Shell Flat & Lune Deep candidate Special Area of Conservation

Formal advice under Regulation 35(3) of The Conservation of Habitats and Species Regulations 2010

Version 6.1 (July 2012)

Document version control

Version	Author	Amendments made	Issued to and date
Shell Flat & Lune Deep cSAC formal advice dialogue 0111. V6.1	RW	Includes accepted changes/additions as per Reg 35 template July 2012, and updated page numbers etc	18 July 2012
Shell Flat & Lune Deep cSAC formal advice dialogue 0111. V6.0	RW	Includes changes/additions as per Reg 35 template July 2012	18 July 2012
Shell Flat & Lune Deep cSAC formal advice dialogue 0111. V5.2	JN	Includes generic text changes to introduction re Paul Duncan/Mark Duffy. Version control change and date to reflect these changes	June 2012
Shell Flat & Lune Deep cSAC formal advice dialogue 0111. V5.1	RW	Includes JM's comments and additions	April 2012. To national specialists
Shell Flat & Lune Deep cSAC formal advice dialogue 0111. V5.0	RW	Additions made following relevant authority input.	April 2012. To Director Marine
Shell Flat & Lune Deep cSAC formal advice dialogue 0111. V4.0	RW	Lune Deep added following its submission on 14 September 2011. QAd by National specialist RE	September 2011. To RAs
Shell Flat cSAC formal advice dialogue 0111. V3.5	RW	Updates made following PD comments	July 2011. To national specialists
Shell Flat cSAC formal advice dialogue 0111. V3.4	RW	Updates made following JB and RE comments	June 2011. To workstream lead.
Shell Flat cSAC formal advice dialogue 0111. Version 3.3		D&BT comments	April 2011. To NE specialists
Shell Flat cSAC formal advice dialogue 0111. Version 3.1	Natural England	Change in status from pSAC to cSAC	For review before dialogue with relevant authorities, 16th March 2011
Shellflatlunedeep_cons_obs_1011	Altered by Rob Whiteley	Change in status from dSAC to pSAC	Formal consultation

09. Version 2.1			November 2009. To Satkeholders
Shellflatlunedeep_cons_obs_110609	Natural England, Peter Clement	-	Informal dialogue (11/06/09)

Further information

Jed Nicholson
Lead Marine Adviser - Irish Sea Team
Natural England
3rd Floor
Bridgewater House
60, Whitworth Street,
Manchester,
M1 6LT

Email: Jerrard.Nicholson@naturalengland.org.uk
Tel: 0300 060 2777
Fax: 0300 060 1791

Website: http://www.naturalengland.org.uk

Shell Flat & Lune Deep candidate Special Area of Conservation

Formal advice under Regulation 35(3) of The Conservation of Habitats and Species Regulations 2010[1]

Contents

[1] http://www.legislation.gov.uk/uksi/2010/490/made

1. Introduction

This document contains Natural England's formal advice for Shell Flat & Lune Deep candidate Special Area of Conservation (cSAC) given under Regulation 35(3) of The Conservation of Habitats and Species Regulations 2010. This document supersedes the previous draft conservation advice for Shell Flat & Lune Deep proposed SAC (pSAC).

Shell Flat cSAC was formally submitted by the Government to the European Commission as a candidate Special Area of Conservation (cSAC) on 20 August 2010. As a result of the 2009/10 public consultation exercise on the Shell Flat and Lune Deep pSAC, evidence came to light which led Natural England to recommend a new boundary for Lune Deep. Because the boundary changes were significant, Natural England re-consulted on the Lune Deep component part of the site. Lune Deep was then formally submitted by the Government to the European Commission as a cSAC on 14 September 2011.

Shell Flat & Lune Deep cSAC is with the European Commission awaiting 'moderation' (that is an assessment alongside all the other sites submitted by other Member States). If the European Commission approves the site, it becomes a Site of Community Importance and Government then has six years to designate it as a SAC.

Shell Flat & Lune Deep cSAC is subject to full protection under the Habitats Directive[2] transposed through The Conservation of Habitats and Species Regulations 2010[3] (referred to in this documents as the 'Habitats Regulations'). Amongst other things, the Habitats Regulations place an obligation on relevant authorities[4] to put in place measures to protect the sites from damage or deterioration.

This document fulfils Natural England's duty under Regulation 35(3)[5] of The Habitats Regulations, to advise relevant authorities as to (a) the conservation objectives for Shell Flat & Lune Deep cSAC and (b) any operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species, for which Shell Flat & Lune Deep cSAC has been designated.

The advice is based on the best available information at the time of writing.

This formal conservation advice constitutes one element of our advisory role in relation to this site. Relevant authorities can use the current information to explore and put in place management measures (if required) and competent authorities[6] can fulfil their duties under the Habitats Regulations in making the necessary determinations on the impact of activities on the site. However, should relevant authorities or competent authorities require any further advice, they are not limited to taking account of Natural England's formal conservation advice contained here, and would be expected to make further enquiries as required in order to make determinations or implement management measures. Further information/reference should be made to the Selection Assessment Document[7] for Shell Flat & Lune Deep pSAC which is still relevant to the cSAC.

[2] Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of wild fauna and flora
[3] http://www.legislation.gov.uk/uksi/2010/490/contents/made
[4] as defined under Regulation 6 of The Conservation of Habitats and Species Regulations 2010
[5] http://www.legislation.gov.uk/uksi/2010/490/regulation/35/made
[6] as defined under Regulation 7 of The Conservation of Habitats and Species Regulations 2010
[7] http://www.naturalengland.org.uk/Images/SFLD-sad_tcm6-21676.pdf

An independent review of Natural England's marine SAC selection process carried out in 2011 made a number of recommendations as to how Defra and Natural England should modify their approach to future evidence based work. This resulted in Natural England adopting the Government Chief Scientific Adviser's (GCSA) guidelines on using evidence, through the development of a suite of Evidence Standards. Implementation of these standards has included Natural England working with JNCC to develop a protocol, which has been subject to independent expert review, setting out the processes and requirements for the development of conservation advice packages, to ensure that these fully comply with the GCSA's guidelines. Whilst the conservation advice provided here was developed prior to the finalisation of the protocol, it has been assessed for compliance with the protocol and a detailed report can be found on our website[8].

2. Roles and responsibilities

2.1 Natural England's role

The Habitats Regulations transpose the Habitats and Birds Directive into law in England and Wales. They give Natural England a statutory responsibility to advise relevant authorities as to the conservation objectives for cSACs, SACs and SPAs in English territorial waters (0-12nm), and to advise relevant authorities as to operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species for which the sites have been designated.

Natural England will provide additional advice as required for each site to relevant and competent authorities in order for them to fulfil their duties under the Habitats Regulations, such as a competent authority assessing the implications of any plans or projects on a cSAC, SAC, or SPA.

2.2 The role of relevant and competent authorities

A **competent** authority is a public authority whose decision making may have an impact on the Natura 2000[9] series and therefore needs to be subject to the Regulations. All competent authorities are required to have regard for the requirements of the Habitats Directive in the exercise of their functions (regulation 9(3)).

Competent authorities have specific duties and powers under the Habitats Regulations. Where a decision is being considered within or affecting a Natura 2000 site, then the competent authority must follow the procedures in Regulations 61 & 62. Competent authorities also have duties under Regulations 69 & 70 for the review of decisions that have already been made. These Regulations refer back to the procedures set out in Regulation 61.

The competent authority carries out the appropriate assessment and makes a decision on integrity rather than the proponent of the plan or project or Natural England. Regulation 61(2) makes it clear that the applicant has to supply the necessary information for the competent authority to make the assessment. The competent authority can require the proponent to provide sufficient information to inform the assessment. When carrying out the

[8] http://www.naturalengland.org.uk/Images/R35ConservationAdvicePackageProtocol_tcm6-33228.pdf

[9] SACs and SPAs are together referred to as Natura 2000 sites or (in the marine environment) European Marine Sites.

assessment, the competent authority **must** consult Natural England in accordance with the Habitats Regulations.

The Habitats Regulations require relevant authorities to exercise their functions so as to secure compliance with the Habitats Directive. A single management scheme, which the relevant authorities may draw up under Regulation 36[10] of the Habitats Regulations, will provide a framework through which this could be done and it should be based on the advice in this package. Relevant authorities must, within their areas of jurisdiction, have regard to both direct and indirect effects on interest features of the site. This may include consideration of issues outside the boundary of the site.

Nothing within a Regulation 35 package will require relevant authorities to undertake any actions or ameliorate changes in the condition of interest features if it is shown that the changes result wholly from natural causes. Having issued Regulation 35 advice for this site, Natural England will work with relevant authorities and others to agree, within a defined time frame, a protocol for evaluating observed changes to baselines and to develop an understanding of natural change and provide further guidance as appropriate and possible. This does not, however, preclude relevant authorities from taking any appropriate action to prevent deterioration to the interest features, and indeed such actions should be undertaken when required.

2.3 Role of conservation objectives

Conservation objectives are the starting point from which management schemes and monitoring programmes may be developed as they provide the basis for determining what is currently causing or may cause a significant effect, and they inform the scope of appropriate assessments.

The conservation objectives set out what needs to be achieved for the site to make the appropriate contribution to the conservation status of the features for which the site is designated and thus deliver the aims of the Habitats Directive.

In addition this advice will inform the scope and nature of any 'appropriate assessments[11]' which the Directive requires to be undertaken for plans and projects (Regulations 61 and 63 of the Habitats Regulations for inshore waters).

2.4 Role of advice on operations

The advice on operations set out in Section 4 of this document provides the basis for discussion about the nature and extent of the operations taking place within or close to the site and which may have an impact on its interest features. The advice should also be used to help identify the extent to which existing measures of control, management and forms of use are, or can be made, consistent with the conservation objectives, and thereby focus the attention of relevant authorities and surveillance to areas that may need management measures.

[10] http://www.legislation.gov.uk/uksi/2010/490/regulation/36/made

[11] Assessment of implications for European sites and European offshore marine sites

This advice on operations may need to be supplemented through further discussions with the relevant authorities and any advisory groups formed for the site.

2.5 Precautionary principle

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 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).

3. Conservation objectives

3.1 Background to conservation objectives

The conservation objectives and definitions of favourable condition for features on the site may inform the scope and nature of any 'appropriate assessment' under the Habitats Regulations[12]. An appropriate assessment will also require consideration of issues specific to the individual plan or project.

The scope and content of an appropriate assessment will depend upon the location, size and significance of the proposed project. Natural England will advise on a case by case basis.

Following an appropriate assessment, competent authorities are required to ascertain the effect on the integrity of the site. The integrity of the site is defined in paragraph 20 of ODPM Circular 06/2005 (DEFRA Circular 01/2005)[13] as the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified. The determination of favourable condition is separate from the judgement of effect upon integrity. For example, there may be a time-lag between a plan or project being initiated and a consequent adverse effect upon integrity becoming manifest in the condition assessment. In such cases, a plan or project may have an adverse effect upon integrity even though the site remains in favourable condition, at least in the short term.

The conservation objectives for this site are provided in accordance with paragraph 17 of ODPM Circular 06/2005 (DEFRA Circular 01/2005) which outlines the appropriate assessment process. The entry on the Register of European Sites gives the reasons for which a site was classified or designated.

3.2 Shell Flat & Lune Deep cSAC conservation objectives

The formal conservation objectives for Shell Flat & Lune Deep cSAC interest features are provided below. These are high-level objectives for the site features, and Natural England may refine them in future as our understanding of the features improves and further information becomes available, such as survey work. They should be read in the context of other advice given, particularly:

[12] Regulation 61 and 63 by a competent authority and Regulation 21 by Natural England

[13] http://www.communities.gov.uk/documents/planningandbuilding/pdf/147570.pdf

- the Selection Assessment Document[14] which provides more detailed information about the site and evaluates its interest features according to the Habitats Directive selection criteria and guiding principles;

- the favourable condition table (Appendix A) providing information on how to recognise favourable condition for each of the features and which will act as a basis from which the monitoring programme will be developed; and

- the attached map (Appendix B) which shows the known locations of the interest features.

3.2.1 Importance of features

Shell Flat

Shell Flat sandbank runs northeast from the southern corner of the site in a blunt crescent to the south west.

The bank is an example of a Banner Bank, which are generally only a few kilometres in length with an elongated pear/sickle-shaped form, located in water depths less than 20m below chart datum. The data has identified slight sediment changes across the sandbank with the top of the bank being softer and smoother and sediment becoming rougher and harder on the northern and southern slopes (Royal Haskoning, 2008). Previous studies also found that the central crest is bound to the north and south by a more muddy (or clayey) sand sediment dominated by *Ophiuroids* (Titan Environmental Surveys, 2002).

The current evidence base shows the following Annex I habitat and features to be present in the area:

- Sandbanks which are slightly covered by seawater all the time.

Lune Deep

Lune Deep is located at the entrance to Morecambe Bay, and is a deep water channel created by ice movements associated with the last ice age.

The reef habitat present in the area represents a good example of boulder and bedrock reef. This unique enclosed deep hole provides a contrasting habitat to the surrounding muddy communities of the Eastern Irish Mudbelt. The northern flanks of Lune Deep are composed of exposed bedrock with a rugged seabed physiography. In contrast, the southern flank consists of a smooth seabed which is a sink for muddy sands.

Much of the previous survey data for Outer Morecambe Bay was confined to the Lune Deep (Covey, 1998). The presence of stony reef, cobbles and small boulders supporting tide-swept fauna including hydroids, bryozoans, anemones and sponges was identified in Marine Nature Conservation Review (MNCR) diver surveys (Emblow, 1992).

The current evidence base shows the following Annex I habitat and features to be present in the area:

- Reefs.

[14] http://www.naturalengland.org.uk/Images/shellflat-lunedeep-SAD_tcm6-27680.pdf

3.2.2 Sandbanks which are slightly covered by seawater all the time

Definition

Sandbanks are elevated, elongated, rounded or irregular topographic features, permanently submerged and predominantly surrounded by deeper water. They consist mainly of sandy sediments, but larger grain sizes, including boulders and cobbles, or smaller grain sizes including mud may also be present on a sandbank. Banks where sandy sediments occur in a layer over hard substrata are classed as sandbanks if the associated biota are dependent on the sand rather than on the underlying hard substrata. “Slightly covered by sea water all the time” means that above a sandbank the water depth is seldom more than 20 m below chart datum. Sandbanks can, however, extend beneath 20 m below chart datum. It can, therefore, be appropriate to include in designations such areas where they are part of the feature and host its biological assemblages.

3.2.3 Reefs

Definition

Reefs are structures that rise from the seabed and can be formed of either biogenic concretions (i.e. a structure created by the animals themselves, such as mussels), or of geogenic origin (i.e. where animal or plant communities grow on raised or protruding rock). They are predominantly subtidal, but may extend as an unbroken transition into the intertidal (littoral) zone, where they are exposed to the air at low tide. A variety of subtidal seafloor features are included in the reef habitat complex, such as hydrothermal vent habitats, sea mounts, vertical rock walls, horizontal ledges, overhangs, pinnacles, gullies, ridges, sloping or flat bedrock, broken rock and boulder and cobble fields. Reefs may support a zonation of seafloor communities of algae and animal species. Only a few invertebrate species are able to develop biogenic reefs, which are therefore restricted in distribution and extent (Brown *et al.,* 1997).

Rocky reef types are extremely variable, both in structure and in the communities they support. The specific communities that occur vary according to a number of factors. Exposure to wave action has a major effect on community structure (as does rock type) with communities on the granite reefs being markedly different from those occurring on chalk reefs. Light intensity, which varies with depth, also has a major effect on community structure. Consequently, shallow water communities are dominated by seaweeds, whilst deeper rock surfaces are colonised purely by attached animals. Another major factor affecting reef communities is the turbidity of the water. In turbid waters, light penetration is low and algae can occur only in shallow depths or in the intertidal zone. However, in such conditions animals have a plentiful supply of suspended food and filter-feeding species may be abundant.

3.2.4 Key reef sub-features of Shell Flat & Lune Deep cSAC

Bedrock reef communities

Bedrock reef communities are areas of protruding rock, colonised by a suite of flora and fauna. A transition of communities can occur from the near surface sunlit zone, dominated by plants, such as kelp forests and red seaweeds, to the deeper waters where a variety of fauna inhabit the reef, including echinoderms, sponges, corals, anemones, bryozoans and crustaceans.

Patches of sediment were evident in much of Lune Deep, particularly in some of the deeper areas surveyed within the channel. Despite the presence of sediment, much of this area and the biota associated with this habitat can be said to be dependent on the hard substratum rather than the overlying sediment. The mixed faunal and turf communities over the majority of Lune Deep (CR.HCR.XFa) provide habitat for fauna associated with hard substratum.

Stony reef communities

In this area stable boulders and cobbles supported bryozoans *Flustra foliacea* and *Alcyonidium diaphanum* and the hydroids *Nemertesia antennina, Hydrallmania falcata*, all species which are found attached to rocks, shells or other hard substrate. The reef interest identified within and to the north of Lune Deep represent good examples of reef habitat (hard, compact substrates comprising boulders and cobbles generally >64mm in diameter) (Royal Haskoning 2008).

The reef described above appears to begin along the steep northern slope of Lune Deep and progress northwards. In the centre and south of Lune Deep, sediment habitats predominate and sampling indicates muddy sand sediments with a population of *Ophiura* spp. on the surface (Royal Haskoning 2008).

3.2.5 The conservation objective for Shell Flat cSAC Annex I Sandbanks slightly covered with seawater all the time:

Subject to natural change[a], maintain[b] the sandbanks slightly covered by seawater all the time in favourable condition[15]

Favourable condition of the sandbank will be determined through assessment that the following are maintained in the long term in the site:

1. Extent of the habitat
2. Diversity of the habitat and it's component species
3. Community structure of the habitat (e.g. population structure of individual notable species and their contribution to the functioning of the ecosystem)
4. Natural environmental quality (e.g. water quality, suspended sediment levels, etc.
5. Natural environmental processes (e.g. biological and physical processes that occur naturally in the environment, such as water circulation and sediment deposition should not deviate from baseline at designation).

[15] **Explanation of terms used in the Conservation Objectives**

a) Natural change refers to changes in the habitat which are not a result of human influences. 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. Features should not necessarily be considered in unfavourable condition when caused by the short term disappearance of a particular community due to natural processes.

b) Maintain implies that existing evidence suggests the feature to be in favourable condition and will, subject to natural change, remain at its condition at designation. Existing activities are therefore generally considered to be sustainable and be unlikely to adversely affect the condition of the feature if current practices are continued at current levels. However, it must be borne in mind that gradually damaging activities can take time to show their effects. If evidence later shows an activity to be negatively affecting the conservation objectives of the site, then the site will be deemed to be in unfavourable condition and restorative action will needed.

c) Favourable condition relates to the maintenance of the structure, function, and typical species for that feature within the site. Areas of the infralittoral, such as the kelp forests, are currently believed to be in favourable condition and will therefore have a conservation objective of 'maintain', whereas some areas of circalittoral bedrock are known to have experienced damage through towed demersal fishing gear (Royal Haskoning, 2008). Where damage is known to have occurred then a conservation objective of 'restore' will be applied.

d) Restore implies that the feature is degraded to some degree and that activities will have to be managed to reduce or eliminate negative impact(s). Restoration in the marine environment generally refers to natural recovery through the removal of unsustainable physical, chemical and biological pressures, rather than intervention (as is possible with terrestrial features).

3.2.6 The conservation objective for Lune Deep cSAC Annex I Reefs

Subject to natural change[a], maintain[b] the reefs in favourable condition[16].

Favourable condition of the reefs will be determined through assessment that the following are maintained in the long term in the site:

1. Extent of the habitat
2. Diversity of the habitat and it's component species
3. Community structure of the habitat (e.g. population structure of individual notable species and their contribution to the functioning of the ecosystem)
4. Natural environmental quality (e.g. water quality, suspended sediment levels, etc.
5. Natural environmental processes (e.g. biological and physical processes that occur naturally in the environment, such as water circulation and sediment deposition should not deviate from baseline at designation).

3.3 Background to favourable condition tables

The favourable condition table is the principle source of information that Natural England will use to assess the condition of an interest feature and as such comprises indicators of condition. The favourable condition table can be found in Appendix A.

On many terrestrial European sites, we know sufficient information 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

[16] Explanation of terms used in the Conservation Objectives

e) Natural change refers to changes in the habitat which are not a result of human influences. 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. Features should not necessarily be considered in unfavourable condition when caused by the short term disappearance of a particular community due to natural processes.

f) Maintain implies that existing evidence suggests the feature to be in favourable condition and will, subject to natural change, remain at its condition at designation. Existing activities are therefore generally considered to be sustainable and be unlikely to adversely affect the condition of the feature if current practices are continued at current levels. However, it must be borne in mind that gradually damaging activities can take time to show their effects. If evidence later shows an activity to be negatively affecting the conservation objectives of the site, then the site will be deemed to be in unfavourable condition and restorative action will needed.

g) Favourable condition relates to the maintenance of the structure, function, and typical species for that feature within the site. Areas of the infralittoral, such as the kelp forests, are currently believed to be in favourable condition and will therefore have a conservation objective of 'maintain', whereas some areas of circalittoral bedrock are known to have experienced damage through towed demersal fishing gear (Royal Haskoning, 2008). Where damage is known to have occurred then a conservation objective of 'restore' will be applied.

h) Restore implies that the feature is degraded to some degree and that activities will have to be managed to reduce or eliminate negative impact(s). Restoration in the marine environment generally refers to natural recovery through the removal of unsustainable physical, chemical and biological pressures, rather than intervention (as is possible with terrestrial features).

activities, is much more difficult, and consequently it is much harder to define favourable condition so precisely in such sites. It must be borne in mind that gradually damaging activities can take time to show their effects. If evidence later shows an activity to be negatively affecting the conservation objectives of the site, then the site will be reassessed in light of this new information and restorative action put in place if needed.

Where there are more than one year's observations on the condition of marine habitats, all available information will need to be analysed to determine, where possible, any natural environmental trends at the site. This will provide the basis for judgements of favourable condition to be determined in the context of natural change. Where it becomes clear that certain attributes may indicate a cause for concern, and if further investigation indicates this is justified, restorative management actions will need to be taken. The aim of such action would be to return the interest feature to favourable condition from any unfavourable state. This document will be revised in light of ongoing and future monitoring of the condition of designated features within the site. This will be linked with any developments in our understanding of the structure and functioning of features and the pressures they are exposed to.

This advice also provides the basis for discussions with relevant authorities, and as such the attributes and associated measures and targets may be modified over time. The aim is to have a single agreed set of attributes that will be used as a basis for monitoring in order to report on the condition of features. Condition monitoring of the attributes may be of fairly coarse methodology, underpinned by more rigorous methods on specific areas within the site. Common Standards Monitoring (JNCC 2004) requires mandatory monitoring of some attributes of a designated feature, while other attributes are considered discretionary (or site-specific) and are incorporated to highlight local distinctiveness. Priority will be given to measuring attributes that are at risk from anthropogenic pressure and for which changes in management may be necessary. This information may be generated by Natural England or collected by other organisations through agreements.

Whilst the favourable condition table is the key source of information of condition for site features additional source of information may also be selected to inform our view about the integrity and condition of the site. For example, a part of risk based monitoring activity data (as collected by the relevant authorities) will give an indication as to the levels of pressure that may impact on the site features.

The condition monitoring programme will be developed through discussion with the relevant / competent authorities and other interested parties, ideally as part of the management scheme process. Natural England will be responsible for collating the information required to assess condition, and will form a judgement on the condition of each feature within the site. The condition assessment will take into account all available information, including other data on site integrity / condition that has been gathered by others for purposes such as appropriate assessment, licence applications etc. using the favourable condition table to guide the process.

4. Advice on operations

4.1 Background

Natural England has a duty under Regulation 35(3)(b) of the Habitats Regulations 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.

As part of its advice on operations Natural England has considered the pressures that may be caused by activities and the vulnerability of the sites interest features to those pressures.

The following sections provide information to help relate general advice to each of specific interest features for the Shell Flat & Lune Deep cSAC to current levels (as at September 2011) of human usage. This is aimed at being a broad assessment of pressures and the vulnerability of features.

This advice relates to the vulnerability of the interest features and sub-features of the Shell Flat & Lune Deep cSAC. The process of deriving and scoring relative vulnerability is provided at Appendix C. A summary of the pressures which may cause deterioration or disturbance is given at Appendix D, and detailed in Appendix E. Further explanation of the sensitivity of the interest features or sub-features follows with examples of their exposure and therefore their vulnerability to damage or disturbance from the listed categories of pressures. This enables links to be made between the categories of pressure and the ecological requirements of the features.

4.2 Purpose of advice

The aim of this advice is to 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 at Shell Flat Lune Deep cSAC. The advice is linked to the conservation objectives for interest features and will help provide the basis for detailed discussions between relevant authorities enabling them to formulate and agree a management scheme for the site should one be deemed necessary.

The advice given here will inform, but is given without prejudice to, any advice provided under Regulation 61 or Regulation 63 on operations that qualify as plans or projects within the meaning of Article 6 of the Habitats Directive.

4.3 Methods for assessment

To develop this advice on operations Natural England has used a three step process involving:

- an assessment of the **sensitivity** of the interest features or their component sub-features to operations;

- an assessment of the **exposure** of each interest feature or their component sub-features to operations; and

- a final assessment of **current vulnerability** of interest features or their component sub-features to operations.

This three step process builds up a level of information necessary to manage activities in and around the site in an effective manner. Through a consistent approach, this process enables Natural England to both explain the reasoning behind our advice and identify to competent and relevant authorities those operations which pose the most current threats to the favourable condition of the interest features on the site.

Two different biotopes are present within the site, and for the purpose of assessment site-specific data on biotopes associated with the features were used according to best available evidence at the time of writing (Appendix F).

4.3.1 Sensitivity assessment

The sensitivity assessment used is an assessment of the relative sensitivity of the interest features or the component sub-features of the Shell Flat & Lune Deep cSAC to the effects of 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 (Hiscock, 1996). Sensitivity is dependent on the intolerance of a species or habitat to damage from an external factor and the time taken for its subsequent recovery.

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 of the interest features was based on the sensitivities of their component biotopes, listed in Appendix F. Biotope sensitivities were derived from the Marine Life Information Network (MarLIN)[17] biology and sensitivity database (Tyler-Walters and Hiscock, 2003) and the JNCC. Biotope sensitivities were assessed using the MarLIN approach (Hiscock and Tyler-Walters, 2005, 2006; Tyler-Walters *et al*., 2001). Sensitivities are available from the MarLIN and JNCC websites (www.marlin.ac.uk, www.jncc.defra.gov.uk).

4.3.2 Exposure assessment

This has been undertaken for Shell Flat & Lune Deep cSAC by assessing the relative exposure of the interest features on the site to the effects of broad categories of human activities currently occurring on the site (as at September 2011). These assessments were made on the basis of the best available information and advice.

Appendix E shows the relative exposure of the Shell Flat & Lune Deep features to physical, chemical and biological pressures. This assessment is based on known human activities operating in or adjacent to the site, and the anticipated pressures associated with these activities.

4.3.3 Vulnerability assessment

The third step in the process is to determine the vulnerability of interest features or their component sub-features to operations. This is 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).

[17] www.marlin.ac.uk

4.4 Format of advice

The advice is provided within six broad categories of operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species. 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 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 Natural England.

These broad categories provide a clear framework against which relevant authorities can assess activities under their responsibility.

4.5 Update and review of advice

Information as to the operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species, for which the site has been designated, is provided in light of what Natural England knows about current and recent activities and patterns of usage at Shell Flat & Lune Deep cSAC. Natural England expects that the information on activities and patterns of usage will be refined as part of the process of developing the management scheme and through discussion with the relevant authorities. As part of this process the option of identifying a number of spatial zones with different activity levels may be appropriate. It is important that future consideration of this advice by relevant authorities and others takes account of changes in the usage patterns that have occurred at the site, over the intervening period, since the information was gathered. In contrast, the information provided in this advice on the sensitivity of interest features or sub-features is relatively stable and will only change as a result of an improvement in our scientific knowledge, which will be a relatively long term process. Advice for sites will be kept under review and will be periodically updated through discussions 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. Specific advice on operations for Shell Flat & Lune Deep cSAC

The following sections provide information to help relate general advice to each of specific interest features for Shell Flat & Lune Deep cSAC.

This advice relates to the vulnerability of the interest features of the Shell Flat & Lune Deep cSAC as summarised in Appendix D and detailed in the Appendix E. Further explanation of the sensitivity of the interest features or sub-features follows with examples of their exposure and therefore their vulnerability to damage or disturbance from the listed categories of operations. This enables links to be made between the categories of operation and the ecological requirements of the features.

This advice relates to the vulnerability of the interest features and sub-features of Shell Flat & Lune Deep cSAC to current levels of human usage.

5.1 Sandbanks which are slightly covered by seawater all the time

5.1.1 Physical loss

Subtidal sandbanks are relatively high energy environments, often with a good ability to recover from physical disturbance, however, loss of distinct assemblages within the habitat through removal of sediment habitat may result in a decrease in the overall diversity of the interest feature. Thus sandbank features are considered to have low sensitivity to smothering, but be moderately sensitive to physical loss due to removal of sediment.

An offshore wind farm has previously been proposed for a site which overlaps the sandbank, however this proposal has now been withdrawn and therefore this is not considered further in the assessment of exposure.

Overall the site is considered to have negligible exposure to physical loss by removal or smothering.

Overall the **vulnerability of Sandbanks** within the Shell Flat & Lune Deep cSAC to **physical loss** is considered to be **low.**

5.1.2 Physical damage

Sandbank communities are characterised by frequent disturbance by tidal currents, and contain organisms which are adapted to recurrent erosion and accretion (for example, polychaetes and amphipods which are able to reburrow rapidly following disturbance). Following significant disturbance, communities can re-establish relatively quickly from the planktonic larval pool or migration from areas nearby, particularly as communities are largely composed of opportunistic species. Indications are that this re-establishment can occur within a few tidal cycles (Sherman & Coull 1980, Palmer 1988, Giere 1993). Sensitivity to physical damage resulting from siltation or abrasion is considered to be low.

Sandbank habitats within Shell Flat & Lune Deep cSAC currently have a moderate exposure to physical damage from commercial and recreational fishing activities such as anchoring and the towing of light demersal trawling gear.

Trenching for the Walney 2 windfarm cable through the north-eastern tip of Shell Flat & Lune Deep cSAC was undertaken in May 2011. The trenching and anchoring of the trenching vessel caused significant but temporary damage to a small area of the sandbank. If the cables ever become exposed they also have the potential to cause localised abrasive damage to the sandbank.

Overall the **vulnerability of Sandbanks** within the Shell Flat & Lune Deep cSAC to **physical damage** is considered to be **low.**

5.1.3 Toxic contamination

Toxic substances can have a number of effects on benthic communities depending on the nature of the contaminant and receiving biota. Some may be lethal, removing individuals and species; others may be sub-lethal, which could affect functioning of organisms such as the reproduction, reducing the fitness for survival, and hence populations in the longer term (Nedwell, 1997). For many benthic communities, the sensitivity of exposure to different chemicals is unknown, or limited to a small number of toxicity studies on specific species. Based on available published information, the sensitivity of sand and muddy sand communities to different types of toxic contamination has been classified as low to moderate.

The pathways by which toxic contaminants can reach these sub-tidal features would include point source discharges of effluents and land run-off from Morecambe Bay and the Fylde coast, atmospheric deposition, and accidental spillage at sea (e.g. oil spills).

Direct discharges into the site include low levels of radionuclides and heavy metals, however significant dilution afforded to these low inputs, together with the high energy environments associated with sandbank, mean that they have a low exposure to toxic contamination from these sources (Elliot *et al.*, 1998).

An under-sea gas storage site is proposed for the area and would sit 4.4km to the west of Shell Flat at its nearest point. The construction and maintenance of the site, as well as its vessel traffic, would increase the potential exposure to spills and other introductions of non-synthetic compounds.

Overall the **vulnerability of Sandbanks** within the Shell Flat & Lune Deep cSAC to **toxic contamination** is considered to be **low.**

5.1.4 Non-Toxic contamination

Non-toxic contamination can lead to changing levels of nutrients, organic enrichment, temperature, turbidity and salinity. All of which could have direct and in-direct effects on the exposed features and their communities. The sensitivity of dynamic sand communities and gravelly muddy sand communities to different types of non-toxic contamination is considered to be low.

The principle pathways by which non-toxic contaminants can reach these sub-tidal features would include point source discharges of effluents e.g. from local waste water treatment works, land run-off (mainly from Morecambe Bay), and offshore operations (e.g. shipping). In general, however, it is considered that the habitat features within the site have a low exposure to non-toxic contamination.

An under-sea gas storage site is proposed for the area and would sit 4.4km to the west of Shell Flat at its nearest point. Temporary solution-mining of the storage caverns of the site would leach brine in to the surrounding environment and thereby increase nearby salinity levels. Models on the discharge predict quick dispersion of the brine and a small localised area of impact, however.

Overall the **vulnerability of Sandbanks** within the Shell Flat & Lune Deep cSAC to **non-toxic contamination** is considered to be **low.**

5.1.5 Biological disturbance

Biological disturbance can include the introduction of pathogens or non-native species as well as selective extraction of species from the ecosystem. Removal of fish species and larger molluscs can have significant impacts on the structure and functioning of benthic communities including sandbanks over and above the physical effects of fishing methods, particularly as some fish species fill upper roles in the trophic web.

Some fishing occurs on Shell Flat sandbank, mainly flatfish, but not to a great extent.

Overall the **vulnerability of Sandbanks** within the Shell Flat & Lune Deep cSAC to **biological disturbance** is considered to be **Moderate**.

5.2 Reefs

5.2.1 Physical loss

The reef features are considered to have moderate sensitivity to loss through direct removal. They are considered to have a relatively low degree of sensitivity smothering due to the high degree of natural sediment influence that the communities of Lune deep experience and their relatively high level of recoverability. However, any loss of reef communities would be of concern due to their ecological importance within the reef habitat. Many communities that use the reef habitats are interdependent upon the ecological functioning of others (for example, invertebrate communities and fish) and it is important that this potential indirect effect is considered when the effects of removal or smothering are assessed.

There is a licensed dredge disposal site within Lune Deep, which deposits spoil from maintenance dredging operations in Morecambe Bay however this is some away from the site boundary. As a consequence the reefs are currently considered to have only low exposure to physical loss due to smothering.

Mobile fishing gear (mainly trawling for flat fish) occurs on the sandy/muddy substrate in the bottom of the Lune Deep channel, but the gear does not come in to contact with the reef features. Potting for crabs and lobsters also occurs around the northern edge of Lune Deep but not on its flanks. The level of potting is low and pots used are understood not to cause much damage to the habitat on which they sit.

Overall the **vulnerability of reef sub-features** within the Shell Flat & Lune Deep cSAC to **physical loss** is considered to be **low**.

5.2.2 Physical damage

The reef features are considered to have a low degree of sensitivity to siltation commensurate with their sensitivity to smothering. They also share moderate sensitivity to abrasion which can cause damage to a significant proportion of the species found in relatively stable cobble, boulder and bedrock reef communities. In addition, stony reef is considered to have a low degree of sensitivity to selective extraction of the substratum.

Again due to the presence of the dredge disposal site within Lune Deep the exposure of the reef feature to siltation is considered to be low resulting in an assessment of low vulnerability.

Despite the sensitivity of the reef feature to physical damage through abrasion, and of stony reef to selective extraction, the reef is not identified as having a significant degree of

exposure to activities such as towed demersal fisheries or aggregate extraction which can result in such effects and thus the exposure to abrasion is considered to be low. Thus vulnerability of the reef feature to abrasion or selective extraction is also considered to be low.

Overall the **vulnerability of the reef feature** within the Shell Flat & Lune Deep cSAC to **physical damage** is considered to be **low**

5.2.3 Toxic contamination

The dominant reef biotopes are considered to have intermediate intolerance to contamination by both synthetic and non synthetic substances; and recover moderately quickly once the contamination is removed. Thus their overall level of sensitivity is considered to be moderate.

Due to the proximity of the reef sub-features to the coast, they are currently considered to be exposed to moderate levels of toxic contamination from land based discharges (e.g. the waste water discharge into Lune Deep from the Fylde coast). This judgement results from both the distance of the reef to the waste water discharge and known levels of heavy metals, and synthetic substances.

Overall the **vulnerability of reef sub-features** within the Shell Flat & Lune Deep cSAC to toxic contamination is considered to be **moderate**.

5.2.4 Non-Toxic contamination

The dominant biotopes are likely to be of low sensitivity to nutrient enrichment.

Due to the proximity of the reef feature to the coast, and in particular local waste water discharges they are currently exposed to moderate- levels of non-toxic contamination from land based discharges.

Overall the **vulnerability of the reef feature** within the Shell Flat & Lune Deep cSAC to **non-toxic contamination** is considered to be **low**.

5.2.5 Biological disturbance

Biological disturbance can include the introduction of pathogens or non-native species as well as selective extraction of species from the ecosystem. Removal of fish and crustacean species can have significant impacts on the structure and functioning of benthic communities over and above the physical effects of fishing methods. Thus the reef feature is considered to be moderately sensitive to selective extraction of species.

As indicated above the exposure of the reef feature to fishing is considered to be relatively low at this site as some fishing occurs on the floor of Lune Deep – mainly flatfish – but not to a great extent.

Overall the **vulnerability of the reef feature** within the Shell Flat and Lune Deep cSAC to **biological disturbance** is considered to be **low**.

6. References

BGS. 2005. DTI Strategic Environmental Assessment Area 6, Irish Sea, seabed and surficial geology and processes. British Geological Survey. Commissioned Report CR/05/057

BROWN, A. E., BURN, A. J., HOPKINS, J. J., & WAY, S. F., (eds), 1997. The Habitats Directive: selection of Special Areas of Conservation in the UK. Joint Nature Conservation Committee Report 270, Peterborough, 295pp.

CEFAS. 2004. Distribution and relative abundance of demersal fishes from beam trawl survey in the Irish Sea (ICESS division VIIa) 1993-2001. M. Parker-Humphreys. Technical Report No.120.

CONNOR, D.W., ALLEN, J.H., GOLDING, N., HOWELL, K.L., LIEBERKNECHT, L.M., NORTHEN, K.O. & REKER, J.B. (2004). The Marine Habitat Classification for Britain and Ireland Version 04.05 JNCC, Peterborough

DETR & THE WELSH OFFICE. 1998. *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. London: DETR.

ELLIOTT, M., NEDWELL, S., JONES, N.V., READ, S.J., CUTTS, N.D. &.HEMINGWAY, K.L.. 1998. *Intertidal Sand and Mudflats & Subtidal Mobile Sandbanks (volume II). An overview of dynamic and sensitivity characteristics for conservation management of marine SACs*. Scottish Association for Marine Science (UK Marine SACs Project). 151 Pages.

EMBLOW. C.S. 1992. Survey of the sublittoral hard substrata from Morecambe Bay to Whitehaven. JNCC Report No. 28 (Marine Nature Conservation Review, report no. MNCR/SR/19)

HISCOCK, K. 1996. Marine Nature Conservation Review: rationale and methods. Peterborough, JNCC.

HISCOCK, K. & TYLER-WALTERS, H., 2006. Assessing the sensitivity of seabed species and biotopes - the Marine Life Information Network (*MarLIN***)**. *Hydrobiologia*, 555, 309-320.

ROYAL HASKONING 2008. Inshore Special Area of Conservation (SAC): Shell Flat and Lune Deep, SAC Selection Assessment. Report No. 9S02829S0282/SSR/ MORECAMBE/01.

SCOTTISH POWER, 2007. Cirrus Shell Flat Array – Benthic Survey 2007. P40254 September 2007 (Rev 3).

TITAN ENVIRONMENTAL SURVEYS LTD. 2002. Shell Flat Wind Farm Development. Benthic Survey. Report on behalf of Shell Exploration and Production / Scottish Power plc. Final Report. (CS0045/D1/V3). December 2002.

TYLER-WALTERS, H. & HISCOCK, K., 2003**.** A biotope sensitivity database to underpin delivery of the Habitats Directive and Biodiversity Action Plan in the seas around England and Scotland. *Report to English Nature and Scottish Natural Heritage from the Marine Life Information Network (MarLIN). Plymouth: Marine Biological Association of the UK.* [*English Nature Research Reports*, ENRR No. 499.]

TYLER-WALTERS, H. & HISCOCK, K., 2005. Impact of human activities on benthic biotopes and species. *Report to Department for Environment, Food and Rural Affairs from the Marine Life Information Network* (*MarLIN*). Plymouth: Marine Biological Association of the UK. [Contract no. CDEP 84/5/244]

TYLER-WALTERS, H., HISCOCK, K., LEAR, D.B. & JACKSON, A., 2001. Identifying species and ecosystem sensitivities**.** *Report to the Department for Environment, Food and Rural Affairs from the Marine Life Information Network (MarLIN), Marine Biological Association of the United Kingdom, Plymouth.* Contract CW0826.

Appendix A

Favourable Condition Table (FCT) for Shell Flat & Lune Deep cSAC

Feature: Annex I Sandbanks which are slightly covered by seawater all the time

(See Appendix F for description of biotope codes used)

Attribute	Measure	Target	Comment
Extent of sandbanks (Mandatory CSM attribute)	Overall area (ha) of sandbanks measured periodically throughout the reporting cycle.	No decrease in extent from established baseline, subject to natural succession/ known cyclical change. Baseline: Royal Haskoning 2008. An acoustic survey of the sandbank is planned for 2011	Consideration of changes in extent will need to take account of the dynamic nature of the sandbank.

Attribute	Measure	Target	Comment
Topography of sandbanks (Mandatory CSM attribute)	Depth distribution of sandbanks from selected sites, measured periodically (as change is likely to be gradual in most areas, it is suggested that a 5 - 10 year survey timescale is sufficient for measurement of this attribute, although UKHO may be able to provide additional advice for specific sites based on their routine resurvey data).	No alteration in topography of the sandbanks, allowing for natural responses to hydrodynamic regime. Baseline not yet fully established. An acoustic survey of the sandbank is planned for 2011.	The depth and distribution of the sandbanks reflects the energy conditions and stability of the sediment, which is key to the structure of the feature. However, it should be noted that subtidal sandbanks are naturally dynamic environments and sections of them may be subject to significant fluctuations in height over time, while other sections are more stable
Sediment character (Mandatory CSM attribute)	Assessed using Particle Size Analysis (PSA).Parameters include percentage sand/silt/gravel, mean and median grain size, and sorting coefficient, used to characterise sediment type	Maintain distribution of sediments allowing for natural fluctuations. Average PSA parameters should not deviate significantly from the baseline established for the sites, subject to natural change. The site baselines have been determined by BGS SB250 sediment data and survey work. Primary data in Royal Haskoning 2008	Sediment character is key to the structure of the sandbank, and reflects the physical processes acting on it. In addition to this, the sediment character is instrumental in determining the biological communities present on the sandbank.
Distribution of feature and biotopes (Distribution of biotopes is Mandatory CSM attribute)	Distribution and extent of community types (Table 1), measured by grab sampling or drop down video. Frequency and occurrence of component species of representative sandbank biotopes: SS.SSa.CMuSa.AalbNuc SS.SMu.CSaMu.AfilMysAnit	Maintain the distribution of subtidal sandbank communities, allowing for fluctuation. Baseline: Royal Haskoning 2008	Notable biotopes should be selected owing to their national significance, sensitivity, or representativity as a typical biotope for the biological zone. Where a biotope is lost from a baseline known area of presence (outside expected natural variation), leading to a loss of the conservation

Attribute	Measure	Target	Comment
	Distribution of sub-features has not yet been determined		interest of the site, then condition should be considered unfavourable. Changes in the presence or distribution of biotopes may indicate long-term changes in the physical conditions at the site, and deterioration in the overall biological value of the site.
Species composition of representative or notable biotopes (Discretionary CSM attribute)	Species composition of representative or notable biotopes (Table 1) is measured by grab sampling or drop down video. Frequency and occurrence of component species of representative or notable offshore upstanding reef biotopes including: SS.SSa.CMuSa.AalbNuc SS.SMu.CSaMu.AfilMysAnit , measured once, during summer, within the reporting cycle.	No decline in biotope quality as a result of reduction in species richness or loss of species of ecological importance, allowing for fluctuation. Baseline: Royal Haskoning 2008	Whilst some change in community composition over time is expected (for example, as part of cyclic changes or successional trends) changes in the overall nature of communities across the key representative biotopes sandbank, may indicate deterioration in the condition of the biodiversity of the sandbanks. Species composition of representative or notable biotopes is an important contributor to the structure of a biotope. The presence and abundance of a characterising species gives an indication of the quality of a biotope, and any change in composition may indicate a cyclic change or trend in the reef community. Where changes in species composition are known to be clearly attributable to natural

Attribute	Measure	Target	Comment
			succession, seasonal variability or mass recruitment or dieback of characterising species, then the target value should accommodate this variability. Where there is a change in biotope quality outside the expected variation or a loss of the conservation interest of the site, then condition should be considered unfavourable.

Attribute	Measure	Target	Comment
Species population measures (Discretionary CSM attribute)	Species are not yet specified	Maintain age/size class structure of individual species *Baseline yet to be established*	Changes in presence and/or abundance of a species can critically affect the physical and functional nature of the habitat, leading to unfavourable condition. The species selected should serve an important role in the structure and function of the biological community. Whilst some change in community structure over time is expected (for example, as part of cyclic changes or successional trends) changes in the overall nature of communities across the sandbank, including mobile species e.g. fish, crustacean species etc, may indicate deterioration in the condition of the biodiversity of the sandbanks. Where the field assessment judges changes in the presence and/or abundance of specified species to be unfavourable, and subsequent investigation reveals the cause is clearly attributable to natural succession and known cyclical change (such as mass recruitment and dieback of characterising species), the final assessment will require expert judgement by Natural England advisers to determine the reported condition of the feature. The

Attribute	Measure	Target	Comment
			feature's condition could be declared favourable where the expert judgement of Natural England/JNCC advisers is certain that the conservation interest of the feature is not compromised by the failure of this attribute to meet its target condition. Where there is a change outside the expected variation or a loss of the conservation interest of the site, (e.g. due to anthropogenic activities or unrecoverable natural losses) then condition should be considered unfavourable

Feature: Reefs

Attribute	Measure	Target	Comment
Extent of reefs (Mandatory CSM attribute)	Overall area (ha) of reef measured periodically throughout the reporting cycle.	No decrease in extent from established baseline, subject to natural change. *Baseline from Royal Haskoning 2008 and MCA acoustic data. Further CMACS survey work for Lune Deep is scheduled for 2011*	Extent of reef is a reporting requirement of the Habitats Directive. While changes in extent may be unlikely due to removal of the bedrock reef itself, loss of extent may occur due to excessive smothering by sediment as part of natural coastal processes or anthropogenic activity.
Biotope composition of reefs (Mandatory CSM attribute)	Presence and/or abundance of a variety of reef biotopes (Table 2) at specified locations throughout the site.	Maintain the full variety of biotopes identified for the site to an established baseline, subject to natural change. *Biotopes identified from Royal Haskoning, 2008; and CMACS survey work for scheduled for 2011 will further examine Lune Deep biotope and species composition.*	This attribute aims to measure the overall variety of communities throughout the site. It will be expected to find the suite of target biotopes within the combined results of the survey for the site. Absence of a biotope from the subset will result in an unfavourable assessment for the feature. Measuring biotope composition throughout the whole site is challenging. It is therefore appropriate to measure the presence of the biotopes at a number of specified known locations throughout the site. Where changes in biotope composition are known to be attributable to natural processes (e.g. winter storm events, changes in supporting processes or mass recruitment or dieback of characterising species) then the target value should accommodate this variability. Where a change in biotope composition occurs outside

Attribute	Measure	Target	Comment
			the expected variation or a loss of the conservation interest of the site is identified, then condition should be considered unfavourable.
Distribution and spatial pattern of reef biotopes (Mandatory CSM attribute)	Distribution and spatial arrangement of reef biotopes (Table 2) at specified locations. Measure during summer, once during reporting cycle.	Maintain the distribution and spatial pattern of reef biotopes identified for the site, to an established baseline, allowing for natural change. *Biotopes identified from Royal Haskoning, 2008; and CMACS survey work for scheduled for 2011 will further examine Lune Deep biotope and species composition.*	The distribution and spatial pattern of biotopes at specified locations is an essential component of the feature, representing the structure and particularly the function of the reef. Distribution refers to the geographic location of biotopes throughout the feature. Spatial pattern refers to the local zonation or juxtaposition of biotopes at specified locations. This attribute complements an assessment of the 'biotope composition' attribute by ensuring that the distribution of the conservation interest is maintained throughout the feature. Unlike *Biotope Composition* this attribute is concerned with the presence or absence of biotopes at specific locations and their spatial relationship to one another. Measuring the full distribution and spatial pattern of the biotopes is challenging. It is therefore appropriate to measure the presence of the biotopes at a number of specified known locations throughout the site. Changes in the distribution and spatial arrangement may indicate long-term changes in the prevailing physical conditions at the

Attribute	Measure	Target	Comment
			site. Where changes in distribution/spatial pattern are known to be clearly attributable to cyclical succession or an expected shift in distribution then the target value should accommodate this variability. Where a change in biotope distribution/spatial pattern occurs outside the expected variation or a loss of the conservation interest of the site is identified, condition should be considered unfavourable.
Extent of representative / notable reef biotopes (Discretionary CSM attribute)	Extent of representative/notable reef biotopes (Table 2), including CR.HCR.XFa, CR.HCR.XFa.FluCoAs, CR.HCR.XFa.FluHocu, SS.SMx.CMx.FluHyd, measured once during summer, within the reporting cycle.	No change in the extent of representative / notable reef biotopes, from an established baseline, allowing for natural change. *Biotopes identified from Royal Haskoning, 2008; and CMACS survey work for scheduled for 2011 will further examine Lune Deep biotope and species composition.*	The extent of the representative / notable biotopes listed is an important structural aspect of the sub-feature and therefore the bedrock reef habitat. Changes in extent and distribution may indicate long-term changes in the physical conditions at the site. Notable biotopes selected owing to their national significance, sensitivity, or representativity as a typical biotope for the biological zone. Where a change in extent outside the expected variation occurs or a change in the structure of the biotope leading to a loss of the conservation interest of the site is identified, then condition should be considered unfavourable.
Presence of representative / notable reef biotopes (Discretionary CSM attribute)	Presence and/or abundance of representative/notable reef biotopes (Table 2), including	Presence of biotopes at specified locations should not deviate significantly from an established baseline, allowing for natural change.	Where a biotope is lost from a baseline known area of presence (outside expected natural variation), leading to a loss of the conservation

Attribute	Measure	Target	Comment
	CR.HCR.XFa, CR.HCR.XFa.FluCoAs, CR.HCR.XFa.FluHocu, SS.SMx.CMx.FluHyd, measured once during summer, within the reporting cycle.	*Biotopes identified from Royal Haskoning, 2008; and CMACS survey work for scheduled for 2011 will further examine Lune Deep biotope and species composition.*	interest of the site, then condition should be considered unfavourable.
Species composition of representative or notable reef biotopes (Discretionary CSM attribute)	Frequency and occurrence of component species of representative or notable reef biotopes (Table 2) including: CR.HCR.XFa, CR.HCR.XFa.FluCoAs, CR.HCR.XFa.FluHocu, SS.SMx.CMx.FluHyd, measured once, during summer, within the reporting cycle.	No decline in reef biotope quality due to change in species composition or loss of notable species, from an established baseline, allowing for natural change. *Biotopes identified from Royal Haskoning, 2008; and CMACS survey work for scheduled for 2011 will further examine Lune Deep biotope and species composition.*	Notable biotopes selected owing to their national significance, sensitivity, or representativity as a typical biotope for the biological zone. Species composition is an important contributor to the structure of a biotope and therefore the reef as a whole. The presence and abundance of a characterising species gives an indication of the quality of a biotope, and any change in composition may indicate a cyclic change or trend in the reef community. Where changes in species composition are known to be clearly attributable to natural succession, known cyclical change or mass recruitment or dieback of characterising species, then the target value should accommodate this variability. Where there is a change in biotope quality outside the expected variation or a loss of the conservation interest of the site, then condition should be considered unfavourable.
Presence and/or abundance of specified reef species	Species may include: *Alcyonium digitatum, Cancer pagurus, Flustra*	Maintain presence and/or abundance of species from an established	Changes in presence and/or abundance of a species can critically

Attribute	Measure	Target	Comment
(Discretionary CSM attribute)	*foliacea, Asterias rubens, Nemertesia* spp.*, antennina* spp.*, Pomatoceros, Ammodytes, Hyas araneus, Urticina eques* , Measured once, during summer, within the reporting cycle. (Table 2).	baseline, allowing for natural change. *Species identified from Royal Haskoning, 2008; and CMACS survey work for scheduled for 2011 will further examine Lune Deep biotope and species composition.*	affect the physical and functional nature of the habitat, leading to unfavourable condition. The species selected should serve an important role in the structure and function of the biological community. Where the field assessment judges changes in the presence and/or abundance of specified species to be unfavourable, and subsequent investigation reveals the cause is clearly attributable to natural succession and known cyclical change (such as mass recruitment and dieback of characterising species), the final assessment will require expert judgement to determine the reported condition of the feature. The feature's condition could be declared favourable where the expert judgement by Natural England advisers is certain that the conservation interest of the feature is not compromised by the failure of this attribute to meet its target condition. Where there is a change outside the expected variation or a loss of the conservation interest of the site, (e.g. due to anthropogenic activities or unrecoverable natural losses) then condition should be considered unfavourable.

Table 1: Shell Flat & Lune Deep cSAC sandbank communities (From Haskoning 2008)

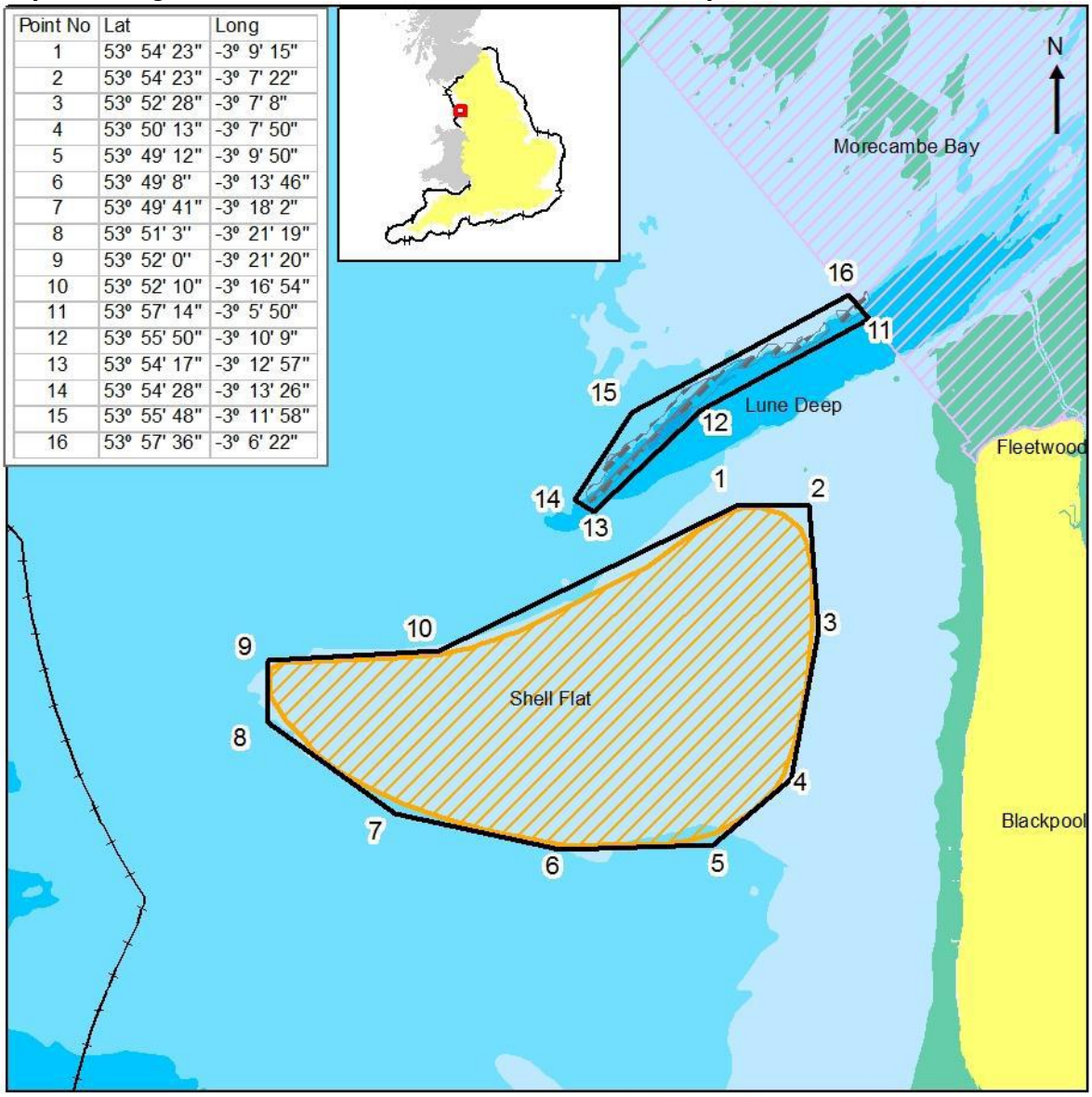
Biotopes (from www.marlin.ac.uk)		Sandbank
SS.SSa.CMuSa.AalbNuc	*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment.	*
SS.SMu.CSaMu.AfilMysAnit	*Amphiura filiformis* and *Echinocardium cordatum* in circalittoral clean or slightly muddy sand off shallow wave-exposed coasts)	*

Table 2: Shell Flat & Lune Deep cSAC reef communities (From Haskoning 2008)

Biotope (from www.marlin.ac.uk and www.jncc.defra.gov.uk)		Reefs
CR.HCR.XFa	Mixed faunal turf communities	*
CR.HCR.XFa.FluCoAs	*Flustra foliacea* and colonial ascidians on tide-swept moderately wave-exposed circalittoral rock	*
CR.HCR.XFa.FluHocu	*Flustra foliacea* and *Haliclona oculata* with a rich faunal turf on tide-swept circalittoral mixed substrata	*
SS.SMx.CMx.FluHyd	*Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment	*

Map showing interest features of Shell Flat & Lune Deep cSAC

Point No	Lat	Long
1	53° 54' 23"	-3° 9' 15"
2	53° 54' 23"	-3° 7' 22"
3	53° 52' 28"	-3° 7' 8"
4	53° 50' 13"	-3° 7' 50"
5	53° 49' 12"	-3° 9' 50"
6	53° 49' 8"	-3° 13' 46"
7	53° 49' 41"	-3° 18' 2"
8	53° 51' 3"	-3° 21' 19"
9	53° 52' 0"	-3° 21' 20"
10	53° 52' 10"	-3° 16' 54"
11	53° 57' 14"	-3° 5' 50"
12	53° 55' 50"	-3° 10' 9"
13	53° 54' 17"	-3° 12' 57"
14	53° 54' 28"	-3° 13' 26"
15	53° 55' 48"	-3° 11' 58"
16	53° 57' 36"	-3° 6' 22"



candidate Special Area of Conservation
Shell Flat and Lune Deep

Scale 1:200,000 Map 1 of 1
0 1 2 4 Kilometers

EU Site Code: UK0030376
Theme ID: 1452095
Version number: 2.0
Grid Ref: SD203415
Longitude: 3° 12' 45" W
Version: 9.0
Latitude: 53° 51' 50"N
Plotted: 05/09/2011
Projection: UTM 30N (WGS84)
Plot ID: 9.0
Area of SAC: 105.65 sq km 10565.34 ha

- candidate Special Area of Conservation
- Reefs
- Sandbanks which are slightly covered by sea water all the time
- Special Areas of Conservation

Depth Areas

- Drying
- <=10m
- <=20m
- <=50m
- <=100m
- England 12nM Territorial Seas Limit

NATURAL ENGLAND

Appendix C
Methods deriving vulnerability

Sensitivity[17]	
None	-
Low	•
Moderate	••
High	•••

Exposure	
None	-
Low	+
Medium	++
High	+++

Vulnerability	
None detectable	
Low	
Moderate	
High	

The relative vulnerability of an interest feature is determined by multiplying the scores for relative sensitivity and exposure, and classifying that total into categories of relative vulnerability. For the sandbank features the sensitivity is as defined by MarLIN (2011). The sensitivity assessment for each activity in Annex D for the sub-feature uses the highest (i.e. most precautionary) sensitivity for the range of biotopes and species used to define this sub-feature, where more than one biotope or species is related to a sub-feature (see Annex F for list of biotopes and species sub-features consist of, and for which sensitivity assessments are available for).

		Relative sensitivity of the interest feature			
		High (3)	**Moderate (2)**	**Low (1)**	**None detectable (0)**
Relative exposure of the interest feature	**High (3)**	9	6	3	0
	Medium (2)	6	4	2	0
	Low (1)	3	2	1	0
	None (0)	0	0	0	0

Categories of relative vulnerability	
High	6-9
Moderate	3-5
Low	1-2
None detectable	0

[17]Where sensitivities in MarLIN are defined as 'Very Low' they are classified here as 'Low'. Where sensitivities in MarLIN are defined as 'Very High' they are classified here as 'High'

Appendix D

Summary of pressures which may cause deterioration or disturbance to Shell Flat & Lune Deep cSAC

Pressures which may cause deterioration or disturbance	Shell Flat Sandbank	Lune Deep Reef
Physical loss		
Removal (e.g. capital dredging, offshore development)		✓
Smothering (e.g. by aggregate dredging, disposal of dredge spoil)		✓
Physical damage		
Siltation (e.g. run-off, channel dredging, outfalls)	✓	✓
Abrasion (e.g. boating, anchoring, demersal fishing)	✓	✓
Selective extraction (e.g. aggregate dredging)		
Toxic contamination		
Introduction of synthetic compounds (e.g. pesticides, TBT, PCBs)	✓	✓
Introduction of non-synthetic compounds (e.g. heavy metals, hydrocarbons)	✓	✓
Introduction of radionuclides		
Non-toxic contamination		
Changes in nutrient loading (e.g. agricultural run-off, outfalls)		
Changes in organic loading (e.g. mariculture, outfalls)	✓	✓
Changes in thermal regime (e.g. power stations)		
Changes in turbidity (e.g. run-off, dredging)	✓	✓
Changes in salinity (e.g. water abstraction, outfalls)	✓	✓
Biological disturbance		
Introduction of microbial pathogens		
Introduction of non-native species and translocation		
Selective extraction of species (e.g. bait digging, wildfowling, commercial & recreational fishing)	✓	✓

Appendix E

Assessment of relative vulnerability of interest features and sub-features of Shell Flat & Lune Deep cSAC to different categories of pressures (see Appendix C for key)

Pressures which may cause deterioration or disturbance	Feature					
	Annex I sandbanks			Annex I reefs		
	Sensitivity	Exposure	Vulnerability	Sensitivity	Exposure	Vulnerability
Physical loss						
Removal (e.g. harvesting, coastal development)	••	-	-	••	+	Low
Smothering (e.g. by artificial structures, disposal of dredge spoil)	••	-	-	••	+	Low
Physical damage						
Siltation (e.g. run off, channel dredging, outfalls)	•	+	Low	••	+	Low
Abrasion (e.g. boating, anchoring, trampling)	•	++	Low	••	+	Low
Selective extraction (e.g. aggregate dredging)	••	-	-	•••	-	-
Toxic contamination						
Introduction of synthetic compounds (e.g. pesticides, TBT, PCBs)	••	+	Low	••	++	Moderate
Introduction of non-synthetic compounds (e.g. heavy metals, hydrocarbons)	••	+	Low	••	++	Moderate
Introduction of radionuclides	Insufficient information	-	-	Insufficient information	-	-
Non-toxic contamination						
Changes in nutrient loading (e.g. agricultural run-off, outfalls)	•	+	Low	•	+	Low

Changes in organic loading (e.g. mariculture, outfalls)	•	+	Low	•	+	Low
Changes in thermal regime (e.g. power stations)	•	-	-	•••	-	-
Changes in turbidity (e.g. run-off, dredging)	•	+	Low	••	-	-
Changes in salinity (e.g. water abstraction, outfalls)	•	-	-	•••	-	-
Biological disturbance						
Introduction of microbial pathogens	•	+	Low	•	+	Low
Introduction of non-native species and translocation	•	+	Low	••	+	Low
Selective extraction of species (e.g. bait digging, wildfowling, commercial & recreational fishing)	•••	+	Moderate	•••	-	-

Appendix F

Shell Flat & Lune Deep cSAC Species and Biotopes used to determine site sensitivity

Shell Flat cSAC Biotopes[18] and Species used to determine site sensitivity	
Sandbank	
SS.SSa.CMuSa,AlcNuc	*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment), across its surface area, dominated by *Nucula nitidosa* and *Magelona johnstoni* with some *Fabulina fibula*.
SS.SMu.CSaMu.AfilMysAnit	*Amphiura filiformis* and *Echinocardium cordatum* in circalittoral clean or slightly muddy sand off shallow wave-exposed coasts
Reefs	
CR.HCR.XFa	Mixed faunal turf communities
CR.HCR.XFa.FluCoAs	*Flustra foliacea* and colonial ascidians on tide-swept moderately wave-exposed circalittoral rock
CR.HCR.XFa.FluHocu	*Flustra foliacea* and *Haliclona oculata* with a rich faunal turf on tide-swept circalittoral mixed substrata
SS.SMx.CMx.FluHyd	*Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment
Alcyonium digitatum *Cancer pagurus* *Flustra foliacea* *Asterias rubens* *Nemertesia antennina* *Pomatoceros* spp. *Ammodytes* spp. *Hyas araneus* *Urticina eques* *Alcyonium digitatum*	

[18] Biotopes used are according to MarLIN 2004 codes (see www.marlin.ac.uk). These listed biotopes may be reviewed to reflect new evidence/survey results.