of impact.
- 4.11 **It is vital that any replacement habitat is accessible to the Barbastelle bat population affected.**
- 4.12 An Ecological Management Plan for the site must be provided setting out how the site will be managed for SAC bats for the duration of the development. Where appropriate a Monitoring Strategy also needs to be included in order to ensure continued use of the site by SAC bats and includes measures to rectify the situation if negative results occur.

Lighting

- 4.13 Lighting is considered to have a high impact on Barbastelle bat roosts and a lesser impact on foraging and commuting habitats. This does not mean that there are no effects at all - Barbastelle bats do not feed through street lights as some more tolerant bat species even though their prey is attracted to them - and lighting on features used by these bats should be minimised. Other bat species, including Bechstein's bats, present at a proposed development site could be light sensitive and it is recommended that prospective developers provide evidence with their application of introduced light levels so as not to disturb the behaviour of the more sensitive species.¹²
- 4.14 A variety of techniques will be supported to facilitate development that will minimise and/or compensate for light spill:
- Use of warm white LED lights with directional baffles as required (LED light lacks a UV element and minimises insect migration from areas accessed by SAC bats)
 - use of building structure, design, location and orientation to maintain and/or provide a functional
 - use of landscaping to protect and/or create dark corridors on site. Planting will be expected to consist of native species, with provision for invertebrates, and planting will be expected to be managed for ecology rather than practicality
 - use of SMART glass
 - use of internal lighting design solutions to minimise light spill
 - use of smart lighting solutions
- 4.15 Prospective developers will be expected to provide evidence, ideally in the form of a lux contour plan and sensitive lighting strategy, with their application to demonstrate that introduced light levels will not affect existing and proposed features used by SAC bats to above 0.5 lux; or not exceeding baseline light levels where this is not feasible.

¹² Stone, E. L. 2013. *Bats and Lighting Overview of current evidence and mitigation*. Bristol: University of Bristol. Light levels for lesser horseshoe bats are used lacking evidence for Bechstein's bats

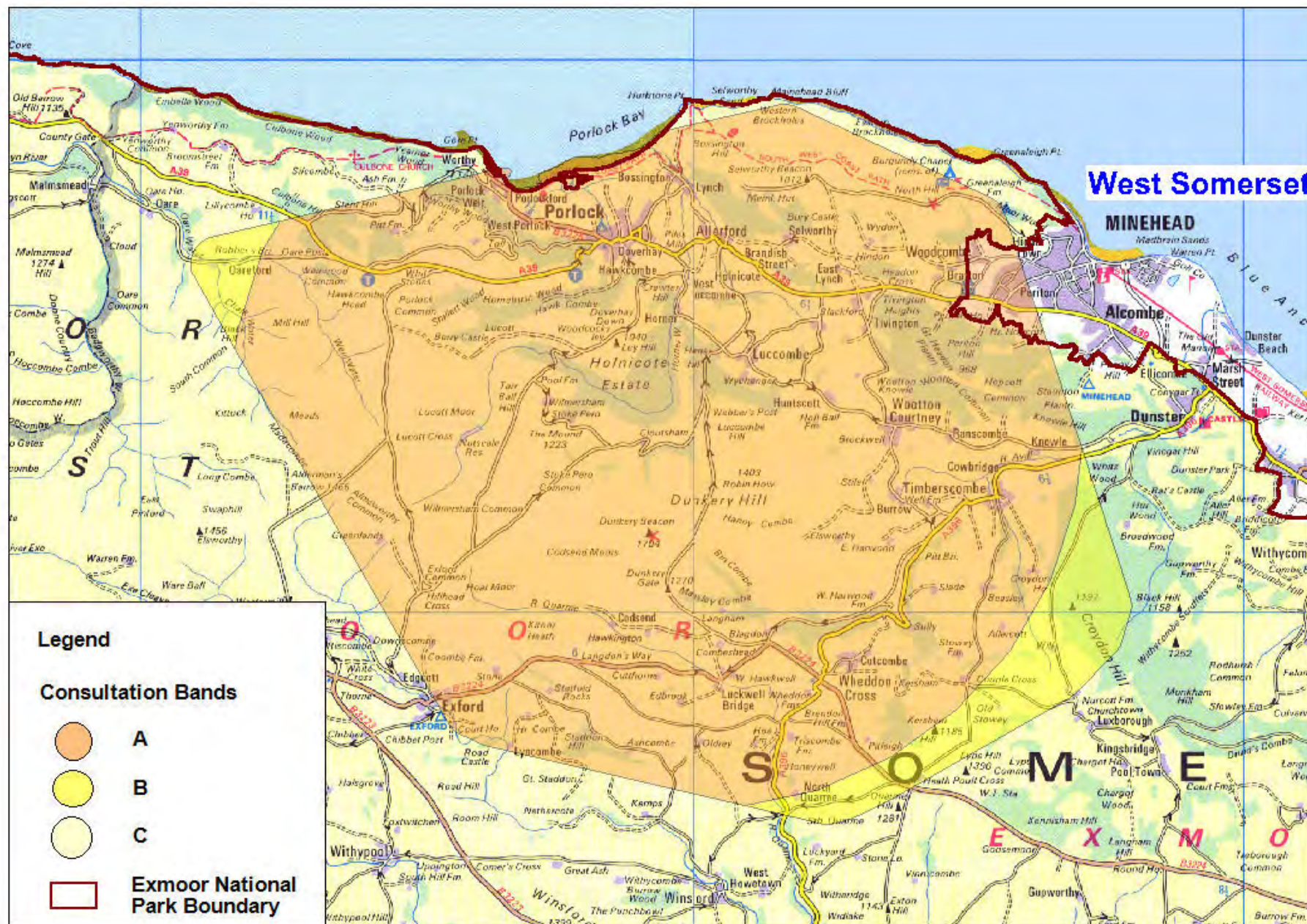
Proposed developments with minor impacts

- 4.16 In circumstances where this is likely to be overall less potential impact, especially in Band C, mitigation may be put forward without the need for a full season's survey. (See Annex 4) This approach will only be suitable where it can be clearly demonstrated that the impacts of a proposed development are proven to be minor and can be fully mitigated without an impact upon the existing (& likely) SAC bat habitat. In order to adopt this approach, it will be necessary for a suitably qualified ecologist to visit the site and prepare a report with an assessment of existing (& likely) SAC bat habitat. The information from this report should provide the basis to determine appropriate mitigation measures associated with the proposed development. The proposed mitigation should clearly demonstrate that there will be no interruption of suitable SAC bat commuting habitat and replacement of foraging habitat as appropriate.
- 4.17 There may also be situations where mitigation will not be required because the proposed development does not have an impact upon existing (& likely) SAC bat habitat. In adopting this approach it will be necessary to substantiate this with a suitably robust statement as part of the submission of the development proposals. In terms of impacts on SAC bats and habitat, it is important to bear in mind that minor proposed developments do not necessarily equate with small developments.

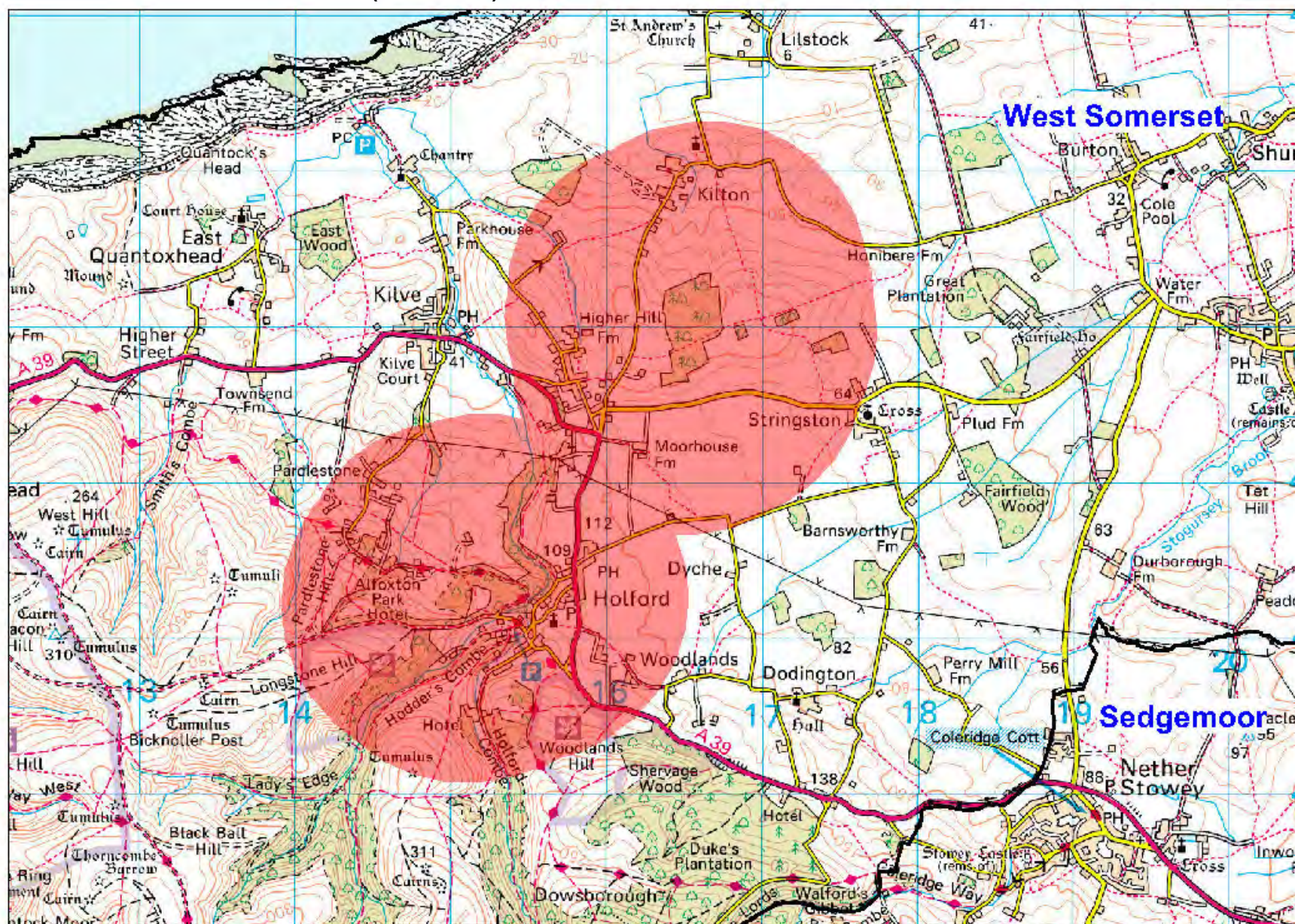
Plan 1: Bat Consultation Zone (Quantocks Roosts)



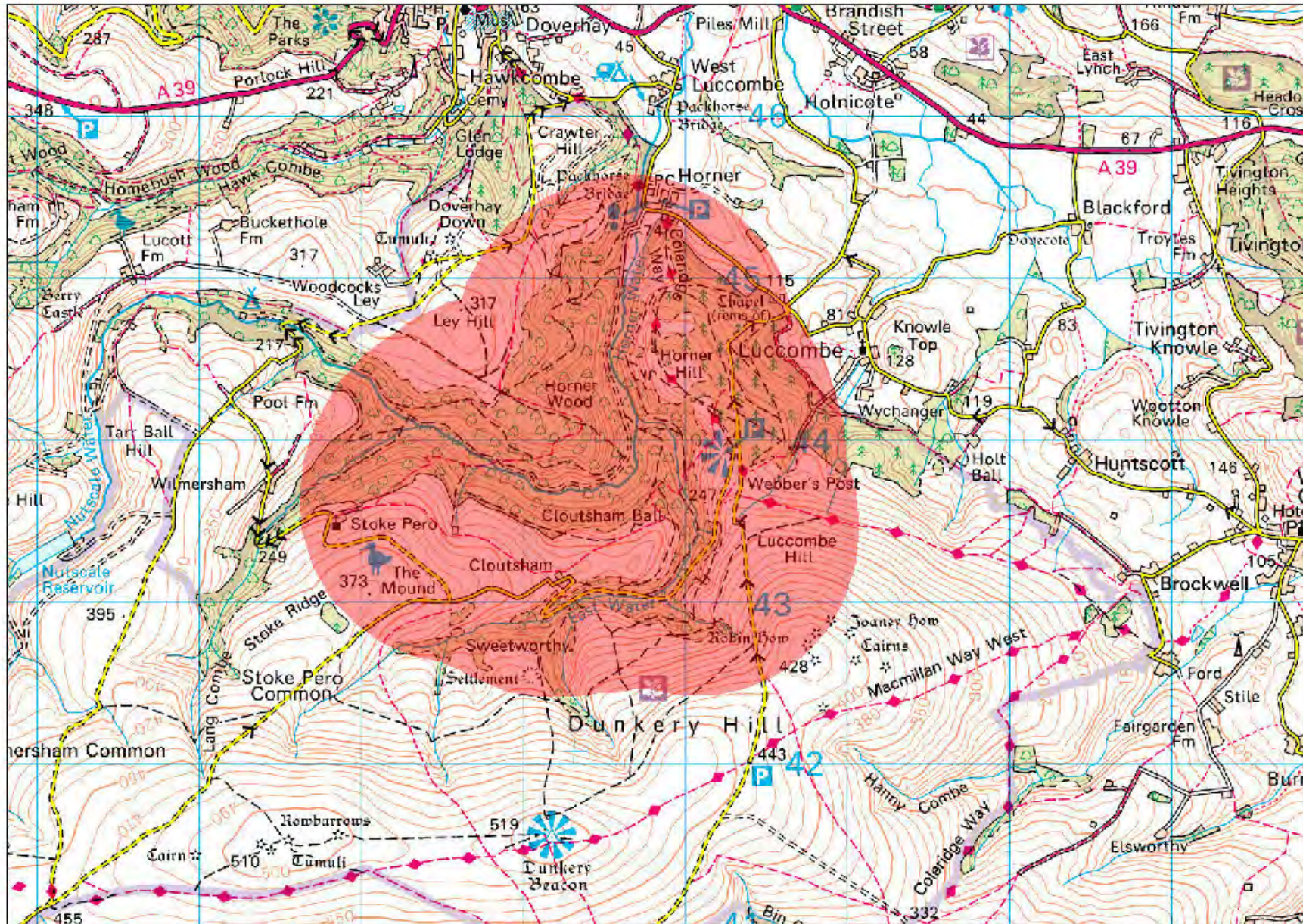
Plan 2: Bat Consultation Zone (Exmoor Roosts)



Plan 3: Juvenile Sustenance Zone (Quantocks)



Plan 4: Juvenile Sustenance Zone (Exmoor)



Annex 1: Details of the Exmoor and Quantocks Oak Woodlands Special Area of Conservation

A1.1 The SAC is made up of 7 component Sites of Special Scientific Interest (SSSI):

- **North Exmoor SSSI**
- Barle Valley SSSI
- Watersmeet SSSI
- West Exmoor Coast & Woods SSSI
- **The Quantocks SSSI**

A1.2 The SAC is primarily designated, aside from its habitats, for a maternity colony of Barbastelle bats *Barbastella barbastellus* that utilises a number of tree roosts in an area of predominantly of oak (*Quercus* spp) woodland. The designation of Barbastelle bats for the SAC was originally due to the Horner Wood maternity sites in the North Exmoor SSSI component site. However, since the date of designation Barbastelle bats have been found roosting in The Quantocks SSSI component site of the SAC with one of the associated maternity roosting areas located in a nearby woodland outside the designated site. Even so this latter roosting area would support the integrity of the roosts located within the SAC. Barbastelle bats frequently switch roosts from one to another on average within 300 metres but up to 1 kilometre apart¹³.

A1.3 Bechstein's bats are not the primary reason for designation of the SAC but, nonetheless, needs to be considered in carrying out a 'Test of Likely Significant Effect'. Like the Barbastelle bat they are present in Horner Woods on Exmoor and have since the SACs designation also been found in the Quantocks component site as well.

A1.4 In terms of physical area, the SAC designation applies to a tiny element of the habitat required by the bat population (some of the woodland supporting maternity roosts and their hibernation sites). It is clear that the wider countryside supports the bat populations because of the following combination of key elements of bat habitat:

A1.5 The area has to be large enough to provide a range of food sources capable of supporting the whole bat population; the bats feed at a number of locations through the night and will select different feeding areas through the year linked to the seasonal availability of their insect prey;

1. Barbastelle bats regularly travel through the administrative areas of West Somerset and Sedgemoor District Councils, and Exmoor National Park between their roosts and feeding sites via a network of established flyways. Barbastelle bats leave the home woodland as a group and 'peel off' into foraging territories. It is likely that female Barbastelle bats seek out male roosts in September, accompanied by their young, and return to their home woodland for the winter.¹⁴ It may be that bats from the colony of breeding females move considerable distances in late summer to find a mate. Bats need a range of habitats during the year in response to the annual cycle of mating, hibernating, giving birth and raising young;

¹³ Russo, D., Cistrone, L. & Jnes, G. 2005. Spatial and temporal patterns of roost use by tree-dwelling barbastelle bats *Barbastellus barbastella*. *Ecography* 28: 769 – 776. 2005

¹⁴ Billington, G. 2012. *Further research on the Barbastelle Bat, Holnicote National Trust Estate, Exmoor, North Somerset*. Report for Natural England. Witham Friary: Greena Ecological Consultants.

2. It follows that Barbastelle bats need to be able to move through the landscape between their roosts and their foraging areas in order to maintain 'Favourable Conservation Status'. They require linear features in the landscape to provide landscape permeability. Barbastelle bats have three types of echolocation call. Compared to most other bat species, the amplitude of echolocation call of the Barbastelle bat is between ten and a hundred times lower than other bats and then at short range when hunting.¹⁵ The Barbastelle bat will tend to fly at tree top height, amongst the woodland canopy and margins and mostly alongside hedgerow cover in a continual forward progression. Over open ground and water they fly at low level.¹⁶ Radio tracking studies¹⁷ and observations in the field confirm that Barbastelle bats will use regular flyways associated with lines of hedgerows and woodland. Further studies¹⁸ have shown that landscapes with broadleaved woodland, large bushy hedgerows and watercourses are important as they provide habitat continuity up to 7km from the roost, after which it is considered dark enough to enable more open spaces to be crossed. Habitat is therefore very important to SAC bats in terms of *quality* (generation of insect prey) and *structure* (allowing them to commute and forage);
3. SAC bats are sensitive to light and will avoid lit areas¹⁹. Although Barbastelle bats will use areas of low intensity illumination²⁰ the interruption of a flyway by light disturbance, as with physical removal/ obstruction, would force the bat to find an alternative route which is likely to incur an additional energetic burden and will therefore be a threat to the viability of the bat colony. In some circumstances, an alternative route is not available and can lead to isolation and fragmentation of the bat population from key foraging areas and/or roosts. The exterior of roost exits must be shielded from any artificial lighting and suitable cover should be present to provide darkened flyways to assist safe departure into the wider landscape²¹.
4. The feeding and foraging requirements of the Barbastelle bats have been reasonably well studied in the southern England and Europe²². From this work we know that most feeding activity is concentrated in an area within 7km of the roost (even juvenile bats will forage up to 7km at a stage in their life when they

¹⁵ Goerlitz, H. R., ter Hofstede, H. M., Zeale, M. R. K., Jones, G. & Holderleed, M. W. 2010. An Aerial-Hawking Bat Uses Stealth Echolocation to Counter Moth Hearing. *Current Biology*, 20, 1568 – 1572.

¹⁶ Greenaway, F. 2008. Barbastelle *Barbastella barbastellus*: in Harris, S. & Yalden, D. W. (eds.) 2008. *Mammals of the British Isles: Handbook*, 4th Edition. Southampton: The Mammal Society.

¹⁷ Zeale, M. 2009. *Barbastelles in the Landscape: Ecological Research and Conservation in Dartmoor National Park*. Report for Dartmoor National Park/ SITA Trust

¹⁸ Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat Barbastella barbastellus*. Peterborough: English Nature

¹⁹ <http://www.batsandlighting.co.uk/>

²⁰ Billington, G. 2000. *Holnicote Estate, Somerset - Horner Woods Barbastelle Bat: radio tracking study*. Holnicote: The National Trust.

²¹ Stone, E. L. 2013. *Bats and Lighting Overview of current evidence and mitigation*. Bristol: University of Bristol.

²² Dietz, C., von Helversen, O. & Nill, D. 2009. *Bats of Britain, Europe and Northwest Africa*. London: A. & C. Black Publishers Ltd; Zeale, M. 2009. *Barbastelles in the Landscape: Ecological Research and Conservation in Dartmoor National Park*. Report for Dartmoor National Park/ SITA Trust; Hillen, J., Kiefer, A. & Veith, M. 2009. Foraging site fidelity shapes the spatial organisation of a population of female western barbastelle bats. *Biological Conservation*, 142 (2009) 817 – 823; Zeale, M. R. K. 2011. *Conservation biology of the barbastelle (Barbastella barbastellus): applications of spatial modelling, ecology and molecular analysis of diet*. PhD Thesis. University of Bristol, Bristol, UK; Eriksson, A. 2004. *Habitat selection in a colony of Barbastella barbastellus in south Sweden*. Uppsala: Institutionen för naturvårdsbiologi; etc.

are most susceptible to mortality). The most important types of habitat for feeding have been shown to be grassland, hedgerows, riverine vegetation, wetlands and woodland that support an abundance of moths with ears. Depending upon the availability of suitable flyways and feeding opportunities, most urban areas will provide limited habitat of any value to Barbastelle bats.



Barbastelle Bat: Henry Schofield. Courtesy Vincent Wildlife Trust

Annex 2: Bat Consultation Zones

- A2.1 The Bat Consultation Zone density band widths will vary from species to species depending on its characteristic use of its home range. The summer foraging range of Barbastelle bats was recorded as being up to 9 kilometres (km) in the Horner Wood area on Exmoor (English Nature, Conservation Objectives for North Exmoor SSSI). Other studies have shown that Barbastelle bats can fly up to 20km from roost sites although the average was about 8km. On Dartmoor the individual mean maximum foraging range of radio tracked Barbastelle bats varied from 3.16 to 20.38km. In Brandenburg hunting grounds are within 4.5km of a nursery colony and young bats and males forage on average closer to their roost sites.²³
- A2.2 Foraging grounds have been recorded in excess of 25km from the roost area in the woodland. Even 6 week old juveniles have been recorded travelling 7km from the roost site. Barbastelle bats fly very fast and often fly more or less directly to their foraging areas, and have been recorded covering 20km in approximately 45 minutes.²⁴
- A2.3 Individual home ranges varied considerably, with bats traveling between 1 and 20 km to reach foraging areas [\bar{X} = 6.8 km \pm 4.8 SD]²⁵.
- A2.4 The Barbastelle bats radio tracked in the study by Hillen et al (2009) spent the first 1-2 hours in their roost woodland but would often forage 6-7km from their roost throughout the night with some individuals travelling as far as 12-17km.²⁶
- A2.5 Foraging takes place within the home range in individual core areas of between 2 and 70 hectares (ha). Dietz et al (2009) report foraging areas of 8.8ha with single bats hunting each night in up to 10 separate areas. There is minimal overlap of individual core foraging areas although the home wood is shared. In the Hillen et al study (2009) the core area sizes ranged from 5 to 285ha (median: 67ha). On Dartmoor the mean core foraging area was 82.49ha \pm 21.93ha. In Germany seven radio tracked Barbastelle bats had a total of 24 distinct foraging sites, sizes between 2ha and 48ha, with each individual bat visiting between 1 and 7 sites. A home range and core area overlap analysis showed that site fidelity across years seems to be more important for home range distribution than competition among colony members. Although the home wood is shared, as afore stated, there is minimal overlap of individual core foraging areas, females being highly faithful to more or less “private” foraging areas which constituted a small fraction (\bar{X} = 10.1% \pm 8.8 SD) of home ranges.²⁷

²³ Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat* *Barbastella barbastellus*. Peterborough: English Nature; Zeale, M. 2009. *Barbastelles in the Landscape: Ecological Research and Conservation in Dartmoor National Park*. Report for Dartmoor National Park/ SITA Trust; Dietz, C., von Helversen, O. & Nill, D. 2009. *Bats of Britain, Europe and Northwest Africa*. London: A. & C. Black Publishers Ltd.

²⁴ Warren, J. n/d. Barbastelle Bats. www.ewebmagazine.co.uk

²⁵ Zeale, M. R. K., Davidson-Watts, I. & Jones, G. 2012. Home range use and habitat selection by barbastelle bats (*Barbastella barbastellus*): implications for conservation. *Journal of Mammalogy* 93(4):1110-1118. 2012.

²⁶ Hillen, J., Kiefer, A. & Veith, M. 2009. Foraging site fidelity shapes the spatial organisation of a population of female western barbastelle bats. *Biological Conservation*, 142 (2009) 817 – 823.

²⁷ Boye, Dr. P. & Dietz, M. 2005. *English Nature Research Reports Number 661: Development of good practice guidelines for woodland management for bats*. Peterborough: English Nature; Dietz, C., von Helversen, O. & Nill, D. 2009. *Bats of Britain, Europe and Northwest Africa*. London: A. & C. Black Publishers Ltd; Zeale, M. 2009. *Barbastelles in the Landscape: Ecological Research and Conservation in Dartmoor National Park*. Report for Dartmoor National Park/ SITA Trust; Hillen, J., Kiefer, A. & Veith, M. 2009. Foraging site fidelity shapes the spatial organisation of a population of female western barbastelle bats. *Biological Conservation*, 142 (2009) 817 – 823; Zeale, M. R. K.

- A2.6 Barbastelle bats go out in groups from the roosting area then disperse to individual hunting grounds. Barbastelle bats are reliant on darkened connecting habitat features between roost sites and feeding areas. Typically these are along vegetated rivers and streams or lines of trees and large hedgerows and paths. Barbastelle bats' foraging paths are generally within 200 metres of water features. Commutes were typically rapid and direct and bats moved freely across large open areas. When Barbastelle bats cross open ground they will fly at low level. At the maternity roost at Longforth Farm, Wellington located in a single tree in the middle of a field Barbastelle bats cross an open space of 100 metres on emergence (pers.comm. Liz Biron, Somerset Environmental Records Centre, 2011).²⁸
- A2.7 The entire home range of the colony is used by individuals having hunting territories both close to and far from the roosting area and of equal importance considering the size of Barbastelle maternity colonies. They commute at high speed making for the most productive foraging area of the night and ignore foraging opportunities along the way²⁹.
- A2.8 Barbastelle bats are spread very thinly in the landscape. At the Ebernoe roost in Sussex the density of bats in late summer was rather less than one female or juvenile to six square kilometres. This area would include very large areas of land that are not or seldom used consisting of arable fields, The hunting territories themselves form a select and vulnerable set of more stable and productive habitats; a small percentage of the total area, but rich in diversity.³⁰
- A2.9 Radio tracking of Barbastelle bats from Horner Wood in autumn/ early winter showed that they ranged up to 4km from their roosts compared to at least 9km in summer, with one exception in November when a radio tagged male bat was briefly recorded moving around 16km west of Horner Wood in a wooded valley at Hillsford Bridge, near Lynmouth, Devon. However, this was probably associated with a seasonable movement/ dispersal.³¹
- A2.10 Zeale (2009) identified that the majority of foraging areas occurred within 6km of the home wood although 5km had been previously given particular importance. Subsequently Zeale et al (2012) suggested that land managers must consider areas of up to 7km radius around maternity roosts, based on their data, when designing and implementing management plans for Barbastelle bats and that feeding sites outside of this range, when identified through radio tracking or by other means, should also be

2011. *Conservation biology of the barbastelle (Barbastella barbastellus): applications of spatial modelling, ecology and molecular analysis of diet*. PhD Dissertation. University of Bristol, Bristol, UK; Simon, M., Hüttenbügel, S. & Smit-Viergutz, J. 2004. *Ecology and Conservation of Bats in Villages and Towns*. Bonn: Bundesamt für Naturschutz.

²⁸ Dietz, C., von Helversen, O. & Nill, D. 2009. *Bats of Britain, Europe and Northwest Africa*. London: A. & C. Black Publishers Ltd; Greenway, F. 2001. The Barbastelle in Britain. *British Wildlife* 12, 5, 327-334; Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat Barbastella barbastellus*. Peterborough: English Nature; Greenaway, F. 2008. *Barbastelle Bats in the Sussex West Weald 1997- 2008*. Sussex Wildlife Trust/ West Weald Landscape Partnership; Zeale, M. 2009. *Barbastelles in the Landscape: Ecological Research and Conservation in Dartmoor National Park*. Report for Dartmoor National Park/ SITA Trust; Zeale, M. R. K., Davidson-Watts, I. & Jones, G. 2012. Home range use and habitat selection by barbastelle bats (*Barbastella barbastellus*): implications for conservation. *Journal of Mammalogy* 93(4):1110-1118. 2012

²⁹ Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat Barbastella barbastellus*. Peterborough: English Nature

³⁰ Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat Barbastella barbastellus*. Peterborough: English Nature

³¹ Billington, G. 2012. *Further research on the Barbastelle Bat, Holnicote National Trust Estate, Exmoor, North Somerset*. Report for Natural England. Witham Friary: Greena Ecological Consultants.

protected. Based on this a 7km buffer around the maternity woodland is used as the basis for Band A.³² The woodland is chosen as Barbastelle bats are likely to roost switch within a few days within the woodland³³.

- A2.11 Band B has been determined by the average recorded maximum summer range recorded for the Quantock roosts, which are 10.2km (See Appendix 1 - the mean for all studies, excluding one in Germany where only short distances were recorded, is 10.1km). Band C is 15.5km based on the recorded Barbastelle bat fixes from field surveys carried out east of the Quantocks roosts. Zones are further defined by the by a Minimum Convex Polygon is formed of all records associated or potentially associated with the maternity roosts. This is buffered by 500 metres to allow for possible unrecorded occurrences outside this area, based on the range of the species' principal prey species, noctuid moths. The Bat Consideration Zone is then confined by this parameter given the directional nature of home range use by Barbastelle bats.³⁴

³² Zeale, M. 2009. *Barbastelles in the Landscape: Ecological Research and Conservation in Dartmoor National Park*. Report for Dartmoor National Park/ SITA Trust; Zeale, M. R. K., Davidson-Watts, I. & Jones, G. 2012. Home range use and habitat selection by barbastelle bats (*Barbastella barbastellus*): implications for conservation. *Journal of Mammalogy* 93(4):1110-1118. 2012

³³ Russo, D., Cistrone, L. & Jnes, G. 2005. Spatial and temporal patterns of roost use by tree-dwelling barbastelle bats *Barbastellus barbastella*. *Ecography* 28: 769 – 776. 2005

³⁴ Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat Barbastella barbastellus*. Peterborough: English Nature; the 500 metres buffer is based on the dispersal distance of noctuid moths that are the prey of Barbastelle bats (e.g. see Dullieu, R., Merckx, T., Paling, N. & Holloway, G. 2007. Using mark-release-recapture to investigate habitat use in a range of common macro-moth species. *Centre for Wildlife Assessment & Conservation E-Journal*, 1: 1-19)

Annex 3: Key Flyways

- A3.1 Maternity colonies are located within mature woodland, which is used year after year. Females disperse from the woodland to feed along established flyways to hunting areas which may be several kilometres away. Flyways consist of tracks and paths through woodland, overgrown hedgerows, and paths with hedgerows on both sides. In open country flyways follow watercourses lined with vegetation. To some extent the ability of the female to feed herself and dependent young depends on the condition of these flyways. A female will repeatedly use the same flyway to visit her hunting territories located along it.³⁵
- A3.2 Close to the roost females will share common flyways but the longest flyway at its end is likely to only be used by one bat. The initial sections of flyway may be used by up to 20 individual bats. However, Billington observed that female Barbastelle bats would split up individually to small connected foraging zones, and then meet up again to forage together, or to move off to another foraging area where they repeated the same behavior.³⁶
- A3.3 The flyways of Barbastelle bats are usually within 200 metres of water.³⁷
- A3.4 Key flyways are not mapped but where flyways are identified in field surveys they should be treated as for Band A and will need to be maintained and secured from any impacts arising from development.

³⁵ Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat* Barbastella barbastellus. Peterborough: English Nature

³⁶ Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat* Barbastella barbastellus. Peterborough: English Nature; Billington, G. 2002. The Bats of Horner Woods. *Somerset Wildlife News* – January 2002, 10 -11.

³⁷ Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat* Barbastella barbastellus. Peterborough: English Nature

Annex 4: Survey Specification for Surveys for Planning Applications Affecting Consultation Zones.

A4.1 Three types of survey are required to inform the impact of proposed development. These are:

- Bat Surveys
- Habitats / Land use Surveys
- Light Surveys

Bat Surveys

A4.2 The following table sets out the survey requirements for development sites within the Bat Consultation Zone based on the guidance given by the Bat Conservation Trust (2016) but adapted to Barbastelle bat ecology.³⁸ Note that the objective is to detect commuting routes and foraging areas rather than roosts. Barbastelle bats emerge in early dusk and often in the light and are active sporadically throughout the night. Typically they emerge from their roosts about 17 to 27 minutes after sunset but then spend another 11 to 45 minutes foraging within the home woodland before setting out to commute to their individual hunting territories³⁹.

A4.3 The following specification is recommended in relation to development proposals within a Barbastelle bat key flyways and zones A and B of the Bat Consultation Zone. It is also worth mentioning the difficulty associated with detecting the Barbastelle bat's echolocation call when hunting. This fact emphasises the requirement for greater surveying effort and the value of broadband surveying techniques. It is recommended that the most sensitive equipment for detecting lower frequencies should be used. It is also recommended that the local planning authority ecologist be contacted with regard to survey effort.

(i) Surveys should pay particular attention to linear landscape features such as hedgerows, paths and tracks between hedgerows, tree lines, watercourses, ditches and rhynes that may provide flyways and areas of grassland, arable margins, scrub and meadow. Ensuring all wider habitat links to woodland are surveyed.

(ii) Automatic bat detector systems should be deployed at an appropriate location (i.e. on a likely flyway; the precise location can also be adjusted from the manual survey findings). The total period of deployment should be at least 50 days from April to October and must include at least one working week in each of the months of April, May, June, August and October (50 nights out of 153; ≈33%).

(iii) The number of automated detectors will vary in response to the number of linear landscape elements and foraging habitat types, the habitat structure, habitat quality, the suite of bat species likely to be present, their foraging strategy and flight-altitude. Every site is different, but the objective would be to sample each habitat component equally⁴⁰. Generally:

³⁸ Collins, J. (ed). 2016. *Bat Survey Guidelines for Professional Ecologists: Good Practice Guidelines*. (3rd Edition). London: Bat Conservation Trust

³⁹ Zeale, M. 2009. *Barbastelles in the Landscape: Ecological Research and Conservation in Dartmoor National Park*. Report for Dartmoor National Park/ SITA Trust

⁴⁰ Pers. Comm. Henry Andrews, AEcol, 23/09/2016

- Riparian corridors, both banks and vegetated edges
- With hedges it depends on the height and width, and also whether they have trees, as to how many detectors might be needed to ensure the coverage is comprehensive no matter what the wind decides to do.
- With grassland and arable margins, the number depends on whether the site is of long sward height or not
- In a woodland situation a sample with three detectors: one on the woodland edge, two in the interior.
- Areas of scrub particularly gorse and buddleia
- Ponds

(iv) Results from automated detectors recording should be analysed to determine whether the site supports foraging or increased levels activity as this affects the Band used in calculating the amount of replacement habitat required to mitigate losses to Barbastelle bats.

(v) Manual transect surveys⁴¹ should be carried out on ten separate evenings; at least one survey should be undertaken in each month from April to August plus October⁴², as the bats' movements vary through the year. Transects should cover the area of and all habitats likely to be affected by the proposed development, including a proportion away from commuting features in field. Moreover, manual surveys only give a snapshot of activity (10 nights out of 183; ≈5.5%), are less effective at detecting Barbastelle bat behaviour and unreliable⁴³, therefore automated bat detector systems should also be deployed see section (vi).

(vi) Surveys should be carried out on warm (>10 °C but >15°C in late summer), still evenings that provide optimal conditions for foraging (insect activity is significantly reduced at low temperatures; see commentary below). Details of temperature and weather conditions during surveys should be included in the final report.

(vii) Surveys should cover the period of peak activity for bats from sunset for at least the next 2.5 hours.⁴⁴

(viii) Transect surveys should preferably be with most sensitive equipment available. Digital echolocation records of the survey should be made available with the final report; along with details of the type and serial number of the detector.

(ix) Surveys should be carried out by suitably qualified and experienced persons. Numbers of personnel involved should be agreed beforehand with the appropriate Somerset authority or Natural England, be indicated in any report and be sufficient to thoroughly and comprehensively survey the size of site in question.

⁴¹ Collins, J. (ed). 2016. *Bat Survey Guidelines for Professional Ecologists: Good Practice Guidelines*. (3rd Edition). London: Bat Conservation Trust

⁴² Female Barbastelle bats are absent from the home woodland during September when they disperse to find male roosts.

⁴³ Warren, J. n/d. Barbastelle Bats. www.ewebmagazine.co.uk

⁴⁴ Barbastelle bats can cover 20km in 45 minutes (Warren, J. n/d. www.ewebmagazine.co.uk). Note that some individual Barbastelle bats may not leave the home woodland for an hour after emergence.

(x) Surveys should also include a desktop exercise collating any records and past data relating to the site via the Somerset Environmental Records Centre (SERC), local Bat Groups etc.

(xi) All bat activity should be clearly marked on maps and included within the report.

(xii) Basic details of records for the site should be passed to SERC after determination of the application.

- A4.4 Survey effort in Band C is to some extent dependent on whether commuting structure is present but not entirely so. More regard should be given to the suitability of the habitat to support prey species hunted by Barbastelle bats. Nonetheless this should be in accordance with Bat Conservation Trust guidelines (Collins, 2016⁴⁵)

Habitat Surveys

- A4.5 Phase 1 surveys should be carried out for all land use developments within the Bat Consultation Zone and be extended to include the management and use of each field, e.g. whether the field is grazed or used as grass ley, and the height, width and management of hedgerows in the period of bat activity. Information can be sought from the landowner on typical management. If grazed, the type of stock and management regimes should be detailed if possible. Habitat mapping should include approximate hectareage of habitats to inform the methodology for calculating replacement habitat required.

Lighting Survey

- A4.6 Surveys of existing light levels on proposed development sites should be undertaken and submitted with the planning application. This should cover the full moon and dark of the moon periods so that an assessment of comparative Barbastelle bat activity on a proposed site can be ascertained. Light levels should be measured at 1 metre above ground level. This survey data can then be used to inform the masterplan of a project.
- A4.7 A lux contour plan of light levels down to 0.5 Lux, modelled at 1 metre above ground level, should be submitted with the application.

⁴⁵ Collins, J. (ed). 2016. *Bat Survey Guidelines for Professional Ecologists: Good Practice Guidelines*. (3rd Edition). London: Bat Conservation Trust

Annex 5: Habitat Requirements of Barbastelle Bats

Prey

- A5.1 Barbastelle bat specialize in preying upon small tympanate moths. Over 90% of their diet comes from the families Pyralidae; Geometridae; Arctiidae; Noctuidae: Tortricidae and Gelechiidae, particularly of the families Noctuidae and Geometridae. In one study 49 species of moth were identified. Most of the species taken amongst these have hearing organs as a defense against bats. The most frequent moth species taken were White Ermine; Buff Ermine; Riband Wave; White-pinion Spotted; Scalloped Hazel; Brown Silver-line; Heart and Dart; Shuttle-shaped Dart; Dark Arches; The Dun-bar; Vine's Rustic; Large Yellow Underwing; and Angle Shades.⁴⁶
- A5.2 Barbastelle bats also eat micro moths, a few Diptera, including Tipulids (crane flies), small beetles and other flying insects. They are heavily reliant on small moths throughout the year but have a more diverse diet in winter eating flies, earwigs and spiders.⁴⁷

General

- A5.3 Greenaway (2002)⁴⁸ states that '*The ideal example of a Barbastelle colony of the distant past would be of a small catchment with dense woodland on its headwaters and wooded river valleys leading down to a wide zone of water meadows and finally reed beds and sand dunes before reaching the sea. Roosts would be in the headwater woodlands and the Barbastelle bats would have individual foraging areas spread up and down the catchment's tributaries and the main river. The colony's territory boundaries would be set by the extent of the catchment area.*' However, radio tracking at Horner Wood shows that not all Barbastelle bat colonies conform to this pattern and individuals cross over into different catchments.
- A5.4 In the radio tracking study carried out by Zeale on Dartmoor in 2008 the most significant habitat preferences were shown to be the following in order:
- Riparian vegetation;
 - Broad-leaved woodland;
 - Unimproved grassland
- A5.5 All three habitats support a high density of insects and often associated with the common species of moth hunted by Barbastelle bats. Other habitats used were improved grassland; mixed woodland; coniferous woodland; scrub; urban; open water; arable and upland moor, the latter four being avoided.

⁴⁶ Zeale, M. 2009. Barbastelles in the Landscape: Ecological Research and Conservation in Dartmoor National Park. *Presentation at the South West Bat Conservation Trust Conference, 25 April, 2009*; Zeale, M. R. H. 2011. *Conservation Biology of the Barbastelle* (Barbastella barbastellus): *Applications of Spatial Modelling, Ecology and Molecular Analysis of Diet*. PhD Dissertation, University of Bristol; Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat Barbastella barbastellus*. Peterborough: English Nature.

⁴⁷ Dietz, C., von Helversen, O. & Nill, D. 2009. *Bats of Britain, Europe and Northwest Africa*. London: A. & C. Black Publishers Ltd; Greenaway, F. 2008. Barbastelle bat *Barbastella barbastellus*: in Harris, S. & Yalden, D. W. (eds.) 2008. *Mammals of the British Isles: Handbook, 4th Edition*. Southampton: The Mammal Society.

⁴⁸ Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat Barbastella barbastellus*. Peterborough: English Nature

- A5.6 For Barbastelle bats at Horner Wood on Exmoor foraging in summer occurred mostly out of woodlands and included areas of scrub, heath, unimproved grassland, along hedgerows and streams and salt marsh. By contrast in the autumn/ early winter bats almost exclusively foraged in woodlands with up to half of the time spent in conifer plantations. Habitats recorded as being used to the east of Porlock Weir during these surveys include patches of scrub (including bramble, gorse, nettles, blackthorn and dog rose); patches of bramble scrub on shingle; saltmarsh; trees lining dry shingle-lined channels; strips of tall vegetation; and short improved turf grazed by sheep. Billington (2012) stated for the Horner Wood maternity colony that, '*The most important single habitat was rough/ unimproved grassland 94.5% of the habitat in the colonies range was used for foraging. The next most important (>57% use) habitats were scattered (Gorse) scrub and broadleaved woodland and other important (>25% use) habitats were Bracken, running water and dense (Gorse) scrub.*'⁴⁹
- A5.7 In Sussex habitat use can be summarised as old meadows, hedgerows and woodlands often in rich valley bottoms during summer and dense old growth deciduous woodland habitats in the colder months. The final destination of most bats is larger floodplain meadows as can be found towards the River Parrett and its estuary. Many of the known British colonies, as is the Quantocks SAC colony, are also within commuting distance of the sea, and besides the SAC colony at least three other colonies are recorded as utilising dune, marsh and established coastal grasslands.⁵⁰

Grassland

- A5.8 During the summer there is a super abundance of moths, and particularly micro moths, over unimproved grasslands. This is a primary habitat for Barbastelle bats. Longer swards benefit the larvae of Noctuid moths.⁵¹
- A5.9 Improved grassland is the fourth most used habitat in the Dartmoor study. Typically it is species poor and likely to be of little importance but they are smaller than arable fields and consequently have a higher density of boundary features. Zeale (2009) considered that caution should be taken when assessing this habitat's true value as it is likely that most foraging activity is focused along hedgerows. Moths are likely to be negatively affected by moderate and high levels of cattle grazing. However, the vast majority (over 90%) of insects found near hedges does not originate in the hedge but come from other habitats brought in on the wind. Nonetheless, field margins, including hedgerows, and woodland edge support comparatively high densities of moths and Barbastelle bats have been observed foraging in these areas.⁵²
- A5.10 The wider the field margin the higher the abundance of macro-moths compared to standard margins. The presence of trees has no significant effect on moth abundance.

⁴⁹ Zeale, M. 2009. *Barbastelles in the Landscape: Ecological Research and Conservation in Dartmoor National Park*. Report for Dartmoor National Park/ SITA Trust; Billington, G. 2012. *Further research on the Barbastelle Bat, Holnicote National Trust Estate, Exmoor, North Somerset*. Report for Natural England. Witham Friary: Greena Ecological Consultants.

⁵⁰ Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat* *Barbastella barbastellus*. Peterborough: English Nature

⁵¹ Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat* *Barbastella barbastellus*. Peterborough: English Nature; Ransome, R. D. 1996. *The management of feeding areas for Greater Horseshoe bats*. Peterborough: English Nature; Ransome, R. D. 1997.

⁵² Zeale, M. 2009. *Barbastelles in the Landscape: Ecological Research and Conservation in Dartmoor National Park*. Report for Dartmoor National Park/ SITA Trust; Ekroos, J., Heliola, J. & Kuussaari, M. 2010. Homogenization of lepidopteron communities in intensively cultivated agricultural landscapes. *Journal of Applied Ecology*, 2010, 47, 459 – 467; Bat Conservation Trust. 2003. *Agricultural practice and bats: A review of current research literature and management recommendations*. London: Defra project BD2005; Zeale, M., Davidson-Watts, I. & Jones, G., 2012. Home range use and habitat selection by barbastelle bats (*Barbastella barbastellus*): implications for conservation. *Journal of Mammalogy* 93: 1110-1118.

Sites with higher nectar availability also had higher abundances of moths. Plant species richness and vegetation height may provide higher larval food availability and shelter from potential predators.⁵³

Woodland

- A5.11 When Barbastelle bat flyways cut across woodland blocks these are usually utilised as secondary foraging areas. Unbroken strips of dense mature woodland connecting down to water with continued woodland features are an ideal pattern of vegetation. If track ways are available they are used as flyways. They will also hunt above the canopy. Trees producing a low spreading twiggy structure over a thick understorey will increase shade but the bats will require a clear central track way. They rarely forage along woodland edges.⁵⁴
- A5.12 Barbastelle bats foraging in summer occurred mostly out of woodlands. By contrast in the autumn/ early winter bats almost exclusively foraged in woodlands with up to half of the time spent in conifer plantations.⁵⁵
- A5.13 The occurrence of moth eating bats is higher in large and well-connected woodland patches with dense understorey cover. Understorey plants are the larval foods of many small moths, the Geometridae in particular. Macro and micro moths are most abundant where there is grass or litter but less so where there are ferns, moss, bare ground or herbs. They are also more abundant where there is native tree diversity and with larger basal areas. Species such as oak, willow and birch have large numbers of moths, whereas beech has little comparable to non-native species such as sycamore. Moth diversity is greatest on oak and willow species and oak woodlands support high moth diversity. Thermophilous bushes are the most attractive host plants for micro Lepidoptera: 60 species feed on hawthorn and 48 on blackthorn. Oak is the most attractive tree with 83 species.⁵⁶
- A5.14 Uniform stands of trees are poorer in invertebrates than more diversely structured woodland. It is also indicated that small woodlands of less than 1 hectare do not have characteristic woodland moth communities.⁵⁷
- A5.15 Where coppicing is necessary it should be carried out in small patches.⁵⁸

⁵³ Dulieu, R, Merckx, T., Paling, N. & Holloway, G. 2007. Using mark-release-recapture to investigate habitat use in a range of common macro-moth species. *Centre for Wildlife Assessment & Conservation E-Journal* (2007), 1, 1 – 9; Fuentes-Montemayor, E., Goulson, D & Park K. J. 2010. The effectiveness of agri-environmental schemes for the conservation of farmland moths: assessing the importance of landscape-scale management approach. *Journal of Applied Ecology*, 2010

⁵⁴ Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat* *Barbastella barbastellus*. Peterborough: English Nature; Billington, G. 2000. *Holnicote Estate: Horner Woods Barbastelle Bat: radio tracking study*. Cullompton: Greena Ecological Consultancy; Eriksson, A. 2004. *Habitat selection in a colony of Barbastella barbastellus in south Sweden*. Uppsala: Institutionen för naturvårdsbiologi

⁵⁵ Billington, G. 2012. *Further research on the Barbastelle Bat, Holnicote National Trust Estate, Exmoor, North Somerset*. Report for Natural England. Witham Friary: Greena Ecological Consultants

⁵⁶ Fuentes-Montemayor, E., Goulson, D., Cavin, L., Wallace, J.M. & Park, K. J. 2012. Factors influencing moth assemblages in woodland fragments on farmland: Implications for woodland management and creation schemes. *Biological Conservation* 153 (2012) 265–275; Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat* *Barbastella barbastellus*. Peterborough: English Nature; Siero, A. 1999. Habitat selection by barbastelle bats (*Barbastella barbastellus*) in the Swiss Alps (Valais). *J. Zool. Lond.* (1999) 248, 429 – 432;

⁵⁷ Kirby, K. J. (ed). 1988. *A woodland survey handbook*. Peterborough: Nature Conservancy Council; Usher, M.B., Keiller, S.W.J., 1998. The macrolepidoptera of farm woodlands: determinants of diversity and community structure. *Biodivers. Conserv.* 7, 725–748.

⁵⁸ Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat* *Barbastella barbastellus*. Peterborough: English Nature

- A5.16 In Switzerland Barbastelle bats avoided open woodland on stony outcrops and rocky slopes⁵⁹

Hedgerow

- A5.17 Hedgerows under stewardship management do not offer any benefit over conventionally managed hedgerows for hunting micro and macro moths. However, for commuting Barbastelle bats the structure of hedgerows is more important than species composition. High wide hedgerows are preferred especially where they occur either side of a track or path way and where trees develop to form a tunnel. Hedgerows need to be at least 1.5m high. Trimmed hedges provide very poor cover to commuting bats.⁶⁰

Others

- A5.18 Riparian vegetation is the most used habitat by Barbastelle bats in a study on Dartmoor (Zeale, 2009)⁶¹. However, open water was the least selected habitat. The report also stated that it is the riparian vegetation rather than the water that is important to foraging Barbastelle bats, although the secondary importance of water in supporting riparian vegetation should be noted. In summer there is a super-abundance of moths, and particularly micro-moths, over wooded riversides and water meadows.⁶²

- A5.19 Greenway states that, '*The habitat types utilised by the Ebernoe nursery colony consist largely of the flood plains of rivers and streams together with woodlands in proximity to the watercourse. As bats move away from the roost area, woodlands form most of the intermediate foraging zones. Many of these are quite wet. The final destinations of most bats are larger floodplain meadows, particularly on the Arun and the Rother. Normally each bat has a territory of open meadows with an adjoining area of scrub or woodland. To the north and west of Ebernoe the foraging areas are much more enclosed by woodland and the streams are much smaller. In consequence the major foraging areas here are very tightly linear following streams and their floodplains. Several of the bats have a tributary stream each.*'⁶³

- A5.20 In other studies Barbastelle bats are highly associated with foraging habitats over water, such as the pond at Hinkley power station. In south western Germany Barbastelle bats have been observed to forage above water in a similar way to Daubenton's bats.⁶⁴

⁵⁹ Sierro, A. 1999. Habitat selection by barbastelle bats (*Barbastella barbastellus*) in the Swiss Alps (Valais). *J. Zool. Lond.* (1999) 248, 429 – 432.

⁶⁰ Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat* *Barbastella barbastellus*. Peterborough: English Nature; Fuentes-Montemayor, E., Goulson, D & Park K. J. 2010. The effectiveness of agri-environmental schemes for the conservation of farmland moths: assessing the importance of landscape-scale management approach. *Journal of Applied Ecology*, 2010; Simon, M., Hüttenbügel, S. & Smit-Viergutz, J. 2004. *Ecology and Conservation of Bats in Villages and Towns*. Bonn: Bundesamt für Naturschutz

⁶¹ Zeale, M. 2009. *Barbastelles in the Landscape: Ecological Research and Conservation in Dartmoor National Park*. Report for Dartmoor National Park/ SITA Trust

⁶² Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat* *Barbastella barbastellus*. Peterborough: English Nature

⁶³ Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat* *Barbastella barbastellus*. Peterborough: English Nature

⁶⁴ Boye, Dr. P. & Dietz, M. 2005. *English Nature Research Reports Number 661: Development of good practice guidelines for woodland management for bats*. Peterborough: English Nature.

- A5.21 Billington (2000) found that a patchwork of scrub was an important foraging habitat for Barbastelle bats from Horner Woods. Gorse, which attracts an abundance of moths, was shown to be particularly important.⁶⁵
- A5.22 Large Yellow Underwing moths are attracted to Buddleia or Butterfly Bush. Butterfly Bush flowers from July to September. There is potential to deprive Barbastelle bats of a foraging ground by restoring large areas of butterfly bush scrub all in one hit and at the wrong time of year.⁶⁶
- A5.23 Coastal habitats, such as saltmarsh and dunes, were used for foraging both by Barbastelle bats from Horner Woods and the Quantocks roost sites.⁶⁷
- A5.24 Apart from its edge heathland / upland moor was avoided by Barbastelle bats despite the abundance of moths it supports on both Dartmoor and Exmoor, probably due to low temperatures and exposure to winds.⁶⁸

Habitat Associations of Moth Species

- A5.25 A number of moth species have been identified as being preyed upon by Barbastelle bats through DNA analysis of droppings. The following gives some of the characteristics of those species most often found within the droppings of Barbastelle bats on Dartmoor.⁶⁹
- White Ermine is widely distributed and fairly common over much of Britain. It is found in a range of habitats including gardens, hedgerows, grassland, heathland, moorland and woodland. The larvae eat a range of herbaceous plants, including stinging nettle, common broom, viper's bugloss and dandelion. It generally flies from May to July and sometimes later in the south.
 - Buff Ermine is a common to most of Britain and is found in woods, gardens and parks. The larva feeds on a wide variety of trees, shrubs and herbaceous plants, including oak, alder, birch, plantain, dock, sorrel, ragwort, nettle, bramble, elder and honeysuckle. The adult flies from May to July.
 - Riband Wave is a common species throughout Britain and tends to fly between June and August, and sometimes has a second autumn brood in the south. It is found in a wide range of habitats, including gardens, hedgerows, woodland, heathland, calcareous grassland and fens. The larvae feed on a range of low plants such as dock and dandelion.
 - White-pinion Spotted is thought to survive in low densities. It has been found amongst hedgerows, in parks and woodland and along riversides. The larvae feed on the foliage

⁶⁵ Billington, G. 2000. *Holnicote Estate: Horner Woods Barbastelle Bat: radio tracking study*. Cullompton: Greena Ecological Consultancy; Billington, G. 2012. *Further research on the Barbastelle Bat, Holnicote National Trust Estate, Exmoor, North Somerset*. Report for Natural England. Witham Friary: Greena Ecological Consultants

⁶⁶ Pers. comm. Henry Andrews. AEcol, 22/09/2016

⁶⁷ Billington, G. 2012. *Further research on the Barbastelle Bat, Holnicote National Trust Estate, Exmoor, North Somerset*. Report for Natural England. Witham Friary: Greena Ecological Consultants; Rush, T. & Billington, G. 2012. *Report on a radio tracking study of Barbastelle bats at Hinkley Point C*. Witham Friary: Greena Ecological Consultants

⁶⁸ Zeale, M. R. K. 2011. *Conservation Biology of the Barbastelle (Barbastella barbastellus): Applications of Spatial Modelling, Ecology and Molecular Analysis of Diet*. Thesis: University of Bristol.

⁶⁹ Zeale, M. R. K. 2011. *Conservation Biology of the Barbastelle (Barbastella barbastellus): Applications of Spatial Modelling, Ecology and Molecular Analysis of Diet*. Thesis: University of Bristol.

of English elm and have also been reported to feed on wych elm. The adults fly at night from late July to September.

- Scalloped Hazel is moderately common and found in woodland, heaths and suburban habitats, and feeds on a number of deciduous as well as coniferous trees. It flies in May and June. The larvae feed on a wide range of plants including oak, ash, birch, hawthorn, ivy, Norway spruce, larch, willow, poplar, mugwort and burdock.
- Brown Silver-line is a fairly common moth over much of Britain, and can often be disturbed in the daytime by walking through bracken, its food plant. It is often found near bracken, occurring in woodland, heathland and moorland. It flies in a single generation during May and June, and occupies woodland and upland areas where its food plant grows in profusion.
- Heart and Dart are found in agricultural land, meadows, waste land, gardens and places where their food plants grow. Food plants include dock, plantain, chickweed, fat hen, turnip, sugar beet and many other herbaceous plants. The larvae feed on various wild and garden plants. The moth flies from May to July, when it is readily attracted to light.
- Shuttle-shaped Dart is fairly common in southern England and Wales it is found in a range of habitats including gardens, farmland, grassland, heathland and open woodland. There are possibly three generations during the year, with moths on the wing from May to October. The larvae feed on a number of low plants.
- Dark Arches are found in meadows and other grassy place and food plants include cocksfoot, couch grass and other grasses. The larvae feed on the bases and stems of various grasses. The moth is on the wing from July to August and is readily attracted to light.
- The Dun-bar is commonly distributed over much of Britain. It is found in woodland, gardens and hedgerows. It flies at night from July to September and is attracted to light and sugar and sometimes to nectar-rich flowers. The larvae feed on a variety of plants, mainly trees and shrubs, including maple, birch, hazel, hawthorn and oak, and also on the larvae of other Lepidoptera species, even occasionally its own species.
- Vine's Rustic is fairly frequent in the southern part of England up to south Wales and probably enjoying an increase in recent years. It is found in grassland, heathland, woodland rides and gardens. There are two generations with moths occurring between May and October, with the second brood somewhat more numerous.
- Large Yellow Underwing are found in a range of habitats, including agricultural land, gardens, waste ground, and has a range of food plants including dandelion, dock, grasses and a range of herbaceous plants both wild and cultivated, including dog violet and primrose. The larva is one of the 'cutworms' causing fatal damage at the base of virtually any herbaceous plant, including hawkweeds, grasses, plantains and dandelions and a range of cultivated vegetables and flowers. This moth flies at night from July to September and is freely attracted to light.

- Angle Shades occurs throughout Britain, commonly in places, and more so in the south. The adults generally fly between May and October, in at least two generations, but can be found in any month. It may be found almost anywhere. The larvae feed on a variety of herbaceous plants, including oak, birch, ivy, dead nettle, red valerian, bramble, dock and nettle.⁷⁰



Barbastelle Bat. Photo: C. Robiller / Naturlichter.de

⁷⁰ Ransome, R. D. 1996. *The management of feeding areas for Greater Horseshoe bats*. Peterborough: English Nature; <http://ukmoths.org.uk/species/noctua-pronuba/>; <http://ukmoths.org.uk/species/panemeria-tenebrata/>; <http://ukmoths.org.uk/species/agrotis-exclamationis/>; <http://ukmoths.org.uk/species/apamea-monoglypha/>

Annex 6: Methodology for Calculating the Amount of Replacement Habitat Required

Introduction

- A6.1 The method used to calculate the amount of habitat required to replace that lost to the SAC Barbastelle bat population due to development is based on the requirements for maintaining that needed to support viable populations. It uses an approach similar to the Habitat Evaluation Procedures (HEP) developed by the U.S. Fish and Wildlife Service (1980) to provide ‘...for mitigation and compensation that can allow fair use of the land and maintain healthy habitats for affected species’.⁷¹ HEP is structured around the calculation of Habitat Units (HU), which are the product of a Habitat Suitability Index (quality) and the total area of habitat (quantity) affected or required⁷².
- A6.2 A key assumption is that habitat type, amount and distribution influence the distribution of associated animal species. It is also important to recognise that Habitat Suitability Index (HSI) models predict habitat suitability, not actual occurrence or abundance of species populations.⁷³
- A6.3 The HEP uses the Integrated Habitat System (IHS) developed by Somerset Environmental Records Centre, described below. It requires a Habitat Suitability Index for the Barbastelle bat scored on IHS descriptions, which are given in Appendices 2 and 3.
- A6.4 Such methods are necessary to obtain an objective quantitative assessment that provides improved confidence that the mitigation agreed is likely to be adequate; and that a development will not significantly reduce the quantity or quality of habitat available to the Barbastelle bat population; whereas current ecological impact assessments are often based on subjective interpretations. In Somerset they have been used since 2009 including for effects on Barbastelle, Greater and Lesser Horseshoe bats to inform the adequacy of replacement habitat provided by the developer. The method has gone through planning inquiries including for a Nationally Significant Infrastructure Project.
- A6.5 The methodology has also been reviewed and further developed with the Bat Conservation Trust.

Integrated Habitat System Mapping

- A6.6 The Integrated Habitat System coding is used as a basis for describing and calculating habitat values used as a base in applying scores in Habitat Suitability Indices. The Integrated Habitat System (IHS)⁷⁴ classification comprises over 400 habitat categories, the majority drawn from existing classifications, together with descriptions, authorities and correspondences arranged in a logical hierarchy that allow application for different purposes. The classification can be customised for a geographical area or special project use without losing data integrity.
- A6.7 The IHS represents a coded integration of existing classifications in use in the UK with

⁷¹ <http://www.fort.usgs.gov/Products/Software/HEP/>

⁷² U. S. Fish and Wildlife Service. 1980. *Habitat Evaluation Procedures ESM102*. Washington, D. C.: Department of the Interior.

⁷³ Dijak, W. D. & Rittenhouse, C. D. 2009. Development and Application of Habitat Suitability Models to Large Landscapes: in Millsaugh, J. J. & Thompson, F. R. 2009. *Models for Planning Wildlife Conservation in Large Landscapes*. London: Academic Press.

⁷⁴ <http://www.somerc.com/integrated+habitat+system/>

particular emphasis on Broad Habitat Types, Priority Habitat Types, Annex 1 of the Habitats Directive and Phase 1⁷⁵.

- A6.8 Standard habitat definitions from these classifications are combined into a hierarchy starting at the level of Broad Habitat Types, through Priority Habitat types, Annex 1 to vegetation communities which are coded. These are the Habitat Codes.
- A6.9 Within IHS Habitat Codes are hierarchical with the numbers in the code increasing as the habitat becomes more specific. Descriptions of habitats can be found in IHS Definitions (Somerset Environmental Records Centre)⁷⁶. For example:
- WB0 Broadleaved, mixed and yew woodland (Broad Habitat Type)
 - WB3 Broadleaved woodland
 - WB32 Upland mixed ashwoods (Priority Habitat Type)
 - WB321 Tilio-Acerion forests on slopes, screes and ravines (upland) (Annex 1 Habitat)
- A6.10 As well as Habitat Codes IHS provides Matrix, Formation and Land Use/Management Codes which are added as a string to the main Habitat Code to provide further description.
- A6.11 Ideally habitat information for the whole of the geographic area of the Somerset authorities should be mapped in a GIS programme, such as MapInfo or ArcGIS. However, when used in ecological impact assessment for calculating the value of impacts of habitat change on a species population then at minimum it is only necessary that IHS coding is applied to the habitat types present on the proposed development site to enable the use of Habitat Suitability Indices in the HEP metrics.

Habitat Suitability Indices

Introduction

- A6.12 A form of Habitat Suitability Indices (HSI) has been used in the United States and Canada since the early 1980s as a way of assessing the impacts of development on species' populations and distributions. In addition, they have been used to predict what replacement habitat needs to be created to maintain species' populations. The process assumes that the suitability of habitat for a species can be quantified - the HSI. The overall suitability of an area for a species can be represented as a product of the geographic extents of each habitat and the suitability of those habitats for the species⁷⁷.

Description

- A6.13 In constructing the HSI the index scores are applied to each Habitat, and Matrix, Formation and Land Use / Management codes in the Integrated Habitat System (IHS) based on analysis of the ecological requirements, from existing literature and professional judgement, for each species assessed or mapped.

- A6.14 Each IHS 'Habitat' category is scored on a scale of 0 to 6 (as defined below) using a

⁷⁵ Phase 1 (JNCC, 1993) habitat mapping can be converted to IHS by using the software provided by Somerset Environmental Records Centre.

⁷⁶ <http://www.somerc.com/integrated+habitat+system/>

⁷⁷ <http://www.fort.usgs.gov/Products/Software/HEP/>

potential or precautionary approach as a starting point, e.g. Broadleaved, mixed and yew woodland is assumed to be the Annex 1 broadleaved woodland habitat unless otherwise proved not. The score will be the same across each of the hierarchical levels of the IHS Habitat coding (e.g. poor is scored as 1 whether this is at broadest habitat level or priority habitat level unless there is discernible differences in the type of habitat used, e.g. oak or beech woodland)⁷⁸. This means that the full range of scoring is used before the modifiers (the IHS Formation and Management codes) are applied.

A6.15 The Habitat Code scoring is considered in combination with the IHS Matrix codes⁷⁹. These are either added or subtracted from the Habitat code, e.g. grassland score 3 + scrub score 2 would equal 5. This is to account for species, for example that use grassland with a matrix of scattered scrub or single trees, which would otherwise avoid open grassland habitat.⁸⁰ Habitat Codes have a range of 0 to 6 but when considered in combination must not exceed a score of 6 or fall below a score of 0, Where there is no effect from a Matrix type then a default score of 0 is used.

A6.16 All other Codes are scored between 0 and 1 and are multipliers. Where there is no effect from Formation or Management of the habitat then a default score of 1 is used.

Table 3: Example of HSI Calculation

	Habitat Code	Matrix Code	Formation Code	Land Use / Management Code	HSI Score
Code	GI0	SC2	-	GM12	
Description	Improved Grassland	Scattered Scrub	-	Sheep Grazed	
HSI Score	2	1	1*	0.5	

* default score

A6.17 Scores will be applied such that a precautionary approach or 'potential' approach is taken, e.g. if a species requires grassland which is most valuable when grazed then grassland scores the top score. This potential score will take into account a combination of the Habitat and Matrix codes. The management modifier would then maintain the habitat score at this high level by a multiplier of 1. If the management is not grazed a decimal multiplier is applied to reduce the value of the habitat. For example a grassland habitat is valued at 6 but by applying the relevant management code, i.e. either mown or other management type, the value of the habitat will be reduced. Only one management code is allowed. An example is set out in Table 3 above.

A6.18 The definition of poor, average, good and excellent habitat is adapted from the 'Wildlife Habitat Handbook for the Southern Interior Ecoprovince', British Columbia, Ministry of Environment⁸¹ and expanded, in consultation with the Bat Conservation Trust, as follows:

⁷⁸ The 1 to 6 scale matches Defra's habitat distinctiveness range used in its metric.

⁷⁹ IHS considers that patches of scrub and single trees are matrix habitat acting in combination with main habitats types rather than separate habitats in their own right. It is possible that further sub codes be added to the grassland habitat codes, e.g. calcareous grassland with scattered scrub, etc. but this would lead to a proliferation of coding and current IHS GIS mapping would need amending to take this into account. Therefore by providing a positive multiplier the needs of those species which require a mosaic of grassland and scrub is taken into account.

⁸⁰ IHS considers that patches of scrub and single trees are matrix habitat acting in combination with main habitats types rather than separate habitats in their own right.

⁸¹ For example <http://www.env.gov.bc.ca/wld/documents/techpub/r20.pdf>

Excellent - provides for essential life requisites, including feeding, reproduction or special needs and supports a relatively high population density, implied >70% chance of occurrence, can support positive recruitment. Can be a critical life-cycle association.

Very good - provides for essential life requisites, including feeding, reproduction or special needs and supports a relatively high population density, implied 50 - 70% chance of occurrence, can support positive recruitment.

Good - provides for a life requisites, including feeding, reproduction or special needs and supports a relatively high population density, implied 40 -50% chance of occurrence, can support a stable population.

Average - provides for moderately required life needs, including feeding, reproduction or special needs and supports a relatively moderate population density, implied 25 - 40% chance of occurrence, can support a stable population.

Marginal - provides for marginally required life needs, including feeding, reproduction or special needs and supports a relatively modest population density, implied 15 - 25% chance of occurrence, can support a small population.

Poor - provides for a non-essential life needs, including feeding, reproduction or special needs and supports a relatively low population density, implied <15% chance of occurrence.

A6.19 It is recognised that not all habitat patches of the same type have equal value in terms of resource to a species, for example see Dennis, 2010⁸². However, in scoring the overall HSI, i.e. including all Habitat, Matrix, Formation codes, etc., it is considered that a higher value is given as a precaution. However, there is a factor in the HEP taking into account survey results which is partly aimed to account for variability in habitat quality.

A6.20 No allowance for seasonal variations, i.e. due to the availability of prey species at different times of year, has been made in developing the HSI. It is considered a habitat valued at 6 at a particular period but not at other times will remain at a value of 6 being necessary to support that species at that time of year when other prey or other resources may not be so readily available.

A6.21 The HSI score arising from the above calculation can be joined into a GIS base habitat map and displayed using thematic mapping to give a graphical representation of the value of a landscape to Barbastelle bats.

A6.22 The Habitat Suitability Index for Barbastelle Bats can be found in Appendix 2.

Validation

A6.23 A HSI model can be reviewed against occurrence data held by the biological records centre. The Gulf of Maine HSI work⁸³ established the principle of producing several HSI models for one species and retained the model, which had the best association with known occurrences. The mapping is produced and matched with species data at the biological records centre and the model refined to fit the records with a view to errors of omission and commission.

⁸² Dennis, R.L.H. 2010. *A Resource-Based Habitat View for Conservation. Butterflies in the British Landscape*. Chichester: Wiley-Blackwell.
⁸³ http://www.fws.gov/r5gomp/gom/habitatstudy/Gulf_of_Maine_Watershed_Habitat_Analysis.htm

A6.24 Garshelis (2000)⁸⁴ concluded that the '*...utility of the models is to guide further study or help make predications and decisions regarding complicated systems; they warrant testing but the testing should be viewed as a never-ending process of refinement, properly called bench-marking or calibration.*' The validation should be seen as a continuous refinement process and HSI scoring should be reviewed from time to time and up dated⁸⁵.

A6.25 In this study HSI have initially been researched and scored by the author. However, the scores can be varied through review, further research findings or to reflect local conditions based on survey. Where varied by consultants the reason for the variation should be given and supported by evidence.

Density Band

A6.26 The HSI score is multiplied by the location of the proposed site in relation to that of the Barbastelle bat roost. The Consideration Zone (CZ) is divided into three Density Bands. The three Bands are, 'A' closest to the record, 'B' and 'C' furthest from the record valued at 3, 2 and 1 respectively. The values are given in Table 4 below.

Table 4: CZ Band

Band	Score
A	3
B	2
C	1

A6.27 When two Bands occur within one field take the higher value as the score. The Density Band widths can be found in Table 1 above.

A6.28 Following ecological surveys for Barbastelle bats carried out for the proposed development the Density Band score may be modified up depending on whether feeding activity or a key flyway was recorded or not or whether absence is recorded. This reflects uneven use of a home range and refines the value of the habitat for a species (e.g. see Zeale 2009, 2012⁸⁶). Note that sufficient automated detectors should be deployed.

A6.29 The following criteria should be used to modify the Band following the results of site surveys and applied to the whole of the proposed development site:

- Not present – Where potential habitat is present reduce the Band score down by 0.5, e.g. at A from 3 to 2.5; at B from 2 to 1.5; except at C where it reduced to 0.
- Commuting only – as the Band the site falls within
- Commuting and Foraging or Key Flyway – increase the band score as for A.

⁸⁴ Garshelis, D. L. 2000. Delusions in Habitat Evaluation: Measuring Use, Selection, and Importance: in Boitani, L. & Fuller, T. K. (eds.) 2000. *Research Techniques in Animal Ecology: Controversies and Consequences*. New York: Columbia University Press.

⁸⁵ http://www.fws.gov/r5gomp/gom/habitatstudy/Gulf_of_Maine_Watershed_Habitat_Analysis.htm

⁸⁶ Zeale, M. 2009. *Barbastelles in the Landscape: Ecological Research and Conservation in Dartmoor National Park*. Report for Dartmoor National Park/ SITA Trust; Zeale, M. R. K., Davidson-Watts, I., & Jones, G. 2012. Home range use and habitat selection by barbastelle bats (*Barbastella barbastellus*): implications for conservation. *Journal of Mammalogy* 93(4):1110-1118. 2012

A6.30 The identification of 'foraging' (i.e. a higher level of activity) for Barbastelle bat species is defined as:

- The criteria for foraging for horseshoe bat species, which have low intensity calls, makes use of Miller's (2001) Activity Index.⁸⁷ *'Call sequences with a negative minute on either side (i.e. a minute in which the species was not recorded) are judged to be commuting contacts, whereas contacts in two consecutive minutes or more are judged to be foraging contacts.'* 'Foraging' is defined as 9 or more minutes in which foraging contacts were recorded over any three nights in the five nights of any one automated detector during a recording period.

Calculating the Habitat Unit Value

A6.31 For information the value of the proposed site to a Barbastelle bats in Habitat Suitability value is calculated by using the HSI Score and the Density Band (See Table 5). The outcome of the Habitat Suitability Units used in the HEP is on a scale of 0 to 18⁸⁸.

Table 5: Matrix Combining Habitat Suitability Score and Density Band

		Habitat Suitability Score					
		Poor	Marginal	Average	Good	Very Good	Excellent
		1	2	3	4	5	6
Band	A (3)	3	6	9	12	15	18
	B (2)	2	4	6	8	10	12
	C (1)	1	2	3	4	5	6

A6.32 The habitat replacement value required is calculated by multiplying the score by the hectareage of the habitat affected (hectares x [HSI x Band]) giving figure in **Habitat Units**. For example a HSI x Band score of 12 for an area of 1.50 hectares would give a value of 18 Habitat Units.

A6.33 The resultant total of Habitat Units for the whole proposed development site could then be divided by 18 (6 [HS] x 3 [Band]) to arrive at the minimum area in hectares of accessible replacement habitat required to develop the proposed site

A6.34 Hedgerows and some watercourses are not mapped as separate polygons in OS Mastermap and if a width is not known a default width of 3 metres is used and multiplied by the length to give an area in hectares. These values are usually small and do not significantly affect the overall area of a site, and for simplicity's sake and considering their value to wildlife are not deducted from the area of bordering fields, compartments or OS Mastermap polygons. If preferred calculations can be carried out

⁸⁷ Miller, B. 2001. A method for determining relative activity of free flying bats using a new activity index for acoustic monitoring. *Acta Chiropterologica* 3 (1): 93 – 105.

⁸⁸ This range is in line with that used for the habitat metric used by Defra in its pilot projects 2012 -2014.

separately for these features using linear measurements but the end result is the same, especially if a direct replacement value of the hedgerow or watercourse is required.

- A6.35 Nonetheless hedgerow and other commuting structure should be seen as having a functional role, and should normally be maintained or replaced to maintain Barbastelle bat commuting across a proposed development site.
- A6.36 HEP calculations for development sites should be made on the basis that the total site area would be lost to a species and would therefore produce a maximum replacement requirement to develop the site. This saves a separate calculation for the value of the existing habitat on which enhanced habitat is created. Where habitat remains unchanged and is retained by the development it is not included in the calculation.
- A6.37 To calculate the amount of replacement habitat provided as mitigation within a master plan for a proposed development site the same procedure as described above is used for each area of created or enhanced habitat. These habitats should in the first instance be aimed at providing optimal foraging habitat for Barbastelle bats (although it is unlikely that some habitats such as grazed pasture would be possible to re-create within a development site).
- A6.38 Standard prescriptions that can be used for replacement habitats can be found in Annex 7. Habitats will need to be accessible and undisturbed by introduced lighting to count towards mitigation. As all habitats are considered optimal the HSI score would automatically be 6.
- A6.39 In addition to the standard calculation described above Fraction Multipliers are also applied to the calculation to allow for temporal effects and the difficulty in restoring or creating a habitat (See below).

Fraction Multipliers

- A6.40 In delivering the replacement habitat there may also be an issue or risk with delivering a functional offset and the timing of the impact. A loss in biodiversity would result and there could potentially be a risk to maintaining a species population during the intervening period even though it would recover in time. Therefore, it is important and desirable that where feasible replacement habitat is in place and functional just before development commences on site. However, functionality may not be achieved until several years after replacement habitat has been created and there is a risk that it may fail due to the difficulty in recreating or restoring. To account for these possibilities Fraction Multipliers are used. These are usually applied only once to the calculation for the value of the habitat lost to Barbastelle bats. However, in some circumstances the Fraction Multipliers may be applied to habitat created as replacement for that lost where this has been designed and there are multiple habitat types. In this case they are not applied to the habitat lost calculation.
- A6.41 *The aim of a multiplier is to correct for a disparity or risk. In practice this is very difficult to achieve, not least because of uncertainty in the measurement of the parameters and the complexity of gathering the required data.*⁸⁹ In order that any habitat creation or

⁸⁹ Defra. 2011. *Biodiversity Offsetting. Technical paper: proposed metric for the biodiversity pilot in England*. London: Department for Environment, Food and Rural Affairs.

enhancement would functionally replace habitat lost to development (and the need to take a precautionary approach in the case of Barbastelle bats, as features of European sites and European protected species) a 'fraction multiplier' is applied to the resultant Habitat Units needed to replace habitat lost to development in order to provide robust mitigation, e.g. to maintain 'favourable conservation status'.

A6.42 *'There is wide acknowledgement that ratios should be generally well above 1:1. Thus, compensation ratios of 1:1 or below should only be considered when it is demonstrated that with such an extent, the measures will be 100% effective in reinstating structure and functionality within a short period of time (e.g. without compromising the preservation of the habitats or the populations of key species likely to be affected by the plan or project.'*⁹⁰ The Environment Bank recommend a two for one ratio where habitats are easily re-creatable contiguous to the development or on similar physical terrain as a minimum.⁹¹ In many other situations a significantly higher multiplier may be appropriate⁹². *The conclusion of the BBOP [Business Biodiversity Offsets Programme] paper (Ekstrom et al, 2008) is that where there are real risks around the methods and certainty of restoration or creation then the Moilanen framework is applicable; but for some other situations, (averted risk ...and where restoration techniques are tried and tested), lower ratios can be used.'*⁹³

A6.43 Appendices 4 and 5 give a guide to difficulty in creating and restoring habitats and the time frame required to reach maturity or functionality.

Delivery Risk

A6.44 As different habitats have different levels of difficulty in creation or restoration there will be different risks associated with each. *'Once there is an estimate of the failure risk, it is possible to work out the necessary multiplier to achieve a suitable level of confidence (Bill Butcher pers com; Moilanen, 2009; Treweek & Butcher, 2010). The work of Moilanen provides a basis for different multipliers of various levels of risk. We [Defra] have used this work to come up with categories of difficulty of restoration/expansion, and associated multipliers, as set out in [Tables 6 and 7] below.'*⁹⁴

A6.45 In most cases a multiplier will be applied to the calculation of the habitat lost on the development site and the figure (≥ 1) shown in middle column of Table 6 below will be used. This assumes that the optimal habitat for Barbastelle bats will be created. The resultant figure can either be checked against that provided in the Master Plan to confirm that there is sufficient to mitigate the loss or then be used to design the area into a Master Plan.

A6.46 Where the replacement habitat has been designed, and includes several types, in an

⁹⁰ European Communities. 2007. *Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC: Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission*. Brussels: Office for Official Publications of the European Communities.

⁹¹ Briggs, B., Hill, D. & Gillespie, R. 2008. Habitat banking – how it could work in the U.K. <http://www.environmentbank.com/docs/Habitat-banking.pdf>

⁹² Moilanen, A., Van Teeffelen, A., Ben-Haim, Y. & Ferrier, S. 2009. How much compensation is enough? A framework for incorporating uncertainty and time discounting when calculating offset ratios for impacted habitat. *Restoration Ecology* 17, 470-478.

⁹³ Defra. 2011. *Biodiversity Offsetting. Technical paper: proposed metric for the biodiversity pilot in England*. London: Department for Environment, Food and Rural Affairs.

⁹⁴ Defra. 2011. *Biodiversity Offsetting. Technical paper: proposed metric for the biodiversity pilot in England*. London: Department for Environment, Food and Rural Affairs.

offsite location, for example, this needs to be checked to ensure that adequate mitigation habitat has been provided. In this case, due to the nature of the calculation the multiplier is inversed (≤ 1) as shown in the right hand column of Table 6 and applied to the replacement habitat not the lost habitat.

Table 6: Multipliers for different categories of delivery risk (Defra, 2011)

Difficulty of recreation/restoration	Multiplier	<i>Multiplier (Where the replacement site has been designed and consists of multiple habitat types)</i>
Very High	10	<i>0.1</i>
High	3	<i>0.33</i>
Medium	1.5	<i>0.67</i>
Low	1	<i>1</i>

- A6.47 For information Appendix 3 gives an indicative guide to risk levels which have been assigned to habitats to these broad categories using expert opinion by Defra (2011). Factors such as substrate, nutrient levels, state of existing habitat, etc. will have an impact on the actual risk factor, which may need to be taken into account.

Temporal Risk

- A6.48 In delivering replacement habitat there may be a difference in timing between the implementation of the development and the functionality and maturity of the replacement habitat in terms of providing a resource for the affected species. This time lag would be minimised by calculation of existing habitat value in the pre application stage and implementation of the habitat creation and / or restoration in consultation with the local authority and other nature conservation organisations. In some cases the replacement habitat may be planted or managed concurrently with that of the site development.
- A6.49 Where a time lag occurs a multiplier will be applied to take account of the risk involved to the 'no net loss' objective. These are set out in Table 7 below. Appendix 4 gives general guidance on how long different habitats would be expected to reach maturity. The actual multiplier used needs to be judged on a case by case basis. As with Delivery Risk the multiplier in the left hand column is likely to apply in most cases (see paragraphs A5.45 and A5.46 above).
- A6.50 It is considered that some priority habitats cannot be recreated due to the length of time that they have evolved and the irreplaceability of some constituent organisms, at least in the short and medium terms. It is also considered that in the medium and longer terms the management of any replacement habitat may be uncertain. Therefore Table 7 has been constrained to a maximum period of 20 years. In some cases the time lag for the development of a habitat to support a population may be too long to be acceptable.

Table 7: Multipliers for different time periods using a 3.5% discount rate

Years to target condition	Multiplier	Multiplier (Where the replacement site has been designed and multiple habitat types)
5	1.2	0.83
10	1.4	0.71
15	1.7	0.59
20	2.0	0.5

A6.51 An Excel spread sheet in which figures used in the calculation for the HEP just as an example is shown in Appendix 5. It is likely that a full spread sheet will be made available by the Council.

Summary

A6.52 The total replacement habitat required therefore comprises the following metric for each habitat type within a proposed development site. The whole proposed development site should be included in the calculation.

The HSI = Habitat Code (Range 0 to 6) + or – Matrix Code (Range 0 to 6, Default 0) x Formation Code (Range 0 to 1, Default 1) x Management Code (Range 0 to 1, Default 1)

HSI x Band x hectares x Delivery Risk x Temporal Risk = Habitat Units required.

Habitat Units divided by 18 = hectares required

Off Site Replacement Habitat

A6.53 Where there are residual offsets, i.e. where the replacement habitat cannot be created within the proposed development sites red line boundary an allowance is calculated for the value of the existing habitat on the intended habitat creation site as this will be lost or included in the value of any enhancement. Where replacement habitat is located offsite then the value of that site needs to be taken into account. The formula applied to offset losses of existing habitat at the offset site is:

Area Equivalent of Habitat Units Needed to Offset from Development
(Habitat Value of Desired Habitat Type – Habitat Value of Offsite Habitat Creation Site)

A6.54 This figure is then added to the Habitat Units derived from the calculation from the proposed development site and the total divided by 18 to find the amount of offsite replacement habitat required. For example the proposed development requires 32HUs to replace that lost to Barbastelle bats. The habitat to be created is valued at a suitability score of 6 and the field intended for the creation of replacement habitat at 1. The calculation would be $32 / (6-1) + 32 = 38.4\text{HU}$ (or, divided by 18, 2.13 hectares).

A6.55 It is critical that the replacement site where habitat has been enhanced is accessible to the population of Barbastelle bats affected.

Annex 7: Habitat Creation Prescriptions

- A7.1 The principal source of prey for Barbastelle bats is small moths. Most moths require food for their caterpillars (For some species this is a single type of plant, although most species are not so restricted – see Annex 5). Energy in the form of nectar from flowers is required for the adult. Many species have favoured nectar plants, but some moths do not feed at all in the adult stage; and somewhere to over-winter safely - usually in taller vegetation, scrub or ivy. One study found that night flying moth abundance and diversity correlated positively with the number of bramble (*Rubus fruticosus*) clumps along a hedgerow⁹⁵.

Grassland⁹⁶

- A7.2 The creation of species rich grassland is likely to be more feasible in response to providing replacement habitat to mitigate the impacts of a development. This will need to be managed to produce a long sward to support an abundance of Noctuid moths, one of the main prey items hunted by Barbastelle bats. Specified seed mixes should include food plants, as well as grasses, such as dandelion, dock, hawkweeds, plantains, ragwort, chickweed, fat hen, mouse-ear and red valerian and other herbaceous plants.
- A7.3 Wetter areas of grassland and ponds, such as can be created through sustainable drainage systems, are also favourable to Barbastelle bats
- A7.4 Buddleia and bramble in particular, and other scrub species may be planted within or on the edges of the grassland. The grassland should be divided into parcels and cut in rotation once a year in October and the cuttings removed.
- A7.5 Where grassland is established as a field margin this should be at least 6 metres wide out from the face of the bounding hedgerow. Cuts should be made once a year in the autumn to avoid harming moth populations.

Hedgerow

- A7.6 Hedgerows should be maintained as large as possible and a second row of trees and shrubs parallel to the existing or planted hedgerow leaving a pathway between will create effective flight line conditions. The larger the hedgerow the better the flight line for Barbastelle bats.⁹⁷
- A7.7 Uniformity of species or structure is undesirable and trees with a tall clean trunk, such as ash or beech avoided. Trimmed hedgerows provide poor cover for commuting Barbastelle bats. Where necessary only one side a double hedge line should be trimmed in any one year or then cut back in short sections in rotation on one side of the hedge only. This may not be able to be controlled if hedgerows form the boundaries of

⁹⁵ Coulthard, E. 2015. The Visitation of Moths (Lepidoptera) to Hedgerow Flowering Plants in Intensive Northamptonshire Farmland: in Coulthard, E. 2015. *Habitat and landscape-scale effects on the abundance and diversity of macro-moths (Lepidoptera) in intensive farmland*. PhD. University of Northampton.

⁹⁶ Merckx, T. & Macdonald, D. W. 2015. Landscape-scale conservation of farmland moths: in Macdonald, D. W. & Feber, R. E. (eds) 2015. *Wildlife Conservation on Farmland. Managing for Nature on Lowland Farms*. Oxford: Oxford University Press; Fuentes-Montemayor, E., Goulson, D. & Park, K. J. 2010, The effectiveness of agri-environment schemes for the conservation of farmland moths: assessing the importance of a landscape-scale management approach. *Journal of Applied Ecology* 48, 532-542

⁹⁷ Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat Barbastella barbastellus*. Peterborough: English Nature

residential properties which should be taken into account when master planning a proposed development site.⁹⁸

- A7.8 If not present bramble should be planted at regular intervals in hedgerows and should be included in the planting schedule for new hedgerows⁹⁹. Cow parsley (*Anthriscus sylvestris*) should also be seeded in association with hedgerow enhancement and creation. Bramble is also closely related to other cultivated species such as raspberry (*Rubus idaeus*), Loganberry (*Rubus loganobaccus*); and cloudberry (*Rubus chamaemorus*).

Watercourses

- A7.9 Watercourses and their margins form a major component of Barbastelle bat flyways and vary from larger hedgerow ditches up to medium sized rivers with their bankside vegetation, this latter forming the structure of the flyway. A stream with trees either side and canopies touching is ideal.¹⁰⁰ Watercourses forming part of proposed developments should be maintained and enhanced so that there is sufficient structure to support a flyway. Existing vegetation should not be removed.

Woodland and Trees

- A7.10 Macro moth communities were influenced to some extent by the surrounding landscape. Fuentes-Montemayor et al (2012) found that moth abundance was influenced by the percentage cover of woodland in the surrounding landscape at relatively small spatial scales (<500 m), suggesting that local habitat management (or a landscape management at this spatial scale) would be suitable for moth conservation.
- A7.11 Woodland supports high levels of moth abundances. Macro moths are densest where there is grass or litter, less so where there are ferns, moss, bare ground or herbs. Understorey plants often provide larval foods for small moths, the Geometridae in particular. Within development trees can be planted within grassland areas to form small copses. A diverse mix of tree species should be used using species such as oak, willow and birch which can support large numbers of moths. Species such as beech should be avoided as it has small numbers of moths even when compared to non-native species such as sycamore. Uniformity of stands of trees should also be avoided as they are poorer in invertebrates than more diversely structured woodland.¹⁰¹

⁹⁸ Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat* *Barbastella barbastellus*. Peterborough: English Nature

⁹⁹ Coulthard, E. 2015. The Visitation of Moths (Lepidoptera) to Hedgerow Flowering Plants in Intensive Northamptonshire Farmland: in Coulthard, E. 2015. *Habitat and landscape-scale effects on the abundance and diversity of macro-moths (Lepidoptera) in intensive farmland*. PhD. University of Northampton.

¹⁰⁰ Greenaway, F. 2004. *Advice for the management of flightlines and foraging habitats of the barbastelle bat* *Barbastella barbastellus*. Peterborough: English Nature

¹⁰¹ Fuentes-Montemayor, E., Goulson, D., Cavin, L., Wallace, J.M. & Park, K. J. 2012. Factors influencing moth assemblages in woodland fragments on farmland: Implications for woodland management and creation schemes. *Biological Conservation* 153 (2012) 265–275; Greenaway, F. 2005. *Advice for the management of flightlines and foraging habitats of the barbastelle bat* *Barbastella barbastellus*. Peterborough: English Nature; Kirby, K. J. (ed). 1988. *A woodland survey handbook*. Peterborough: Nature Conservancy Council.

Annex 8: Application of the Habitats Regulations

A8.1 The Habitats Regulations protect identified *sites* by designation as Special Areas of Conservation. However, the Habitats Regulations also protects *habitat* which is important for the Favourable Conservation Status of the species.

A8.2 Achieving Favourable Conservation Status of a site's features '*... will rely largely on maintaining, or indeed restoring where it is necessary, the critical components or elements which underpin the integrity of an individual site. These will comprise the extent and distribution of the qualifying features within the site and the underlying structure, functions and supporting physical, chemical or biological processes associated with that site and which help to support and sustain its qualifying features*'.

A8.3 Regulation 63 Habitats Regulations states that:

A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which:

- is likely to have a significant effect on a European Site (either alone or in combination with other plans or projects), and
- is not directly connected with or necessary to the management of that site must make an appropriate assessment of the implications for that site in view of that site's conservation objectives.

A8.4 Regulation 63 therefore describes a two-stage procedure: a screening stage where the "competent authority" has grounds to conclude whether a plan or project is likely to have a significant effect on a European site, and the appropriate assessment stage if it concludes that a significant effect is likely.

- A8.5 In accordance with Regulation 61 information submitted with a planning application will be used by Sedgemoor District Council or Somerset County Council (in the case of minerals or waste applications) to determine whether the proposal is likely to have a significant effect on the SAC. Sedgemoor District Council will apply a “Test of Likely Significant Effect” for proposals which involve or may involve:
- the destruction of a Barbastelle or Bechstein’s bat roost (maternity, hibernation or subsidiary roost);
 - loss of foraging habitat for SAC bats
 - fragmentation of commuting habitat for SAC bats
 - increase in luminance in close proximity to a roost and/or increase in luminance to foraging or commuting habitat
 - impacts on foraging or commuting habitat which supports the SAC bat populations structurally or functionally
- A8.6 When considering whether a project is likely to have a significant effect on a European site, the competent authority should take account of mitigation measures which are built into the project. Mitigation measures are measures which are designed to avoid or reduce adverse effects on a European site. It is important to distinguish these from compensatory measures which are designed to compensate for unavoidable adverse effects on a European site and follow the “3 tests”¹⁰². Compensatory measures will not be taken into account at the Test of Likely Significant Effect stage.
- A8.7 The precautionary principle underpins the Habitats Directive¹⁰³ and hence the Habitats Regulations and must be applied by the local planning authority as Competent Authority as a matter of law.¹⁰⁴ It is clear that the decision whether or not an appropriate assessment is necessary must be made on a precautionary basis.¹⁰⁵ In addition, the Waddenzee judgement¹⁰⁶ requires a very high level of certainty when it comes to assessing whether a plan or project will adversely affect the integrity of a European site. The judgement states that the competent authority must be sure, certain, convinced that the scheme will not adversely affect the integrity of the site. It goes on to state that that there can be no reasonable scientific doubt remaining as to the absence of adverse effects on the integrity of the site.
- A8.8 For Sedgemoor District Council, West Somerset District Council, the Exmoor National Park Authority or Somerset County Council (in the case of schools, highways, minerals or waste applications) to be able to conclude with enough certainty that a proposed project or development will not have a significant effect on the SAC, the proposal or project must therefore be supported by adequate evidence and bespoke, reasoned mitigation. Where appropriate a long term monitoring plan will be expected to assess whether the bat populations have responded favourably to the mitigation. It is important that consistent monitoring methods are used pre- and post-development, to facilitate the interpretation of monitoring data.

¹⁰² See ODPM circular 06/2005

¹⁰³ Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (known as the ‘Habitats Directive’)

¹⁰⁴ *Assessing Projects under the Habitats Directive: Guidance for Competent Authorities* 2011, CCW p.15

¹⁰⁵ ODPM Circular 06/2005 para13

¹⁰⁶ ECJ judgement: C-127/02 [2004] ECR-I

A8.9 Mitigation, an Ecological Management Plan and, (where required) monitoring during and / or post development, will be secured through either planning conditions or a S106 agreement or both. Data from monitoring will be used by the Sedgemoor District Council, West Somerset District Council, the Exmoor National Park Authority and / or Somerset County Council to determine how the bat populations have responded to mitigation and to increase the evidence base.

Appendix 1: Comparison of Home Ranges of Barbastelle Bats Derived from Radio-Tracking Studies

Home range distance	Minimum Distance	Average Distance	Maximum Distance	Home range area	Reference
On average, bats travelled 8.4 km +/- 4.9 SD (range 1.1–20.4 km) from roosts to foraging areas.	1.1	8.4	13.3	Females were highly faithful to more or less "private" foraging areas which constituted a small fraction ($X^2 = 10.1\%$ +/- 8.8 SD) of home ranges.	Zeale, M. R. K. 2011. <i>Conservation biology of the barbastelle (Barbastella barbastellus): applications of spatial modelling, ecology and molecular analysis of diet</i> . PhD Thesis. University of Bristol, Bristol, UK.
The foraging areas ranged from 0.75km up to 10.2km away from the roosting site.	0.75		10.2	The bats multi-lateral polygon range (MLP) was over a distance of 9.8km (east/ west and using an area of 31.6km ² . This is a more accurate method compared to the commonly used academic analysis method of multi convex polygon, which would exaggerate the area by 34.2% to 48km ² .	Rush, T. & Billington, G. 2013. <i>Report on a radio tracking study of Barbastelle bats at Hinkley Point C</i> . Witham Friary: Greena Ecological Consultancy.
Bats ranged 3.5km northwest, 4.5km north, 6km northeast, 6km east, 9km southeast and 6 km south			9		Billington, G. 2000. <i>Horner Woods Barbastelle Bat: radio tracking study</i> . The National Trust.
In October and November 2001 Barbastelle bats ranged up to 3km from their roosts compared to at least 9km in summer, there was one in November a radio tagged male bat was briefly recorded moving around 16km west of Horner Wood at Hillsford Bridge, near Lynmouth, Devon			3		Billington, G. 2012. <i>Further research on the Barbastelle Bat Holnicote National Trust Estate, Exmoor, North Somerset</i> . Natural England Research Report. Witham Friary: Greena Ecological Consultancy
Ebemore roosts – 1.17km to 10.46km, mean 5.2km (lactating 5.09km)	1.17	5.2	10.46	Ebemore roosts – 50% kernel 20.88 – 368.25 ha, mean 178.15ha.	Greenaway, F. 2008. <i>Barbastelle Bats In The Sussex West Weald 1997 – 2008</i> . Sussex Wildlife Trust/ West Weald Landscape Partnership
The Mens roosts – 2.64km to 11.98km, mean 7.11km (lactating 7.67km)	2.64	7.11	11.98	The Mens roosts – 50% kernel 61.33 – 1152.24ha, mean 379.75	
				Individual 95% kernel, 125 - 2551ha, median 403ha. Individual 50% kernel 5-285 ha, median 67 ha.	Hillen, J., Kiefer, A., Veith, M., 2009. Foraging site fidelity shapes the spatial organisation of a population of female western barbastelle bats. <i>Biological Conservation</i> 142: 817-823.
				Individual MCP mean 222ha ± 88.5, individual 50% kernel 16ha ± 10.	Kerth, G., Melber, M., 2009. Species-specific barrier effects of a motorway on the habitat use of two threatened forest-living bat species. <i>Biological Conservation</i> 142: 270-279.

Home range distance	Minimum Distance	Average Distance	Maximum Distance	Home range area	Reference
Mean maximum distance from roost to furthest edge of core foraging area (80% cluster cores) 6.8km \pm 4.8. Per colony the mean maximum distances were 8.5km (5.6-11.3km) and 5.2km (2.7-7.7km).	2	8.5	11.3	Colony MCPs 10,660ha and 14,804 ha.	Zeale, M., Davidson-Watts, I., Jones, G., 2012. Home range use and habitat selection by barbastelle bats (<i>Barbastella barbastellus</i>): implications for conservation. <i>Journal of Mammalogy</i> 93: 1110-1118.
		5.2	7.7		
				95% kernel 183 ha and 50% kernel 27 ha.	Hillen, J., Kiefer, A., Veith, M., 2010. Interannual fidelity to roosting habitat and flight paths by female western barbastelle bats. <i>Acta Chiropterologica</i> 12: 187-195
Maximum home range was 5km. The distance between roosts in the forest to foraging sites was less than 1km for males and between 3km and 4.5km for females.		(3.75)	(5)	Core regions (calculated using harmonic means) are 100-500m in diameter. Nine tracked animals used a total area of 35km ²	Steinhauser, D., Burger, F., Hoffmeister, U., Matez, G., Teige, T., Steinhauser, P., Wolz, I., 2002. Untersuchungen zur Ökologie der Mopsfledermaus, <i>Barbastella barbastellus</i> (Schreber, 1774), und der Bechsteinfledermaus, <i>Myotis bechsteinii</i> (Kuhl, 1817) im Süden des Landes Brandenburg. <i>Schriftenr. Landschaftspflege. Naturschutz</i> 71: 81–98.
				Mean individual home range 8.8 ha \pm 5.8 SD	Sierro, A., 1999. Habitat selection by barbastelle bats (<i>Barbastella barbastellus</i>) in the Swiss Alps (Valais). <i>Journal of Zoology</i> 248: 429-432.
				Home range approximately 1000 ha	Greenaway, F., 2001. The barbastelle in Britain. <i>British Wildlife</i> 12: 327-334.
Distance between roost and foraging sites was between 0.8km and 8.2 km (average 3.9km)	0.8	3.9	8.2	Seven Barbastelle radio tracked had a total of 24 distinct foraging sites, sizes between 2ha and 48ha. Each individual bat visiting between 1 and 7 sites.	Simon, M., Hüttenbügel, S. & Smit-Viergutz, J. 2004. <i>Ecology and Conservation of Bats in Villages and Towns</i> . Bonn: Bundesamt für Naturschutz
Mean Distances	1.41	6.385	10.1		

Appendix 2: Barbastelle Bat Habitat Suitability Index

Text Colour

Black = Habitat Codes

Blue = Matrix Codes

Green = Formation Codes

Red = Management Codes

NP = Not permissible. It is considered that the habitat is not replaceable

A complete list with full descriptions and parameters of the habitat labels can be obtained from Somerset Environmental Records Centre.¹⁰⁷

The columns on the right refer to scores given by three Barbastelle bat specialists to broad habitat types on a decimal scale of 0 to 1 through a Delphi process and are given for information only. Figures in italics refer to scores given to a Habitat Type rather than a Matrix Code and should be compared with the modified HSI score not that shown which is a multiplier.

Code	Label	HSI	Notes	ZE	BI	GR
WB0	Broadleaved, mixed, and yew woodland	6	Barbastelle bats prefer riparian vegetation, broad leaved woodland, unimproved grassland, improved grassland, scrub, mixed woodland, coniferous woodland and avoid urban, upland moor, arable habitats and areas of open water (Zeale, 2009).	1	1	1
WB1	Mixed woodland	4				
WB2	Scrub woodland	2				
WB3	Broadleaved woodland	6				
WB31	Upland oakwood [=Old sessile oak woods with Ilex and Blechnum in the British Isles(AN1)]	NP	Over 90% of barbastelle bats from Horner Wood in Somerset foraged along linear wooded scrub strips including along watercourses, overgrown hedgerows, uncut grassland, heather moorland edge (within Exmoor Heath SAC), gardens and areas of low level street lighting. Gorse was also important. (Billington, 2002).			
WB32	Upland mixed ashwoods	5				
WB321	Tilio-Acerion forests of slopes, screes and ravines [upland]	NP				
WB32Z	Other upland mixed ashwoods	5				
WB33	Beech and yew woodlands	4				
WB331	Lowland beech and yew woodland	4				
WB3311	Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrub layer (Quercion robori-petraeae or Ilici-Fagenion)	NP				
WB3312	Asperulo-Fagetum beech forests	NP				
WB3313	Taxus baccata woods of the British Isles	NP				
WB331Z	Other lowland beech and yew woodland	4				
WB33Z	Other beech and yew woodlands	4				
WB34	Wet woodland	4				
WB341	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	NP	Barbastelle bats foraging in summer occurred mostly out of woodlands and included areas of scrub, heath, unimproved grassland, along hedgerows and streams and salt marsh. By contrast in the autumn/early winter bats almost exclusively foraged in woodlands with up to half of the time spent in conifer plantations. Habitats recorded as being used to the east of Porlock Weir during these surveys include patches of scrub (including bramble, gorse, nettles, blackthorn and dog rose); patches of bramble scrub on shingle; saltmarsh; trees lining dry shingle-lined channels; strips of tall vegetation; and short improved turf			
WB342	Bog woodland	NP				
WB34Z	Other wet woodland	4				
WB36	Upland birch woodland	NP				
WB361	Lowland mixed deciduous woodland	6				
WB362	Old acidophilous oak woods with Quercus robur on sandy plains	NP				

¹⁰⁷ SERC, 34 Wellington Road, Taunton TA1 5AW Telephone: 01823 664450 Fax: 01823 652411

Code	Label	HSI	Notes	ZE	BI	GR
WB363	Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli	NP	grazed by sheep. (Billington, 2012). Oak woodlands support high moth diversity (Zeale, 2009a)			
WB36Z	Tilio-Acerion forests of slopes, screes and ravines [lowland]	NP				
WB3Z	Other lowland mixed deciduous woodland	6	Moth diversity is greatest on oak and willow species			
WC0	Coniferous woodland	3				
WCZ	Other coniferous woodland	3	Understorey plants are the larval foods of many small moths, the Geometridae in particular. (Greenaway, 2004)			
IH0	Introduced shrub	0				
WF0	Unidentified woodland formation	1				
WF1	Semi-natural	1				
WF11	Native semi-natural	1	It is indicated that small woodlands of less than 1ha do not have characteristic woodland moth communities (Usher & Keiller, 1998)			
WF111	Canopy Cover >90%	0.5				
WF112	Canopy Cover 75 - 90%	0.8				
WF113	Canopy Cover 50 - 75%	1	Scrub, mixed and coniferous woodland of relatively little importance (Zeale, 2009) However, Billington (2000) found Barbastelle bats using coniferous plantations especially in early winter.			
WF114	Canopy Cover 20 - 50%	1				
WF12	Non-native semi-natural	0.7				
WF121	Canopy Cover >90%	0.3				
WF122	Canopy Cover 75 - 90%	0.5	In Switzerland Barbastelle bats avoided open woodland on stony outcrops and rocky slopes (Sierro, 1999).			
WF123	Canopy Cover 50 - 75%	0.7				
WF124	Canopy Cover 20 - 50%	0.7				
WF2	Plantation	0.75	Moth eating bats are higher in large and well-connected woodland patches with dense understorey cover. Accordingly a well-developed woodland understorey has been linked to the occurrence of moth eating bats (Fuentes-Montemayor et al, 2013)	1	0.8	0.9
WF21	Native species plantation	0.75				
WF22	Non-native species plantation	0.5				
WF3	Mixed plantation and semi-natural	0.75				
WF31	Mixed native species semi-natural with native species plantation	0.75				
WF32	Mixed native species semi-natural with non-native species plantation	0.75	Uniform stands of trees are poorer in invertebrates than more diversely structured woodland (Kirby, 1988)			
WF33	Mixed non-native species semi-natural with native species plantation	0.5				
WF34	Mixed non-native species semi-natural with non-native species plantation	0.5				
WM0	Undetermined woodland management	1	Trees in unmanaged woodland are preferred over open woodland and parkland (Russo <i>et al</i> , 2004)			
WM1	High forest	1				
WM2	Coppice with standards	0.5				
WM3	Pure coppice	0.5	Where coppicing is necessary it should be carried out in small patches (Greenaway, 2004)			
WM4	Abandoned coppice	0.75				
WM5	Wood-pasture and parkland	0.75				
WM51	Currently managed wood pasture/parkland	0.75				
WM52	Relic wood pasture/parkland	0.75				
WM6	Pollarded woodland	0.5				
WM7	Unmanaged woodland	1				
WMZ	Other woodland management	1				
WG0	Unidentified woodland clearing	1				
WG1	Herbaceous woodland clearing	1				
WG2	Recently felled/coppiced woodland clearing	0.5				
WG3	Woodland ride	1				
WG4	Recently planted trees	0.25				
WGZ	Other woodland clearings/openings	1				
GA0	Acid grassland	4		0.8	0.7	0.5
GAZ	Upland acid grassland	0				
GC0	Calcareous grassland	4				
GC1	Lowland calcareous grassland	4	The vast majority (over 90%) of insects found near hedges do not			

Code	Label	HSI	Notes	ZE	BI	GR
GC2	Upland calcareous grassland	1	originate in the hedge but come from other habitats brought in on the wind (BCT, 2003)			
GN0	Neutral grassland	4				
GN1	Lowland meadows	4				
GI0	Improved grassland	2				
GP0	Grassland, probably improved	2				
GU0	Grassland, possibly unimproved	3				
SC0	Scrub	1				
SC1	Dense/continuous scrub	1		0.5	0.2	0.3
SC2	Open/scattered scrub	1				
SC21	Open/scattered scrub: native shrubs	1		0.7	0.4	0.5
SC22	Open/scattered scrub: introduced shrubs	1				
TS0	Scattered trees	1				
TS1	Scattered trees some veteran	1		0.8	0.7	0.5
TS11	Broadleaved	1				
TS12	Mixed	0.75				
TS13	Coniferous	0				
TS2	Scattered trees none veteran	0				
TS21	Broadleaved	0				
TS22	Mixed	0				
TS23	Coniferous	0				
PA0	Patchy bracken	0				
PA3	Scattered bracken	0				
OT0	Tall herb and fern (excluding bracken)	0				
OT2	Upland species-rich ledges	0				
OT3	Tall ruderal	0				
OT4	Non-ruderal	0				
OT41	Lemon-scented fern and Hard-fern vegetation (NVC U19)	0				
OT4Z	Other non-ruderal tall herb and fern	0				
OTZ	Other tall herb and fern	0				
HS0	Ephemeral/short perennial herb	0				
BG1	Bare ground	0				
GM0	Undetermined grassland etc. management	1				
GM1	Grazed	0.7	Butterflies and other arthropods are negatively affected by moderate and high levels of cattle grazing (Ekroos, J., Heliola, J. & Kuussaari, M. 2010. Homogenization of lepidopteron communities in intensively cultivated agricultural landscapes. <i>Journal of Applied Ecology</i> , 2010, 47, 459 - 467			
GM11	Cattle grazed	0.7				
GM12	Sheep grazed	0.5				
GM13	Horse grazed	0.6				
GM14	Mixed grazing	0.5				
GM1Z	Other grazing	0.6				
GM2	Mown	0.3				
GM21	Silage	0.2	Hay cutting has great effect on biomass suddenly altering local insect availability at a very susceptible time of year for pregnant bats (Greenaway, 2004)			
GM22	Hay	0.3				
GM23	Frequent mowing	0				
GM2Z	Other mowing regime	0.2				
GM3	Hay and aftermath grazing	0.2				
GM4	Unmanaged	1				
GM5	Burning/swaling	0				
GMZ	Other grassland etc. management	1				
GL1	Amenity grassland	0.2				
GL11	Golf course	0.5				
GL12	Urban parks, playing and sports fields	0.1				
GL1Z	Other amenity grassland	0.1				

Code	Label	HSI	Notes	ZE	BI	GR	
GL2	Non-amenity grassland	1					
GL21	Permanent agricultural grassland	1					
GL211	Arable reversion grassland	1					
GL2111	Species-rich conservation grassland	1					
GL211Z	Other arable reversion grassland	1					
GL21Z	Other permanent agricultural grassland	1					
GL2Z	Other grassland use	1					
CL3	Unintensively managed orchards	1					
CL31	Traditional orchards	1					
CL32	Defunct orchards	1					
CL3Z	Other unintensively managed orchards	1					
CF1	Coastal and floodplain grazing marsh	1					
BR0	Bracken	3					
HE0	Dwarf shrub heath	1	Zeale (2009) found that Barbastelle bats avoided upland moors although they support unimproved habitat are highly exposed with colder temperatures and stronger winds likely to reduce insect abundance and the energetic costs of flight.				
HE1	European dry heaths	1					
HE2	Wet heaths	1					
HE21	Northern Atlantic wet heaths with Erica tetralix	NP					
HE22	Temperate Atlantic wet heaths with Erica ciliaris and Erica tetralix	NP					
HE2Z	Other wet heaths	1					However, Billington (2002) found Barbastelle using moorland edge
HE3	Lichen/Bryophyte heath	NP					
HEZ	Other dwarf shrub heath	1					
HL1	Lowland Heathland	1					
HU1	Upland Heathland	0					
EO0	Bog	2					
EO1	Blanket bog [=Blanket bogs (AN1)]	NP					
EO2	Lowland raised bog	NP					
EO21	Degraded raised bogs still capable of natural regeneration	NP					
EO22	Active raised bogs	NP					
EO2Z	Other lowland raised bogs	NP					
EOZ	Other bogs	NP					
EM0	Fen, marsh and swamp	2					
EM1	Swamp	2					
EM11	Reedbeds	3					
EM12	Calcareous fens with Cladium mariscus and species of the Carex davallianae	NP					
EM1Z	Other swamp vegetation	2					
EM2	Marginal and inundation vegetation	1					
EM21	Marginal vegetation	2					
EM22	Inundation vegetation	0					
EM3	Fens	2					
EM31	Fens [and flushes - lowland]	2					
EM311	Calcareous fens with Cladium mariscus and species of the Carex davallianae	NP					
EM312	Springs	2					
EM3121	Petrifying springs with tufa formation [Cratoneurion]	NP					
EM312Z	Other springs	2					
EM313	Alkaline fens [lowland]	2					
EM31Z	Other lowland fens	2					
EM32	Upland flushes and fens	1					
EM322	Alkaline fens [upland]	NP					

Code	Label	HSI	Notes	ZE	BI	GR
EM323	Transition mires and quaking bogs [upland]	NP				
EM32Z	Other upland flushes and fens	1				
EM3Z	Other fens, transition mires, springs and flushes	1				
EM4	Purple moor grass and rush pastures [Molinia-Juncus]	3				
EM41	Molinia meadows on calcareous, peaty or clayey-silt-laden soils [Molinia caeruleae]	3				
EM4Z	Other purple moor grass and rush pastures [Molinia-Juncus]	3				
AS0	Standing open water and canals	3	<p>Riparian vegetation is the most used habitat by Barbastelle bats in a study on Dartmoor (Zeale, 2009). However, open water was the least selected habitat. The report also stated that it is the riparian vegetation rather than the water that is important to foraging Barbastelle bats, although the secondary importance of water in supporting riparian vegetation should be noted.</p> <p>In SW Germany have been observed to forage above water in a similar way to Daubenton's (Boye & Dietz, 2005) Surveys at Hinkley LWS recorded intensive activity above pond (EDP, 2010)</p> <p>Barbastelle bats' foraging paths are generally within 200 metres of water features (Greenaway, 2008)</p> <p>An ideal example of breeding colony of Barbastelle bats in the distant past would be of a small river catchment with dense woodland on its headwaters and wooded valleys leading to a wide zone of water meadows and finally reed beds and sand dunes before reaching the sea. The colony's territorial boundary would be the catchment area. In modified landscapes colony territories are difficult to define as now they often have unnatural access to new foraging possibilities in adjacent catchments - through plantations for example. (Greenaway, 2004)</p>	0.2	0.6	0.8
AS1	Dystrophic standing water	2				
AS11	Natural dystrophic lakes and ponds	1				
AS1Z	Other dystrophic standing water	2				
AS2	Oligotrophic standing waters	1				
AS21	Oligotrophic lakes	1				
AS211	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	1				
AS212	Oligotrophic to mesotrophic standing waters with vegetation of the littorella uniflorae and/or the Isoeto-nanojuncetea	1				
AS21Z	Other oligotrophic lakes	1				
AS2Z	Other oligotrophic standing waters	2				
AS3	Mesotrophic standing waters	3				
AS31	Mesotrophic lakes	1				
AS311	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	1				
AS312	Oligotrophic to mesotrophic standing waters with vegetation of the littorella uniflorae and/or the Isoeto-nanojuncetea	1				
AS31Z	Other mesotrophic lakes	1				
AS3Z	Other mesotrophic standing waters	3				
AS4	Eutrophic standing waters	4				
AS41	Eutrophic standing waters	1				
AS411	Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation	1				
AS41Z	Other eutrophic standing waters	1				
AS4Z	Other eutrophic standing waters	4				
AS5	Marl standing water	3				
AS6	Brackish standing water with no sea connection	0				
AS7	Aquifer fed naturally fluctuating water bodies	1				
ASZ	Other standing open water and canals	4				
AC0	Channel of unknown origin	1				
AC1	Artificial channels	1				
AC11	Drains, rhynes and ditches	1				
AC111	Species-rich drains, rhynes and ditches	1				
AC11Z	Other drains, rhynes and ditches	1				
AC12	Artificially modified channels	1				
AC13	New artificial channels	0.1				
AC14	Canals	0.75				
AC1Z	Other artificial channels	0.5				
AC2	Natural/naturalistic channels	1				
AO0	Open water of unknown origin	1				
AO1	Artificial open water	1				
AO11	Reservoir	0.5				
AO12	Gravel pits, quarry pools, mine pools and marl pits	0.75				

Code	Label	HSI	Notes	ZE	BI	GR
AO13	Industrial lagoon	0				
AO14	Scrape	1				
AO15	Moat	1				
AO16	Ornamental	0.25				
AO1Z	Other artificial open water	0.25				
AO2	Natural open water	1				
AP1	Pond	1				
AP11	Ponds of high ecological quality	1				
AP1Z	Other pond	0.8				
AP2	Small lake	1				
AP3	Large lake	1				
LT1	Canal-side	1				
LT11	Canal-side with woodland	1				
LT12	Canal-side with scrub or hedgerow and standard trees	1				
LT13	Canal-side with scrub or hedgerow	1				
LT14	Canal-side with layered vegetation	1				
LT15	Canal-side with grassland	0.5				
LT16	Canal-side with damaged banks	0.2				
LT17	Canal-side with constructed banks	0.1				
LT18	Other canal-side type	0.5				
AR0	Rivers and streams	6		0.8	0.9	1
AR1	Headwaters	6				
AR11	Chalk headwaters	6				
AR1111	Tufa streams (Ranunculion fluitantis)	6				
AR111Z	Non-tufa Ranunculion fluitantis headwaters	6				
AR112	Other tufa streams	6				
AR11Z	Other chalk headwaters	6				
AR12	Active shingle rivers [headwaters]	6				
AR1Z	Other headwaters	6				
AR2	Chalk rivers (not including chalk headwaters)	6				
AR2Z	Other chalk rivers	6				
AR3	Active shingle rivers [non headwaters]	6				
ARZ	Other rivers and streams	6				
LT2	River-side	1	Zeale (2009) found a preference for foraging in riparian vegetation followed by broadleaved woodland			
LT21	River-side with woodland	1				
LT22	River-side with scrub or hedgerow and standard trees	1				
LT23	River-side with scrub or hedgerow	1				
LT24	River-side with layered vegetation	1				
LT25	River-side with grassland	0.5				
LT26	River-sdie with vertical banks	1				
LT27	River-side with damaged banks	0.2				
LT28	River-side with constructed banks	0				
LT29	Other river-side type	0.5				
CR0	Arable and horticulture	1	Avoids arable habitats (Zeale, 2009)			
CR1	Grass and grass-clover leys	1				
CR2	Cereal crops	1				
CR3	Non-cereal crops including woody crops	1				
CR31	Intensively managed orchards	1				
CR32	Withy beds	1				
CR33	Vineyards	1				

Code	Label	HSI	Notes	ZE	BI	GR
CR34	Game crops	1				
CR35	Miscanthus	0				
CR3Z	Other non-cereal crops including woody crops	1				
CR4	Freshly ploughed	0				
CR5	Whole field fallow	2				
CR6	Arable headland or uncultivated strip	5				
CR61	Arable field margins	5				
CR6Z	Other arable headland or uncultivated strip	5				
CR7	Freshly harvested/stubble	0				
CRZ	Other arable and horticulture	0				
CL1	Agriculture	1				
CL11	Organic agriculture	1				
CL12	Non-organic agriculture	0.75				
CL2	Market garden and horticulture	0				
CL21	Organic market garden and horticulture	0				
CL22	Non-organic market garden and horticulture	0				
CL4	Intensively managed vineyards	0				
CL4Z	Non-intensively managed vineyards	1				
CL5	Cereal crops managed for wildlife	1				
CL5Z	Cereal crops not managed for wildlife	0.5				
RE0	Inland rock	0				
RE1	Natural rock exposure features	0				
RE2	Artificial rock exposures and waste	0				
PI0	Post -industrial habitats	0				
PI1	Calaminarian grasslands of the Violetalia Calaminariae	0				
PIZ	Other rock outcrops and mine spoil rich in heavy metals	0				
PC0	Post-industrial sites	0				
PC1	Post-industrial sites of high nature conservation value	0				
PC2	Post-industrial sites of low nature conservation value	0				
LF0	Boundary and linear features	5				
LF1	Hedges / Line of trees	5				
LF11	Hedgerows	5				
LF111	Important hedgerows	5		0.9	0.8	1
LF11Z	Non-important hedgerows	4		0.4	0.6	0.8
LF12	Line of trees	5				
LF1Z	Other hedges/line of trees	4				
LF2	Other boundaries and linear features	2				
LF21	Line of trees (not originally intended to be stock proof)	5				
LF22	Bank	0				
LF23	Wall	1				
LF24	Dry ditch	1				
LF25	Grass strip	1				
LF26	Fence	0				
LF27	Transport corridors	1				
LF271	Transport corridor without associated verges	0				
LF272	Transport corridor associated verges only	1				
LF273	Transport corridor with natural land surface	2				
LH1	Intact hedge	1				
LH2	Defunct hedge	1				

Code	Label	HSI	Notes	ZE	BI	GR
LH3	Recently planted hedge	0.25	Cut hedge is specified where height is below 2 metres Uncut hedge is specified where the hedge is between 2 and metres high Overgrown hedge is considered to be over 3 metres high			
LM1	Cut hedge	0.3				
LM11	Cut hedge with standards	0.3				
LM12	Cut hedge without standards	0.2				
LM2	Uncut hedge	0.9				
LM21	Uncut hedge with standards	0.9				
LM22	Uncut hedge without standards	0.8				
LM3	Overgrown hedge	1				
LM31	Overgrown hedge with standards	1				
LM32	Overgrown hedge without standards	1				
LT3	Rail-side	1				
LT4	Road-side	1				
LT5	Path- and track-side	1				
LTZ	Other transport corridor verges, embankments and cuttings	1				
UL1	Railway	0				
UL2	Roadway	0				
UL3	Path and trackway	1				
ULZ	Other transport corridor	0.25				
UR0	Built-up areas and gardens	1	Avoids urban areas (Zeale, 2009)			
UA1	Agricultural	0				
UA2	Industrial/commercial	0	Buildings behind shutters and cladding are occasionally used for roosting (Boye & Dietz, 2005)			
UA3	Domestic	0.1				
UA31	Housing/domestic outbuildings	0.1				
UA32	Gardens	0.1				
UA33	Allotments	0.1				
UA34	Caravan park	0				
UA3Z	Other domestic	0				
UA4	Public amenity	0				
UA41	Churchyards and cemeteries	1				
UA4Z	Other public amenity	0.2				
UA5	Historical built environment	0				
UAZ	Other extended built environment	0				
OV0	Unknown terrestrial vegetation	1				
OV1	Other unknown terrestrial vegetation, possibly wetland	2	Gorse is an important habitat (Billington, 2000)			
OV2	Undetermined gorse	5				
OV3	Undetermined young woodland	2				
OVZ	Other unknown terrestrial vegetation	1				
SR0	Supralittoral Rock	0				
SR1	Vegetated maritime cliff and slopes	3				
SR11	Vegetated sea cliffs of the Atlantic and Baltic coasts	3				
SR1Z	Other vegetated cliffs and lichen dominated cliffs	3				
SR2	Boulders and rock above the high tide mark	0				
SRZ	Other Supralittoral rock	0				
MC1	Maritime cliff and slopes	1				
SS0	Supralittoral Sediment	0				
SS1	Coastal sand dunes	2		Three colonies have been recorded using dunes (Greenway, 2004)		
SS11	Embryonic shifting dunes	1				
SS14	Decalcified fixed dunes	2				
SS17	Humid dune slacks	2				

Code	Label	HSI	Notes	ZE	BI	GR
SS1Z	Other sand dunes	1				
SS3	Shingle above high tide mark	0				
SS31	Coastal vegetated shingle	1				
SS312	Annual vegetation of drift lines	0				
SS3Z	Other shingle above high tide mark	0				
SS4	Strandline vegetation	1				
SSZ	Other supralittoral sediment	0				
LS0	Littoral Sediment	0				
LS3	Coastal saltmarsh	2	Feeds over saltmarsh (Billington, 2000)			
LS3Z	Other saltmarsh	2				
ES1	Estuary	1	Will cross an estuary 500 metre wide (Zeale,2009)			

Appendix 3: Risk Factors for Restoring or Recreating Different Habitats

N.B.: These assignments are meant purely as an indicative guide. The starting position with regard to substrate, nutrient levels, state of existing habitat, etc. will have a major impact in the actual risk factor. Final assessments of risk may need to take other factors into account.

Habitats	Technical difficulty of recreating	Technical difficulty of restoration
Arable Field Margins	Low	n/a
Coastal and Floodplain Grazing Marsh	Low	Low
Eutrophic Standing Waters	Medium	Medium
Hedgerows	Low	Low
Lowland Beech and Yew Woodland	Medium	Low
Lowland Calcareous Grassland	Medium	Low
Lowland Dry Acid Grassland	Medium	Low
Lowland Meadows	Medium	Low
Lowland Mixed Deciduous Woodland	Medium	Low
Open Mosaic Habitats on Previously Developed Land	Low	Low
Ponds	Low	Low
Wood-Pasture & Parkland	Medium	Low

Appendix 4: Feasibility and Timescales of Restoring: examples from Europe

Ecosystem type	Timescale	Notes
Temporary pools	1-5 years	Even when rehabilitated, may never support all pre-existing organisms.
Eutrophic ponds	1-5 years	Rehabilitation possible provided adequate water supply. Readily colonised by water beetles and dragonflies but fauna restricted to those with limited specialisations.
Mudflats	1-10 years	Restoration dependent upon position in tidal frame and sediment supply. Ecosystem services: flood regulation, sedimentation.
Eutrophic grasslands	1-20 years	Dependent upon availability of propagules. Ecosystem services: carbon sequestration, erosion regulation and grazing for domestic livestock and other animals.
Reedbeds	10-100 years	Will readily develop under appropriate hydrological conditions. Ecosystem services: stabilisation of sedimentation, hydrological processes.
Saltmarshes	10-100 years	Dependent upon availability of propagules, position in tidal frame and sediment supply. Ecosystem services: coastal protection, flood control.
Oligotrophic grasslands	20-100 years +	Dependent upon availability of propagules and limitation of nutrient input. Ecosystem services: carbon sequestration, erosion regulation.
Chalk grasslands	50-100 years +	Dependent upon availability of propagules and limitation of nutrient input. Ecosystem services: carbon sequestration, erosion regulation.
Yellow dunes	50-100 years +	Dependent upon sediment supply and availability of propagules. More likely to be restored than re-created. Main ecosystem service: coastal protection.
Heathlands	50-100 years +	Dependent upon nutrient loading, soil structure and availability of propagules. No certainty that vertebrate and invertebrate assemblages will arrive without assistance. More likely to be restored than re-created. Main ecosystem services: carbon sequestration, recreation.
Grey dunes and dune slacks	100-500 years	Potentially restorable, but in long time frames and depending on intensity of disturbance. Main ecosystem service: coastal protection, water purification.
Ancient woodlands	500 – 2000 years	No certainty of success if ecosystem function is sought – dependent upon soil chemistry and mycology plus availability of propagules. Restoration is possibility for plant assemblages and ecosystem services (water regulation, carbon sequestration, erosion control) but questionable for rarer invertebrates.
Blanket/Raised bogs	1,000 – 5,000 years	Probably impossible to restore quickly but will gradually reform themselves over millennia if given the chance. Main ecosystem service: carbon sequestration.
Limestone pavements	10,000 years	Impossible to restore quickly but will reform over many millennia if a glaciation occurs.

Appendix 5: Example of HEP Calculation

The following table gives an example of the HEP calculation for a complex site which straddles two Consideration Zone bands.

Field No	Habitat	Primary Habitat		Matrix		Formation		Management / Land use		HSI Score	Density Band Score	Hectares	Habitat Units	Notes
		Code	Score	Code	Score	Code	Score	Code	Score					
F1	Miscanthus	CR35	0		0		1.00	CL12	1.00	0	2	4.975	0.00	
P2	Pond	AS0	3		0	AP1	1.00		1.00	3.00	2	0.053	0.32	
F3	Maize (Cereal crops, non-organic)	CR2	1		0		1.00	CL12	0.75	0.75	2	0.034	0.05	
F4	Mixed woodland, Mixed plantation and semi natural, high forest	WB1	4		0	WF3	0.75	WM1	1.00	3.00	2	0.362	2.17	
F5	Improved grassland, Frequent mowing (Other amenity)	GI0	2		0		1.00	GM23	0.00	0.00	2	0.344	0.00	
F6	Mixed woodland, Mixed plantation and semi natural, high forest	WB1	4		0	WF3	0.75	WM1	1.00	3.00	2	0.362	2.17	
F7	Built-up Areas and Gardens, gardens	UR0	1		0		1.00	UA32	0.00	0.00	2	0.2	0.00	
F8	Arable (wheat & barley)	CR2	1		0		1.00	CL12	0.75	0.75	2	0.086	0.13	
F9	Arable (type not stated)	CR0	1		0		1.00	CL12	0.75	0.75	2	0.154	0.23	
F10	Improved grassland; Hay Aftermath Grazing	GI0	2		0		1.00	GM3	0.20	0.40	2	3.484	2.79	
F11	Improved grassland, Silage	GI0	2		0		1.00	GM21	0.20	0.40	2	0.833	0.67	
F12	Built-up Areas and Gardens, scattered trees	UR0	1	TS0	1		1.00	UA32	0.00	0.00	1	2.844	0.00	
F13	Mixed Woodland Plantation	WB1	4		0	WF3	0.75		1.00	3.00	1	1.214	3.64	
F14	Cereal Crops, Bare Ground	CR2	1	BG1	0		1.00	CL1	1.00	1.00	1	0.642	0.64	
H1	Hedgerow, overgrown without standards	LF11	5		0		1.00	LM32	1.00	5.00	2	0.149	1.49	
H2	Hedgerow, cut without standards	LF11	5		0		1.00	LM12	0.20	1.00	2	0.58	1.16	
H3	Line of trees	LF21	5		0		1.00		1.00	5.00	2	0.203	2.03	
H4	Hedgerow, uncut without standards	LF11	5		0		1.00	LM22	0.80	4.00	2	0.04	0.32	
H5	Hedgerow, uncut with	LF11	5		0		1.00	LM21	0.90	4.50	2	0.02	0.18	

Field No	Habitat	Primary Habitat		Matrix		Formation		Management / Land use		HSI Score	Density Band Score	Hectares	Habitat Units	Notes
		Code	Score	Code	Score	Code	Score	Code	Score					
	standards													
H6	Hedgerow, cut without standards	LF11	5		0		1.00	LM12	0.20	1.00	2	0.07	0.14	
H7	Hedgerow, uncut without standards	LF11	5		0		1.00	LM22	0.80	4.00	1	0.02	0.08	
H8	Hedgerow, cut without standards	LF11	5		0		1.00	LM12	0.20	1.00	1	0.01	0.01	
												16.679	18.22	
(Habitat required, e.g. Long sward species rich grassland)											Delivery Risk		1.5	
(Habitat required, e.g. Long sward species rich grassland)											Temporal Risk		1.2	
											Habitat Units		32.80	
											Hectares Required		1.82	

Hestercombe House

Special Area of Conservation (SAC)

Guidance on Development

Version 2.2 – May 2019



**Somerset West
and Taunton**

Sedgemoor
IN SOMERSET





This guidance was prepared by Larry Burrows, Ecologist, Somerset Ecology Services, Planning Control, Somerset County Council working in partnership with North Somerset Council and Natural England

Acknowledgements

I wish to thank the following for their input into the development of the guidelines for the North Somerset and Mendip Bats SAC on which the Hestercombe House SAC has been formulated to provide a standard guidance across the county of Somerset:

Henry Andrews, Andrews Ecology
Phil Anelay, North Somerset Council
Geoff Billington, Greena Ecological Consultants
Alistair Campbell, EAD Ecology
Tom Clarkson, Clarkson Woods Ecologists
Jan Collins, Bat Conservation Trust
Matt Cowley, EAD Ecology
Sarah Forsyth, North Somerset Council
Amanda Grundy, Natural England
Laura Horner, Somerset County Council
Alison Howell, Natural England
John Mellor, FPCR Environment and Design Ltd
Susan Stangroom, North Somerset Council
Simon Stonehouse, Natural England
Carol Williams, Bat Conservation Trust
Roger Willmot, North Somerset Council
Gareth Withers, North Somerset Council

For data: Somerset Environmental Records Centre; Radio tracking reports by Greena Ecological Consultants; Kestrel Wildlife Consultants various reports from Council websites

Cover Photo: **Lesser Horseshoe Bat**, Frank Greenaway. Courtesy Vincent Wildlife Trust
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HESTERCOMBE HOUSE SPECIAL AREA OF CONSERVATION (SAC): GUIDANCE ON DEVELOPMENT

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PART A

Non-technical guidance

1. Who is the guidance aimed at and why?

- 1.1 This advice is aimed at developers, consultants, and planners involved in planning and assessing development proposals in the landscapes surrounding the Hestercombe House SAC.
- 1.2 The overall aim is for a clearer approach to considering impacts of development on the SAC. The guidance provides a consistent basis for understanding how rare horseshoe bats use the landscape and where there is likely to be greater risk or opportunity for development. This will help inform strategic planning for the area's future housing needs.
- 1.3 The guidance will comprise a component of the development management process, to be considered in line with relevant policies, such as policy DP8 (Environment) of the Taunton Deane Adopted Core Strategy 2011 - 2028; policies TAU2 and TAU3 of the Taunton Deane Adopted Site Allocations and Development Management Plan; Policy D15 (Bat Consultation Zone) of the Sedgemoor District Council Local Plan; Policy DM2: Biodiversity and geodiversity of the Somerset County Council Minerals Plan; and Policy DM3: Impacts on the environment and local communities of the Somerset County Council Waste Core Strategy
- 1.4 At project level the guidance will help identify key issues at pre-application stage that can inform the location and sensitive design of development proposals and minimise delays and uncertainty. Within the areas identified, there will be clear requirements for survey information and a strong emphasis on retaining and enhancing key habitat for bats and effective mitigation where required. This will demonstrate that development proposals avoid harm to the designated bat populations and support them where possible.
- 1.5 The guidance explains how development activities can impact the SAC and the steps required to avoid or mitigate any impacts. It applies to development proposals that could affect the SAC and trigger the requirements of the Habitats Regulations (see Annex 7). The local planning authority will consider, on the basis of evidence available, whether proposals (planning applications) are likely to impact on horseshoe bats and hence require screening for Habitats Regulations Assessment (HRA). Those are the proposals to which the guidance will be applied. This will reduce the likelihood that it would be applied to minor developments which would not have an impact on the SAC.

- 1.6 The guidance brings together best practice and learning from areas with similar approaches, such as Somerset County Council and South Hams, and the best scientific information available at the time of writing. It will be kept under review by Somerset West and Taunton Council, Somerset County Council and their partners and is fully endorsed by Natural England. The planning guidance is part of a wider approach that is being pursued by partner organisations to safeguard and improve habitat for rare bats that includes farm management. The guidance is also consistent with Natural England's Site Improvement Plan for the SAC.

2. What is the Bats SAC?

- 2.1 Special Areas of Conservation (SAC) are European sites of international importance for wildlife. The SAC is important for Lesser Horseshoe bats. The SAC itself comprises the component Hestercombe House Site of Special Scientific Interest.
- 2.2 However the landscapes around the SACs themselves are also important in providing foraging habitat needed to maintain the favourable conservation status of Lesser Horseshoe bats. This is termed Functionally Linked Land. Therefore, the guidance sets out strong requirements for consultation, survey information and appropriate mitigation, to demonstrate that development proposals will not adversely impact on the designated bat populations.

3. Bat Consultation Zone

- 3.1 The guidance also identifies the "Bat Consultation Zone" where horseshoe bats may be found, divided into bands A, B and C, reflecting the likely importance of the habitat for the bats and proximity to maternity and other roosts.
- 3.2 Within the Consultation Zone development is likely to be subject to particular requirements, depending on the sensitivity of the site.

4. Juvenile Sustenance Zones

- 4.1 It is considered that mature woodland within 600 metres (m) of a Lesser Horseshoe bat maternity roost is also sensitive as the habitat is likely to be used by juveniles. New build developments should avoid the loss of such woodland and connecting habitat between the maternity roost and woodland.

5. Need for early consultation

- 5.1 Section 3 of Part B of the guidance stresses the need for pre-application consultation for development proposals.
- 5.2 Within bands A or B of the Consultation Zone, proposals with the potential to affect features important to bats (identified in Section B paragraph 3.2 below)

should be discussed with the local authority and/or Natural England as necessary.

- 5.3 Within band C developers should take advice from their consultant ecologist.

6. Survey requirements

- 6.1 Section 3 of Part B and Annex 3 of the guidance sets out the survey requirements normally applying to development proposals within the Bat Consultation Zone. Outside the Bat Consultation Zone development proposals may still have impacts on bats, and developers should have regard to best practice guidelines, such as Bat Conservation Trust survey guidelines and [Natural England's Standing Advice for Bats](#).
- 6.2 For proposals within the Consultation Zone (all Bands), developers must employ a consultant ecologist at an early stage to identify and assess any impacts.
- 6.3 For proposals within bands A and B of the Bat Consultation Zone, full season surveys will be needed (unless minor impacts can be demonstrated), and must include automated bat detector surveys. Survey results are crucial for understanding how bats use the site, and therefore how impacts on horseshoe bats can be avoided, minimised or mitigated. Where mitigation is needed the survey results will inform the metric for calculating the amount of habitat needed (see Annex 5).
- 6.4 Within band C survey effort required will depend on whether a commuting structure is present and the suitability of the adjacent habitat to support prey species hunted by horseshoe bats.

7. Proposed developments with minor impacts

- 7.1 In some circumstances a developer may be able to clearly demonstrate (from their qualified ecologist's site visit and report) that the impacts of a proposed development are proven to be minor and can be avoided or mitigated (or do not require mitigation) without an impact on SAC bat habitat, so a full season's survey is not needed. This should be substantiated in a suitably robust statement submitted as part of the development proposals.

8. Need for mitigation, possibly including provision of replacement habitat

- 8.1 Within the Bat Consultation Zone (all Bands), where SAC bats could be adversely affected by development appropriate mitigation will be required.
- 8.2 Development proposals should seek to retain and enhance existing habitats and / or features of value to bats such as those listed in paragraph 3.2 of Part B in this guidance. Where this is not, or is only partially possible appropriate mitigation such as the provision of replacement habitat will be required. The

council's ecologist will have regard to relevant considerations in determining the mitigation requirements, including survey results and calculations relating to quantity of replacement habitat. Annex 5 sets out the methodology and metric for calculating how much replacement habitat should be provided¹.

- 8.3 Any replacement habitat must be accessible to the Hestercombe Lesser Horseshoe bat population.
- 8.4 Where the replacement provision is to be made on land off-site (outside the red line development boundary for the planning application) any existing value of that land as bat habitat will also have to be factored in to the calculation.
- 8.5 Where the replacement provision is to be off site, and land in a different ownership is involved, legal agreements are likely to be needed to ensure that the mitigation is secured in perpetuity.
- 8.6 An Ecological Management Plan for the site must be provided setting out how the site will be managed for SAC bats in perpetuity.
- 8.7 Where appropriate a Monitoring Strategy must also be provided to ensure continued use of the site by SAC bats and include measures to rectify the situation if negative results occur.

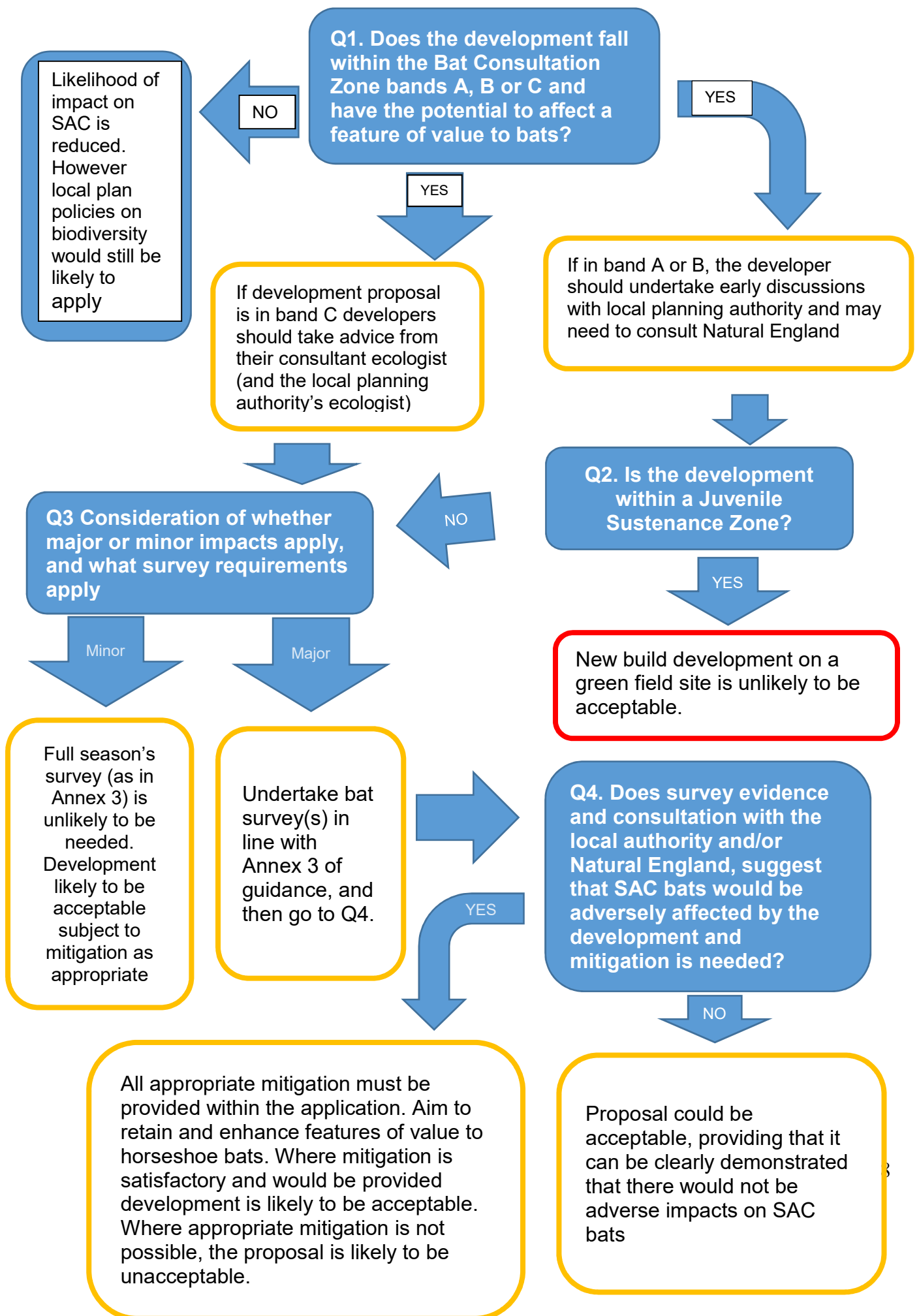
9. Enhancement

- 9.1 Development will be expected to provide enhancement for horseshoe bats. The National Planning Policy Framework (July 2018)² states that '*Planning... decisions should contribute to and enhance the natural... environment by... providing net gains for biodiversity...*' It is expected that development sites would provide a greater quantum of habitat in value than that lost due to the built development and associated infrastructure.
- 9.2 An example of the Excel worksheets used in calculating the quantum of replacement habitat required is given in Appendix 5 with a box showing the amount gained or lost due to a proposed development. It is expected that a percentage gain will be defined by Defra in due course.

¹ In the Somerset County area developers may ask the Local Planning Authority to carry out the calculation for the amount of habitat required to replace the value of that lost to horseshoe bats prior to the application being submitted, to check that the proposed master plan for the site has adequate land dedicated to the purpose. A charge may be levied for this service.

²

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740441/National_Planning_Policy_Framework_web_accessible_version.pdf



PART B

Technical Guidance

1. Introduction

- 1.1 The Hestercombe House SAC is designated under the Habitats Directive 92/43/EEC, which is transposed into UK law under the Conservation of Habitats and Species Regulations 2017 ('Habitat Regulations'). This means that the populations of bats supported by this site are of international importance and therefore afforded high levels of protection, placing significant legal duties on decision-makers to prevent damage to bat roosts, feeding areas and the routes used by bats to travel between these locations.
- 1.2 The primary reason for designation of the SAC is the Annex II species, the Lesser Horseshoe bats *Rhinolophus hipposideros*
- 1.3 The Conservation Objectives for the SAC³ is: With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' which include the bat species listed above), and subject to natural change, ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:
 - The extent and distribution of habitats of the qualifying species;
 - The structure and function of the habitats of qualifying species;
 - The supporting processes on which the habitats of qualifying species rely;
 - The populations of qualifying species; and,
 - The distribution of qualifying species within the site.
- 1.4 Therefore, planners and prospective developers need to be aware that the habitats and features which support the population of Lesser Horseshoe bats outside the designated site are a material consideration in ensuring the integrity of the designated site.
- 1.5 The purpose of this advice is not to duplicate or override existing legal requirements for protected bat species or their roosts. These aspects are well governed by the Natural England licensing procedures (Wildlife Management and Licensing Unit) for protected species.

³ <http://publications.naturalengland.org.uk/publication/5039159320248320>

- 1.6 This document should serve as an evidence base and provide guidance on the planning implications for development control in the relevant local planning authority (LPA). There are opportunities beyond the scope of this document to use this evidence base to inform the preparation of land use plans through the local plans.
- 1.7 This advice is aimed at applicants, agents, consultants and planners involved in producing and assessing development proposals in the landscapes surrounding the Hestercombe House SAC. Within these areas there will be a strong requirement for survey information and mitigation for bats and their habitat in order to demonstrate that development proposals will not impact on the designated Lesser Horseshoe bat population.
- 1.8 The guidance explains how development activities can impact the SAC and the steps required to avoid or mitigate any impacts. It applies to development proposals that could affect the Hestercombe House SAC and trigger the requirements of the Habitats Regulations (see Annex 7). The local planning authority will consider, on the basis of evidence available, whether proposals (planning applications) are likely to impact on Lesser Horseshoe bats and hence require screening for Habitats Regulations Assessment (HRA). Those are the proposals to which the guidance will be applied. This will reduce the likelihood that it would be applied to minor developments which would not have an impact on the SAC.
- 1.9 An important objective of the advice is to identify areas in which development proposals might impact on the designated populations at an early stage of the planning process, in order to inform sensitive siting and design, and to avoid unnecessary delays to project plans by raising potential issues at the outset.
- 1.10 This technical guidance is based on the advice from experts and ecological consultants⁴, current best practice and the best scientific information available at the time of writing. It will be kept under review by Somerset West and Taunton Council, Somerset County Council and Natural England.

2. Sensitive Zones for Lesser Horseshoe Bats

Introduction

- 2.1 To facilitate decision making and in order to provide key information for potential developers at an early stage, using the best available data a Bat Consultation Zone (See Plans 1 below) have been identified. This is based on an accumulation of known data, beginning with the on-going Somerset Bat Group monitoring of the Hestercombe House from the 1990s and including radio tracking studies of the Lesser Horseshoe bat maternity roost.⁵ The data is constantly being added to and updated. Therefore, the

⁴ See acknowledgements

⁵ Billington, G. 2005. *Radio tracking study of Lesser Horseshoe bats at Hestercombe House Site of Special Scientific Interest, July 2005*. English Nature Somerset & Gloucestershire Team; Duvergé, L. 2008. *Report on bat surveys carried out at Hestercombe House SSSI Taunton, Somerset, in 2007 and 2008*. Cullompton: Kestrel Wildlife Consultants.

Plan reflect the current understanding of key roosts and habitat associated with the SAC.

Bat Consultation Zone (orange, yellow and pale yellow shading on Plan 1 below)

- 2.2 The Bat Consultation Zone illustrates the geographic area where horseshoe bats may be found. It is divided into three bands, A, B and C, reflecting the density at which horseshoe species may be found at a distance from a roost site. The basis for these distances is set out in Annex 2 and is based on the distances recorded through radio tracking studies at Hestercombe House and research into densities of occurrence throughout the species range. Note that the radio tracking studies only recorded the movements of a small number of bats from the maternity roost and therefore it is likely that any area within the Bat Consultation Zone could be exploited by Lesser Horseshoe bats.

Table 1: Band Widths for Horseshoe Bats

Band	Lesser Horseshoe bat (metres)	
	Maternity Roost	Other Roost
A	0 - 600	
B	601 - 2500	0 - 300
C	2501 - 6000	301 - 1250

- 2.3 The banding within the Bat Consultation Zone is centred on the maternity roosts at Hestercombe House. A smaller band is formed around the subsidiary roost in West Monkton which occurs within the bands formed from the maternity roost. Bontadina et al (2002)⁶ recommended that a radius of 600 metres around a Lesser Horseshoe bat maternity roost should have special consideration. This area is particularly sensitive and new build development on green field sites should be avoided in this zone.
- 2.4 Band A is shown in orange shading; Band B in yellow; and Band C in pale yellow reflecting the decreasing density at which Lesser Horseshoe bats are likely to occur away from the home roost.

Horseshoe Bat ‘Juvenile Sustenance Zones’ (red and pink shading on Plan 2 below)

- 2.8 The Juvenile Sustenance Zone for Lesser Horseshoe bats includes all mature woodland within 600 metres of the maternity roost⁷. Juveniles select broadleaved woodland habitat⁸. It is highly unlikely that the biomass or shelter that such woodland provides can be replaced within development schemes. Consideration also needs to be given to connecting flight routes between the maternity roost and the woodlands.

⁶ Bontadina, F., Schofield, H. & Naef-Daenzer, B. 2002. Radio-tracking reveals that Lesser Horseshoe bats (*Rhinolophus hipposideros*) forage in woodland. *J. Zool. Lond.* (2002) 258, 281-290.

⁷ Bontadina et al recommends that conservation management should have special consideration within 600 metres of the roost. (Bontadina, F., Schofield, H. & Naef-Daenzer, B. 2002. Radio-tracking reveals that Lesser Horseshoe bats (*Rhinolophus hipposideros*) forage in woodland. *J. Zool. Lond.* (2002) 258, 281-290)

⁸ Knight, T. 2006. *The use of landscape features and habitats by the Lesser Horseshoe bat* (*Rhinolophus hipposideros*). PhD thesis. University of Bristol.

3. Consultation and Surveys

- 3.1 For development proposals within the Juvenile Sustenance Zone it is essential that Natural England and the Somerset West and Taunton planning authority are consulted at an early stage of the process, as it is unlikely that new build development on or adjacent to woodland or links between the maternity roost and woodland sites could be made acceptable, due to the critical nature of the area in supporting the SAC population.
- 3.2 Where a proposal within Bands A or B of the Consultation Zone has the potential to affect the features identified below, early discussions with the local planning authority (who will consult Natural England as necessary) are also essential.
- Known bat roost
 - On or adjacent to a Site of Special Scientific Interest (SSSI)
 - Linear features: hedgerows, tree lines, watercourses, stone walls, railway cuttings
 - Pasture, hay meadow, stream line, woodland, parkland, woodland edge
 - Wetland habitat: ponds, marsh, reedbed, rivers, streams, rhynes
 - Buildings or bridges, especially if these are not used or are undisturbed and particularly if there is a large void with potential access
 - Cellars, mines, ice houses, tunnels or other structures with voids which produce tunnel-like conditions
 - Development which introduces new lighting
 - New wind turbine proposals (in respect of displacement)⁹
- 3.3 Early discussion refers to pre application stage prior to submission of a planning application; and, essentially, *before* any Master Plan proposals are submitted or finalised. This will ensure that adequate survey data is obtained. Please note that early discussions will also help inform likely mitigation requirements, and ensure, for example, that proposals seek to retain and enhance key features and habitats, and that sufficient land can be allocated for such avoidance and/or mitigation measures as may be required. This should result in appropriate bespoke mitigation measures that are designed in at an appropriately early stage. A site lighting plan with existing (pre-development) night time lux levels should also be provided.
- 3.4 In Band C developers should take advice from their consultant ecologist and planners from their ecologist colleagues.
- 3.5 Failure to provide the necessary information in support of an application is likely to lead to delays in registration and determination, and the application may need to be withdrawn. If insufficient information is submitted to allow the local planning authority

⁹ Horseshoe bat casualties are very rare with only one Greater Horseshoe being recorded in Europe over the ten year period 2003 to 2013. (Eurobats. 2014. *Report of the Intercessional Working Group on Wind Turbines and Bat Populations*. EUROBATS.StC9-AC19.12)

to assess the application in accordance with the Habitats Regulations, the application is likely to be considered unacceptable.

- 3.6 For proposals within the Bat Consultation Zone (all Bands), an ecological consultant¹⁰ should be commissioned at an early stage to identify and assess any impacts the proposals may have.
- 3.7 Surveys should determine the use of the site by Lesser Horseshoe bats, whether the site is being used as a commuting route or contains hunting territories or both. Survey results inform the metric for calculating the amount of replacement habitat required in the methodology set out in Annex 5. Consideration should be given to the site within the wider landscape.
- 3.8 Surveys should be carried out in accordance with the Survey Specification at Annex 3. Exact survey requirements will reflect the sensitivity of the site, and the nature and scale of the proposals. The ecological consultant will advise on detailed requirements following a preliminary site assessment and desk study.
- 3.9 It is essential to note that bat surveys are seasonally constrained. For proposals which have the potential to impact on the SAC, a full season (April to October inclusive) will be required, but this may not be necessary in certain circumstances, where this is demonstrable to the council's ecologist. (See Section B paragraphs 4.17 to 4.18 on minor impacts.) Winter surveys may be required for those developments in proximity to hibernation roosts. This will need to be included in the plan for project delivery at an early stage to avoid a potential 12-month delay to allow appropriate surveys to be undertaken.
- 3.10 Outside the Bat Consultation Zone, development proposals may still have impacts on bats. All species of bat and their roosts are protected by the Wildlife and Countryside Act (1981, as amended) and the Habitats Regulations. Further advice on potential impacts to bats is contained in [Natural England's Standing Advice for Development Impacts on Bats](#), English Nature's Bat Mitigation Guidelines (2004) and the Bat Conservation Trust Bat Survey Guidelines for Professionals (2016).¹¹

4. Mitigation within the Consultation Zone

- 4.1 Within the Bat Consultation Zone, where Lesser Horseshoe bats would be affected or potentially affected by development appropriate mitigation will be required. The aim should be to retain and enhance habitat and features of value to Lesser Horseshoe bats, such as those listed in paragraph 3.2 of Part B of this guidance. Where this is not possible replacement habitat may be needed. The council's ecologist will have regard to relevant considerations in determining the mitigation requirements, including

¹⁰ Consultants should be members of CIEEM www.cieem.net or taken from the Environmental Consultants Directory www.endsdirectory.com

¹¹ <http://www.naturalengland.org.uk/ourwork/planningdevelopment/spatialplanning/standingadvice/default.aspx>; Collins, J. (ed). 2016. *Bat Survey Guidelines for Professional Ecologists: Good Practice Guidelines*. (3rd Edition). London: Bat Conservation Trust; Mitchell-Jones, A. J. 2004. *Bat Mitigation Guidelines*. Peterborough: English Nature.[As updated]

survey results and calculations relating to replacement habitat. (See the methodology and metric in Annex 5.) The developer's ecologist should carry out the calculations when requested by the council's ecologist. Replacement habitat should always aim to be the optimal for the species affected.

4.2 The following are examples of habitats to which the above principles will apply:

- Hunting habitat such as woodland, ponds, watercourses, hedgerows, woodland edges, tree lines, rough grassland and pasture
- Connecting habitat, which is important to ensure continued functionality of commuting habitats. (Proposals should seek to retain existing linear commuting features as replacement of hedgerows is likely to require a significant period to establish).

4.3 The following are also important principles:

- Seek to maintain the quality of all semi-natural habitats and design the development around enhancing existing habitats to replace the value of that lost making sure that they remain accessible to the affected bats
- Maintain bat roosts in situ and maintain or replace night roosts, and consider enhancing provision of night roosting features. Night roosts are important for resting, feeding and grooming, particularly those located at distance from the main roost

4.4 Loss of habitat refers not only to physical removal but also from the effects of lighting. A development proposal will be expected to demonstrate that bats will not be prevented from using features by the introduction of new lighting or a change in lighting levels. Reference to specific lux levels will be expected. Lighting refers to both external and internal light sources. Applicants will be expected to demonstrate that considerations of site design, including building orientation; and the latest techniques in lighting design have been employed in order to, ideally, avoid light spill to retained bat habitats. Applicants will similarly be expected to demonstrate use of the latest techniques to avoid or reduce light spill from within buildings.

4.5 Where replacement habitat provision is necessary, the type(s) of habitat to be provided shall be agreed with the local authority's ecologist and/or Natural England as appropriate.

4.6 Where replacement habitat is required off site in mitigation the land should not be a designated Site of Special Scientific Interest, be contributing already to supporting conservation features or in countryside stewardship to enhance for bats.

4.7 Replacement habitat should aim to be the optimal for the species affected (See Annex 6). The following are examples of habitats of value to horseshoe bats and which may be created or enhanced as the replacement provision. Planting will be expected to consist of native species that produce an abundance of invertebrates, particularly lacewings, small aquatic flies and moth species.

- Woodland, especially associated with water features
- Hedgerows with trees – tall, bushy hedgerows at least 3 metres wide and 3 metres tall managed so that there are perching opportunities
- Wildflower meadow - managed for moths, e.g. Long swards

- Grazed pasture is difficult to impossible to recreate on site and only feasible with management agreements with local landowners over and above existing regimes. Even so there may be issues which prevent grazing in the future¹²
 - Ponds - for drinking and a prey source for Lesser Horseshoe bats
 - Provision of night roosting opportunities on site
- 4.8 The method for checking the adequacy of replacement habitat provided with an application or then in Master Planning of a proposed development, is given in Annex 5.
- 4.9 It is important that provision of the replacement habitat is carried out to timescales to be agreed by the local authority and/or Natural England as appropriate.
- 4.10 In the case of quarries, waste sites or other large scale sites where restoration is proposed this should not be considered as mitigation for habitat lost to horseshoe bats. The timescale to when these restorations are likely to be implemented, i.e. 40 years after the quarry has been worked, is too long to provide any replacement to maintain the existing population at the time of impact.
- 4.11 **It is vital that any replacement habitat is accessible to the Lesser Horseshoe bat population affected.**
- 4.12 A Landscape and Ecological Management Plan for the site must be provided setting out how the site will be managed for SAC bats for the duration of the development. Where appropriate a Monitoring Strategy also needs to be included in order to ensure continued use of the site by SAC bats and includes measures to rectify the situation if negative results occur.

Lighting

- 4.13 Lesser Horseshoe bats are known to be a very light sensitive species and are linked to linear habitat features. Recent research suggests that preferred commuting routes for Lesser Horseshoe bats are at lux levels even lower than previously thought: "*under natural, unlit conditions ... 0.04 lux*" but avoid levels above 3.6 Lux. (Stone, 2009; Stone et al, 2009) They regularly use dark hedgerows which are an average of 0.45 Lux. Stone et al (2009) stated, '*It is unsurprising that few bats flew along the unlit side of the hedge, given that light levels on the unlit side on lit nights (mean 4.17 lux) were significantly higher than those along dark hedges (mean 0.45 lux); even these relatively low light levels may make established routes unsuitable for commuting.*' They are potentially disrupted from flying along flight structures, such as hedgerows by introduced artificial light levels above 0.5 Lux. It was also found that continued disruption increased the effect, i.e. Lesser Horseshoe bats do not become habituated to the presence of artificial lighting.¹³

¹² For example see paragraphs 41 to 50 of Appeal Ref: APP/X1165/A/13/2205208 Land at Churston Golf Club, Churston, Devon, TQ5 0LA. <https://acp.planninginspectorate.gov.uk/ViewCase.aspx?Caseid=2205208&ColD=0>

¹³ Stone, E. L. 2009. The impact of street lighting on lesser horseshoe bats *Presented at the South West Bat Conservation Trust Conference, 25 April, 2009*; Stone, E. L., Jones, G. & Harris, S. 2009. Street Lighting Disturbs Commuting Bats. *Current Biology* 19, 1123–1127, July 14, 2009; Stone, E.L 2013. *Bats and Lighting – Overview of current evidence and mitigation*. Bristol: University of Bristol)

- 4.14 in addition many night flying species of insect such as moths, a prey species for Lesser Horseshoe bats, are attracted to light, especially those lamps that emit a ultra-violet component and particularly if it is a single light source in a dark area. It is also considered that insects are attracted to illuminated areas from further afield resulting in adjacent habitats supporting reduced numbers of insects. This is likely to further impact on the ability of the horseshoe bats to be able to feed.¹⁴
- 4.15 A variety of techniques will be supported to facilitate development that will avoid, minimise and/or compensate for light spill:
- Use of soft white LED lights with directional baffles as required (LED light lacks a UV element and minimises insect migration from areas accessed by SAC bats)
 - use of building structure, design, location and orientation to avoid/minimise lighting impacts on retained habitats
 - use of landscaping and planting to protect and/or create dark corridors on site.
 - use of SMART glass where appropriate
 - use of internal lighting design solutions to minimise light spill from places such as windows
 - use of SMART lighting solutions
- See also the 'Guidance Note 08/18 Bats and artificial lighting in the UK' (Institute of Lighting Engineers/ Bat Conservation Trust, 2018) and widths of lighting zones illustrated in the Trowbridge Bat Mitigation Strategy SPD: Draft for Consultation.¹⁵
- 4.16 Prospective developers will be expected to provide evidence, ideally in the form of a lux contour plan and sensitive lighting strategy, with their application to demonstrate that introduced light levels will not affect existing and proposed features used by SAC bats to above 0.5 lux; or not exceeding baseline light levels where this is not feasible.

Proposed developments with minor impacts

- 4.17 In circumstances of overall less potential impact, especially in Band C, mitigation may be put forward without the need for a full season's survey. (See Annex 3) This approach will only be suitable where it can be clearly demonstrated that the impacts of a proposed development are proven to be minor and can be fully mitigated without an impact upon the existing (& likely) Lesser Horseshoe bat habitat. In order to adopt this approach, it will be necessary for a suitably qualified ecologist to visit the site and prepare a report with an assessment of existing (& likely) Lesser Horseshoe bat habitat. The information from this report should provide the basis to determine appropriate mitigation measures associated with the proposed development. The

¹⁴ Bat Conservation Trust/Institute of Lighting Engineers. 2008. *Bats and Lighting in the UK: Version 2*; pers. comm. Dr Emma Stone, University of Bristol, 2009.

¹⁵ Institute of Lighting Engineers/ Bat Conservation Trust. 2018. *Guidance Note 08/18 Bats and artificial lighting in the UK* <https://www.theilp.org.uk/documents/guidance-note-8-bats-and-artificial-lighting/>; Bennet, J. & Mitchell, B. 2019. *Trowbridge Bat Mitigation Strategy SPD: Draft for Consultation*. Bradford-on-Avon: Johns Associates. http://wiltshire.objective.co.uk/portal/spatial_planning/spds/trowbridge_bat_mitigation_strategy_spd/the_trowbridge_bat_mitigation_strategy_spd?tab=files

proposed mitigation should clearly demonstrate that there will be no interruption of suitable SAC bat commuting habitat. Replacement of foraging habitat may be required as appropriate.

- 4.18 There may also be situations where mitigation will not be required because the proposed development does not have an impact upon existing (& likely) Lesser Horseshoe bat habitat. In adopting this approach it will be necessary to substantiate this with a suitably robust statement as part of the submission of the development proposals. In terms of impacts on SAC bats and habitat, it is important to bear in mind that minor proposed developments do not necessarily equate with small developments.