Offshore Special Area of Conservation: Haisborough, Hammond and Winterton

Draft Conservation Objectives and Advice on Operations

Version 4.0 (12th August 2010)

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Summary of Draft Conservation Objectives and Advice on Operations for Haisborough, Hammond and Winterton possible Special Area of Conservation (SAC)

This advice is based on information on the candidate SAC presented in Natural England and JNCC's 'Haisborough, Hammond and Winterton: SAC Selection Assessment' document (Version 6.0 (August 2010) Natural England and JNCC's conservation objectives and advice on operations is site and feature specific, and has been developed using best available scientific information and expert interpretation as at August 2010. The draft advice is generated through a coarse grading of sensitivity and exposure of site interest features to physical, chemical and biological pressures associated with human activity. Sensitivity and exposure have been combined to give a measure of the vulnerability of an interest feature to operations which may cause damage or deterioration, and which therefore require management.

The exact impact of any operation will be dependent upon the nature, scale, location and timing of events. This Advice on Operations for the Haisborough, Hammond and Winterton site will be kept under review and will be periodically updated to reflect changes in both sensitivity and exposure.

Management actions should enable the biological communities associated with the Haisborough, Hammond and Winterton Annex I Sandbanks which are slightly covered by seawater all the time and Annex I habitat Reefs to achieve their full natural biological diversity, and the underlying physical structure of the interest feature to be maintained. This will require assessment and management of human activities likely to affect these adversely, and of activities likely to impact the functioning of natural processes upon which the feature is dependent.

To fulfil the conservation objectives for the Annex I habitat Sandbanks which are slightly covered by seawater all the time, and Annex I habitat Reefs, the competent authorities for this area are advised to manage human activities within their remit such that they do not result in deterioration or disturbance or impede the restoration of this feature through any of the following.

i) Physical loss by Removal (e.g. aggregate dredging) or Obstruction (e.g. gas and renewables industry infrastructure and cables);

ii) Physical damage by Physical disturbance or abrasion (e.g. demersal trawling), Changes in suspended sediment (e.g. aggregate and maintenance dredging, demersal trawling) Changes in suspended sediment (e.g. aggregate dredging, demersal trawling);

iii) **Toxic contamination** by introduction of Synthetic and/or Non-synthetic compounds (e.g. pollution from oil and gas industry, shipping);

iv) **Non-toxic contamination** by Changes in turbidity (e.g. aggregate and maintenance dredging, demersal trawling);

v) **Biological disturbance** by Selective extraction of species (e.g. demersal trawling).

Natural England is currently undertaking a risk assessment process for all existing inshore marine SACs. JNCC and Natural England will extend this process to include the Haisborough, Hammond and Winterton site.

1. Haisborough, Hammond and Winterton: Draft conservation objectives and operations advice

1.1 Natural England and JNCC's roles

The Haisborough, Hammond and Winterton possible SAC (pSAC), as outlined in the SAC Selection Assessment document prepared by Natural England and JNCC, lies across both English territorial waters and UK offshore waters.

The Conservation of Habitats and Species Regulations 2010 transpose the Habitats Directive into law on land and in territorial waters of Great Britain (out to 12 nautical miles from the coast). The Regulations give Natural England a statutory responsibility to advise relevant authorities on the conservation objectives and operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species for which the sites have been designated, for European marine sites in England.

The Offshore Marine Conservation (Natural Habitats &c.) Regulations 2007 (as amended in 2010) transpose the Habitats Directive into law for UK offshore waters (from 12 nautical miles from the coast out to 200 nm or the UK Continental Shelf). These Regulations give JNCC a statutory responsibility to advise Competent Authorities of the conservation objectives for offshore Special Areas of Conservation and to advise them of operations which may adversely affect the integrity of the site.

For both inshore and offshore waters, the requirement to provide advice on conservation objectives and advice on operations applies once a site has been submitted by Government to the European Commission (i.e. becomes a candidate SAC).

This advice is also required under the Offshore Petroleum Activities (Conservation of Habitats) Regulations (as amended in 2007); and the Environmental Impact Assessment and Natural Habitats (Extraction of Minerals by Marine Dredging) Regulations 2007.

This draft document for Haisborough, Hammond and Winterton pSAC is jointly prepared by JNCC and Natural England in fulfilment of the requirements of Regulation 35 of the Conservation of Habitats and Species Regulations 2010, and Regulation 18 of the Offshore Marine Conservation (Natural Habitats &c.) Regulations 2007.

This document will inform the scope and nature of any 'appropriate assessments' which the Directive requires to be undertaken for plans and projects (Regulations 61 & 63 of the 2010 Habitats and Species Regulations for inshore waters; and Regulation 25 of the Offshore Regulations). Natural England and/or JNCC may also provide more detailed advice to competent authorities assessing the implications of any such plans or projects. The information provided in this document will also be a key component of any management measure or scheme which may be developed for this site, and will inform monitoring and assessments of site condition and of the features on the site.

1.2 The role of relevant authorities

1.2.1 Inshore (0 – 12 nautical miles): The role of Relevant Authorities

Regulation 9 of the Conservation of Habitats and Species Regulations 2010 require competent 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 34 for the European marine site provides 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 SAC.

1.2.2 Offshore (12 – 200 nautical miles): The role of Competent Authorities

Regulations 22 and 23 of the Offshore Marine Conservation (Natural Habitats &c.) Regulations 2007 (as amended in 2010) require competent authorities to exercise their functions so as to secure compliance with the Habitats Directive. Competent 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 SAC.

1.3 Activity outside the control of relevant /competent authorities

Nothing within this document will require relevant /competent 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[1]. Having issued Advice on Operations for European marine sites, Natural England and JNCC will work with relevant /competent authorities and others to agree, within a defined time frame, a protocol for evaluating all 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 /competent authorities from taking action to prevent deterioration to the interest features, and indeed such actions should be taken when required.

1.4 Role of conservation objectives

The conservation objectives set out what is needed to ensure Favourable Condition of the Annex I feature. The UK conservation agencies use the term 'favourable condition' to represent the concept of Favourable Conservation Status for the interest features of an individual SAC (Davies, 2001). For an Annex I habitat, Favourable Conservation Status under the Habitats Directive occurs when: i) its natural range and area it covers within that range are stable or increasing; and ii) 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 iii) the conservation status of its typical species is favourable[2] (Article 1e).

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1 Determination of what constitutes natural change will be based on the best available information and scientific opinion at the time.

2 The term Favourable Conservation Status relates to the individual habitats and species over their natural range within the European Union. However, because the selection of the European network of

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, or may, cause a significant effect, and they inform the scope of appropriate assessments of plans or projects. The conservation objectives set out what needs to be achieved and thus deliver the aims of the Habitats Directive.

1.5 Role of advice on operations

Under the Habitats Directive, Member States are required to take appropriate steps to avoid the deterioration or disturbance of interest features within SACs (Article 6.2. The advice on operations set out in Section 3 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 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/competent authorities and surveillance to areas that may need management measures.

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

1.6 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 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).

2. Conservation objectives

2.1 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 and Offshore Marine Conservation Regulations, as well as providing the basis for the management of activities that may affect the features. An appropriate assessment will also require consideration of issues specific to the individual plan or project. The

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SACs is seen as fundamental to achieving Favourable Conservation Status, the European Commission considers that the concept should also be applied at the site level.

habitat quality definitions do not by themselves provide a comprehensive basis on which to assess plans and projects as required under

- Regulations 21-23; 27; 61-63 and 68 – 107 of the Conservation (Natural Habitats &c.) Regulations 1994;
- Regulations 25 - 29 of the Offshore Marine Conservation (Natural Habitats &c.) Regulations 2007;
- Regulation 5 (1 – 4) of the Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001
- Regulations 6; 13(1); 18(3); 13(3); 19(3); 24 & Schedule 3 of the Environmental Impact Assessment and Natural Habitats (Extraction of Minerals by Marine Dredging) (England and Northern Ireland Regulations 2007.

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

Through 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) 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 European Sites under the Habitats Regulations and Offshore Marine Conservation Regulations 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 European Site was classified or designated.

2.2 Haisborough, Hammond and Winterton SAC Conservation objectives

Under Regulation 35(3)(a) of the Conservation of Habitats and Species Regulations 2010 and Regulation 18 of the Offshore Marine Conservation (Natural Habitats &c.) Regulations 2007, Natural England and JNCC have a duty to advise other relevant authorities and / or competent authorities as to the conservation objectives for the European marine site. The conservation objectives for the Haisborough, Hammond and Winterton pSAC interest features are provided below. These are high level objectives for the site features, and Natural England / JNCC may refine them in future as our understanding of the features improves. They should be read in the context of (and in conjunction with) other advice given, particularly:

- the Selection Assessment Document which provides more detailed information about the site and evaluates its interest features according to the Habitats Directive selection criteria and guiding principles;
- the summary favourable condition table, which further defines favourable condition for the interest feature.

Within the objectives below superscript letters refer to explanatory text provided subsequently in section 2.2.2.

2.2.1 The draft conservation objective for Sandbanks slightly covered by seawater all the time

The Conservation Objectives for the Haisborough, Hammond and Winterton Sandbanks which are slightly covered by seawater at all time are:

Subject to natural change maintain[a] the feature in favourable condition, such that:

- The natural environmental quality[b] is maintained
- The natural environmental processes[c] are maintained
- The extent[d], physical structure[e], diversity[f], community structure[g] and typical species[h] representative **low diversity dynamic sand communities** are maintained.
- The extent[d], physical structure[e], diversity[f], community structure[g] and typical species[h] representative **moderate diversity stable sand communities** are maintained.

2.2.2 The draft conservation objective for *Sabellaria spinulosa* reef

The Conservation Objectives for the Haisborough, Hammond and Winterton *Sabellaria spinulosa* reefs are:

Subject to natural change maintain[a] or restore[a] the feature in / to favourable condition, such that:

- The natural environmental quality[b] is maintained
- The natural environmental processes[c] are maintained
- The extent[d], physical structure[e], diversity[f], community structure[g] and typical species[h] representative of *Sabellaria spinulosa* biogenic reef in the southern North Sea are maintained, or restored where deterioration has occurred.

It should be noted that the Reef feature is dependent on the maintenance of the same underpinning environmental quality and environmental processes that will enable the Sandbank feature to be in favourable condition.

2.2.3 Explanation of terms used in the Conservation Objectives

a) **Maintain** implies that based on our existing understanding the feature is regarded as being in favourable condition and will, subject to natural change, remain at its condition at designation. Understanding the functioning of large, varied, dynamic marine sites, which experience a variety of pressures resulting from historic and current activities, is difficult and consequently it is hard to define favourable condition precisely in such sites.

The Haisborough, Hammond and Winterton SAC Site Assessment Document indicates that the site has been affected by a number of human activities, but is currently considered to be in good condition overall. However, the advice on operations concludes that the features are moderately vulnerable to biological disturbance and physical damage as a result of moderate exposure to demersal fishing activities. There is a lack of evidence regarding the ecological impact of this activity on the sandbank feature at this particular site, but on further investigation we may conclude that the feature is in unfavourable condition and therefore will need restoration (see definition below). In addition, we currently have insufficient evidence on intensity and distribution of fishing to ascertain the amount of potential damage to the sandbank feature and therefore the possible extent to which restoration might be required. Our assessment of the condition of the sandbank feature in relation to other activities occurring at the site may also be revised in future.

Restoration in the marine environment generally refers to natural recovery through the reduction or removal of detrimental physical, chemical and biological pressures, rather than intervention (as is possible with the terrestrial features). Natural England and JNCC consider that maintenance or restoration of the following parameters (b - g) will take account of the maintenance or restoration of natural structures and functions and ecological processes.

b) **Natural environmental quality** e.g. chemical quality parameters of water, suspended sediment levels, radionuclide levels etc should not deviate from baseline at designation (if available) or reference conditions

c) **Natural environmental processes** e.g. circulation, sediment deposition and erosion etc. should not deviate from baseline at designation (if available) or reference conditions

d) **Extent** - the area covered by the habitat and communities

e) **Physical structure -** the shape, form and composition of the habitat and its substrata.

f) **Diversity** - the number of different biological communities, or number of species within a given community (for a list of biotopes comprising the sub-feature refer to Table 3).

g) **Community structure** e.g. age classes, sex ratios, distribution of species, abundance, biomass, reproductive capacity, recruitment, range and mobility

h) **Typical species –** see Appendix V for draft criteria for identifying typical species.

2.2.4 Background to favourable condition tables

The favourable condition table is the principle source of information that Natural England and JNCC will use to assess the condition of an interest feature and as such comprises indicators of condition. Favourable condition tables will be drafted in detail on designation of the SAC and it's adoption as a European marine site. This will involve the collation and quantification of a number of indicators of condition 'Attributes'. For these draft objectives, an indication of the Attributes to be included in the condition table are given in Table 1, and this will form the basis for the condition monitoring process as described below.

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. Future editions of the advice within this document, produced by Natural England and JNCC, will revise the current assumptions about feature condition in light of ongoing and future monitoring. 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 competent authorities, and as such the attributes and associated measures and targets may be modified over time. The aim is to develop a single agreed set of attributes that will be used as a basis for monitoring 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. To meet UK common standards, Natural England and JNCC will be committed to reporting on the attributes listed in the final version of the table. This information may be generated by Natural England or JNCC or collected by other organisations through agreements.

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, (assessing the conduct of activities in relation to licence conditions, conducted by relevant / competent authorities and their statutory advisors), together with data obtained to inform appropriate assessments, will also have an important role in assessing condition. 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 if developed. Natural England and JNCC 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 using the favourable condition table to guide the process.

Table 1 Indication of attributes to be used in defining favourable condition for the Haisborough, Hammond and Winterton pSAC annex I feature Sandbanks which are slightly covered by seawater all the time

Favourable condition tables will be drafted in detail on designation of the SAC and its adoption as a European marine site

Attribute	Target	Comments
Extent of sandbanks	No change in extent of sublittoral sandbank sediment habitat allowing for natural fluctuation / known cyclical change	Consideration of changes in extent will need to take account of the dynamic nature of the sandbank. The map on page 5 of the site selection assessment document shows the extent of the features.
Topography of sandbanks	No alteration in topography of the sandbanks, allowing for natural responses to hydrodynamic regime	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:	No change in composition of sediment types across the sandbank, allowing for natural succession/ known cyclical change.	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 sub-features and biotopes	Maintain the distribution of subtidal sandbank communities, allowing for natural succession/ known cyclical change.	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.
Community composition	No decline in biotope quality as a result of reduction in species richness or loss of species of ecological importance, allowing for natural succession/ known cyclical change.	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.
Population structure of individual species	Maintain age/size class structure of individual species.	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.

Table 2: Indication of attributes to be used in defining favourable condition for the Haisborough, Hammond and Winterton pSAC Annex I feature Reefs

Favourable condition tables will be drafted in detail on designation of the SAC and its adoption as a European marine site

Attribute	Target	Comments
Extent of reef	No change in extent of reef.	Consideration of changes in extent will need to take account of the dynamic nature of the sandbank habitat that supports the reef. The map on page 7 of the site selection document shows the extent of the features.
Reef elevation	No change in reef elevation	Consideration of changes in extent will need to take account of the dynamic natural cycles of reef growth and senescence. Reef elevation is related to the age and maturity of the biogenic reef and can be affected / reduced by physical damage to the reef.
Community composition	Reef shows no significant decline in community composition from baseline records	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 the community across the reef, may indicate deterioration in its condition. Measurement of the community composition of this feature is challenging. Remote sensing methods (such as side scan sonar) and drop down video although improving can be unreliable. Therefore limited grab sampling may be required to sample the benthic reef community. Additional techniques may be required to sample mobile species.
Presence and/or abundance of individual species	Reef shows no significant decline in presence and/or abundance of individual species from baseline records	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 (including mobile species) associated with the reefs, e.g. fish, crustacean species etc may indicate deterioration in the condition of the biodiversity of the reefs. Measurement of the community composition of this feature is challenging. Remote sensing methods (such as side scan sonar) and drop down video although improving can be unreliable. Therefore limited grab sampling may be required to sample the benthic reef community. Additional techniques may be required to sample mobile species

Population structure of individual species	Maintain age/size class structure of individual species.	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 (including mobile species) associated with the reefs, e.g. fish, crustacean species etc may indicate deterioration in the condition of the biodiversity of the reefs.

Table 3: Biotope communities comprising the features / sub-features of Haisborough Hammond and Winterton pSAC

The biotopes listed in the table have been derived from predictions relating to the broad biota classes outlined in figure 9.1 in the site assessment documents. Further refinement of the biotope list will be necessary prior to the development of the monitoring programme.

Biotopes (from Connor et al 2004)		**Occurrence in Low diversity dynamic sand communities**	**Occurrence in Moderate diversity stable sand communities**	**Occurrence in *Sabellaria spinulosa* reef**
SS.SMU.CSaMu.LkorPpel	*Lagis koreni* and *Phaxas pellucidus* in circalittoral sandy mud		*	
SS.SBR.PoR.SspiMx	*Sabellaria spinulosa* on stable circalittoral mixed sediment		*	*
SS.SCS.CCS	Circalittoral coarse sediment	*		
SS.SCS.ICS.MoeVen	*Moerella* spp. with venerid bivalves in infralittoral gravelly sand		*	
SS.SCS.ICS.SLan	Dense *Lanice conchilega* and other polychaetes in tide-swept infralittoral sand and mixed gravelly sand	*	*	
SS.SMx.CMx	Circalittoral mixed sediment		*	
SS.SMX.OMx.PoVen	Polychaete-rich deep *Venus* community in offshore mixed sediments		*	
SS.SSA.CFiSa.ApriBatPo	*Abra prismatica*, *Bathyporeia elegans* and polychaetes in circalittoral fine sand		*	
SS.SSA.CFiSa.EpusOborApri	*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand		*	
SS.SSa.CMuSa.AalbNuc	*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment		*	
SS.SSA.IFiSa.IMoSa	Infralittoral mobile clean	*		

	sand with sparse fauna			
SS.SSA.IFiSa.NcirBat	*Nephtys cirrosa* and *Bathyporeia* spp. in infralittoral sand	*		
SS.SSA.IFiSa.TbAmPo	Semi-permanent tube-building amphipods and polychaetes in sublittoral sand		*	
SS.SSA.IMuSa.EcorEns	*Echinocardium cordatum* and *Ensis* spp. in lower shore and shallow sublittoral slightly muddy fine sand	*		
SS.SSA.IMuSa.FfabMag	*Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand		*	
SS.SSa.OSa	Offshore circalittoral sand		*	

3. Advice on operations

Natural England has 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.

JNCC has a duty under Regulation 18 of the Conservation Offshore Marine Conservation (Natural Habitats &c.) Regulations 2007 to advise Competent 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.

3.1 Purpose of advice

The aim of this advice is to enable all Relevant and Competent Authorities to direct their work on the management of activities that pose a threat to the favourable condition of interest features on the Haisborough, Hammond and Winterton pSAC. The advice is linked to the conservation objectives for interest features and will help provide the basis for detailed discussions between relevant / competent 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 without prejudice to, any advice given under Regulation 48 or Regulation 50 (of the Conservation (Natural Habitats &c.) Regulations 1994) and Regulation 25 and Regulation 27 (of the Offshore Marine Conservation (Natural Habitats &c.) on operations that qualify as plans or projects within the meaning of Article 6 of the Habitats Directive.

3.2 Update and review of advice

Information as to the operations which may cause deterioration of natural habitats for which the site has been designated, is provided in light of what Natural England knows about current activities and patterns of usage at the Haisborough, Hammond and Winterton pSAC. Natural England and JNCC expect that the information on current activities and patterns of usage (which was used to derive exposure in Tables 4 and 5) will be refined as part of the process of developing the management scheme and through discussion with the relevant and competent 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 / competent authorities and others takes account of changes in the usage patterns that have occurred at the site, since this 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. Advice for sites will be kept under review and will be periodically updated through discussions with relevant / competent authorities and others to reflect significant changes in our understanding of sensitivity together with knowledge of changes within the site.

3.3 Plans and Projects

Under the following regulations:

- Regulation 48(1) of the Conservation (Natural Habitats, &c.) Regulations 1994,

- Regulation 25(1) of the Offshore Marine Conservation (Natural Habitats &c.) Regulations 2007,
- Regulation 5 of the Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001 and
- Schedule 3, paragraph 2 of the Environmental Impact Assessment and Natural Habitats (Extraction of Minerals by Marine Dredging) (England and Northern Ireland Regulations 2007,

an appropriate assessment needs to be undertaken in respect of any plan or project which:

a. either alone or in-combination with other plans or projects would be likely to have a ***significant effect*** on a European Site; and
b. is not directly connected with the management of the site for nature conservation.

A site that is being considered for designation as a SAC under the Habitats Directive becomes a European site for the purposes of the above Regulations at the point in time at which it is proposed to the Commission by the secretary of State or a Devolved Administration as a site eligible for designation as a SAC. On submission, the site becomes known in the UK as a candidate SAC (cSAC).

Whilst there is no obligation in domestic law to make this assessment in respect of a site prior to it becoming a cSAC, it should be considered a matter of good practice for Competent Authorities, before deciding to undertake or permit a plan or project, to assess its implications for sites such as this, whose proposed details are in the public domain, in accordance with the process described in Article 6.3 of the Habitats Directive. In doing so, a Competent Authority will be reducing the likelihood of the UK jeopardising the fulfilment of its obligations under the Habitats Directive. Further, without pre-judging any review of extant consents that may be required by the Habitats Regulations or the Offshore Marine Conservation Regulations, undertaking such an assessment and determining any consents in accordance with it, will reduce the uncertainty for developers who are granted consent but have not fully implemented it by the time the site becomes a cSAC.

3.4 Methods for assessment

Six broad Pressure Categories which may cause i) deterioration of natural habitats or the habitats of species, or ii) disturbance of species, (either alone or in combination), are considered in this document:

- Physical Loss
- Physical Damage
- Non-physical disturbance
- Toxic contamination
- Non-toxic contamination
- Biological disturbance

Example sources of pressures are provided (See Tables 4 and 5), although these examples are not inclusive of all potentially detrimental activities.

A three-step process is used to assess the vulnerability of the site's two sub-feature communities (i.e. **low diversity dynamic sand communities** and **moderate diversity stable sand communities)** and the ***Sabellaria spinulosa* reef feature** to the above pressures (see flow diagram in Appendix I):

- An assessment of the **sensitivity** of the sub-features to the listed pressures;
- An assessment of the current **exposure** of the sub-features to the pressures; and
- An assessment of the **vulnerability** of the sub-features to the pressures. Vulnerability occurs where sensitivity to a given pressure is combined with exposure to that pressure.

This approach is sufficiently robust to take into account the effects of new activities or changes in patterns of usage, and by assessing sensitivity, exposure and vulnerability independently, the reasoning behind current (and any future) advice is made clear. If an interest feature is known or thought to be sensitive to a particular pressure category, new activities or changes in patterns of activities which result in that pressure are likely to cause deterioration or disturbance.

All the scores of relative sensitivity, exposure and vulnerability are derived using best available scientific data and expert judgement. This method uses a coarse categorisation system, reflecting the current state of our understanding of the marine environment. It should be recognised that data for offshore habitats are sparse and assessments may need revision in light of new research or survey.

3.4.1 Sensitivity assessment

This assessment evaluates the relative sensitivity of the Haisborough, Hammond and Winterton interest features to the effects of the aforementioned pressures. Sensitivity is defined here 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, 2006). 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) (MarLIN, 2006). The sensitivity of interest features (and scientific understanding of sensitivity) may change over time; hence an operation which is not currently deemed to have a negative effect may do so in the future.

Tables4 and 5 show the sensitivity assessments for the sub-features of the Haisborough, Hammond and Winterton possible SAC. They are drawn principally from MarLIN's (2001) evaluations of the sensitivities of the following biotope (which is comparable to that present within the SAC):

Annex 1 habitat Sandbanks which are slightly covered by seawater all the time

Sub-feature 1 - low diversity dynamic sand communities

- ***Nephtys cirrosa* and *Bathyporeia* spp. in infralittoral sand (IGS.NcirBat)**

There is no direct assessment of 'low diversity dynamic sand communities' the on MarLIN website (the widely used reference database for information on habitat ecology, distribution, species composition and likely sensitivity to human activities and natural events). However, MarLIN states that the biotope above also 'covers' the

biotope ‘Sparse fauna in infralittoral mobile clean sand (IGS.Mob)’ in terms of sensitivity assessment and therefore provides a good analogue.

Sub-feature 2 - moderate diversity stable sand communities

- **Dense *Lanice conchilega* and other polychaetes in tide-swept infralittoral sand (IGS.Lcon)**

There is no direct assessment of ‘moderate diversity stable gravel and mixed sediment communities’ on the MarLIN website. Natural England and JNCC expert opinion considers this biotope to be a good analogue.

The applicability of the MarLIN assessments of sensitivity is dependent on the quality of available scientific information on these biotopes and their characterising species. In addition, both the biotope classification system and the MarLIN sensitivity assessments primarily rely on inshore biological data, so although they are applicable to habitats in offshore waters, confidence in these assessments in an offshore context is necessarily lower. JNCC and Natural England have in some cases, therefore, adjusted the assessments of sensitivity to be more precautionary. Further detail on our approach to evaluating sensitivity can be provided on request.

Annex 1 habitat Reefs

- ***Sabellaria spinulosa* on stable circalittoral mixed sediment (SS.SBR.PoR.SspiMx)**

Natural England and JNCC expert opinion considers this biotope to match the *Sabellaria spinulosa* reef feature.

The applicability of the MarLIN assessments of sensitivity is dependent on the quality of available scientific information on these biotopes and their characterising species. In addition, both the biotope classification system and the MarLIN sensitivity assessments primarily rely on inshore biological data, so although they are applicable to habitats in offshore waters, confidence in these assessments in an offshore context is necessarily lower. JNCC and Natural England have in some cases, therefore, adjusted the assessments of sensitivity to be more precautionary (see Tables 4 and 5). Further detail on our approach to evaluating sensitivity can be provided on request.

Interest feature sensitivity to physical, chemical and biological pressures:

The interest features and associated biological communities of the Haisborough, Hammond and Winterton site are sensitive to: **Physical loss**, **Physical damage**, **Toxic** and **Non-toxic contamination**, and **Biological disturbance**, resulting from a range of activities.

a) Physical loss

Low diversity dynamic sand communities and moderate diversity stable sand communities are relatively high energy habitats, often with a good ability to recover from physical disturbance, however, loss of distinct assemblages within the habitat sub-features through removal of sediment habitat may result in a decrease in the overall diversity of the interest feature. Thus sandbank sub-features are considered to be moderately sensitive to physical loss.

Sabellaria spinulosa reef has been shown to have a reasonably good recoverability following physical disturbance, but the timescale of recovery is variable, dependent upon suitable environmental conditions, frequency and intensity of disturbance (Pearce *et al* 2007). *Sabellaria spinulosa* requires a level of turbidity in order to construct tubes and thus build reef, and is considered to be sensitive to ***reductions*** in turbidity, therefore the sensitivity is considered low as human activities will increase turbidity levels Thus *S. spinulosa* reefs are considered to be highly sensitive to physical loss.

b) Physical damage

Studies have shown that high suspended sediment loads would be unlikely to affect the communities in this area as they are evolved to exist in high turbidity waters.

Low diversity dynamic sand 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 re-burrow 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. Thus the low diversity dynamic sand communities are considered to have low sensitivity to physical damage.

Moderate diversity stable sand communities are generally based on more stable sediments with higher levels of organic matter. Whilst exposed to tidal currents, the habitats tend to be more diverse and contain a wide range of infauna and epifauna. These communities are more sensitive to physical damage as it takes longer for sediments and 'climax' communities to re-establish. Thus moderate diversity stable sand communities are considered to be moderately sensitive to physical damage.

The same is true for *Sabellaria spinulosa* reefs; if the physical structure of the reef is damaged or destroyed the habitat will reduce in diversity. Whilst the reef is able to recover, this recovery may take some time, and is dependent on the prevailing environmental conditions (Pearce *et al*, 2007). *S. spinulosa* reef is considered highly sensitive to physical damage.

Toxic contamination

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 Low diversity dynamic sand communities, moderate diversity stable sand communities and *Sabellaria spinulosa* reef to different types of toxic contamination has been classified as moderate.

Non-toxic contamination

The main impacts of increases in turbidity on benthic communities within the site are likely to be smothering and/or damage to filter-feeding organisms. Low diversity dynamic sand communities are adapted to frequent erosion and accretion of sediment, and their sensitivity to turbidity changes is considered to be low. Moderate diversity stable sand communities are also considered to have a low sensitivity to changes in turbidity based upon the sensitivity identified for their component species.

Sabellaria spinulosa requires a level of turbidity in order to construct tubes and thus build reef, and is considered to be sensitive to ***reductions*** in turbidity, therefore the sensitivity is considered low as human activities will increase turbidity levels.

Biological disturbance

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, particularly as some fish species fill upper roles in the trophic web, and shrimp are important prey items. Sandbank sub-features are considered to be moderately sensitive to selective extraction of species.

Sabellaria spinulosa reefs are considered to have a moderate sensitivity to selective extraction of species due to the role of higher species in controlling the overall community structure of the reef.

3.4.2 Exposure assessment

Column 4 of Tables 4 and 5 shows the relative exposure of the Haisborough, Hammond and Winterton's sub-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.

As offshore sites cover a relatively large geographical area precise information on some operations within SAC boundaries is not yet available. Expert judgement was used to determine where on or near site activities are likely to affect interest features physically, chemically and/or biologically. Spatial data on offshore industry activities has been provided by The Crown Estate for aggregate extraction and windfarm development and UK Deal for oil and gas industry activities. UK-wide fisheries data for offshore waters are not yet available to Natural England and JNCC at sufficient resolution to enable a full assessment of exposure to different types of fishing activities. Availability of Vessel Monitoring System (VMS) data combined with logbook and/or vessel registration data for all European vessels across UK waters on an annual basis would allow the spatial extent and intensity of physical and biological pressures associated with mobile demersal fishing to be evaluated more thoroughly, although only at present for vessels greater than 15m.

We are not aware of an adequate methodology to assess the distribution of static/set demersal gear use, or the intensity of its physical and biological impacts. Interest feature exposure and vulnerability to static/set demersal gears have therefore not been assessed.

In 2007, the Centre for Environment, Fisheries & Aquaculture Science (Cefas) published a study documenting the spatial distribution of direct, physical pressures on the seabed caused by industries operating in the English and Welsh sector of UK offshore waters in 2004 (Eastwood *et al*., 2007). Pressure was estimated as the spatial extent of each industry activity; the intensity, frequency, and impacts arising from the pressures were not considered. Cefas has provided JNCC with the GIS datasets from this study, which has enabled an evaluation of the level at which this site is exposed to six pressures: i) Removal, ii) Smothering, iii) Changes in suspended sediment, iv) Physical disturbance and abrasion, v) Obstruction and vi) Selective extraction of species (a biological pressure). Further information on how Cefas' data have been interpreted, and the level of confidence associated with these

assessments can be provided by JNCC on request. This methodology was used in conjunction with expert opinion to assess the exposure to these pressures on this site. The limitations of this study, as identified by Eastwood *et al*. (2007) are noted in Appendix II.

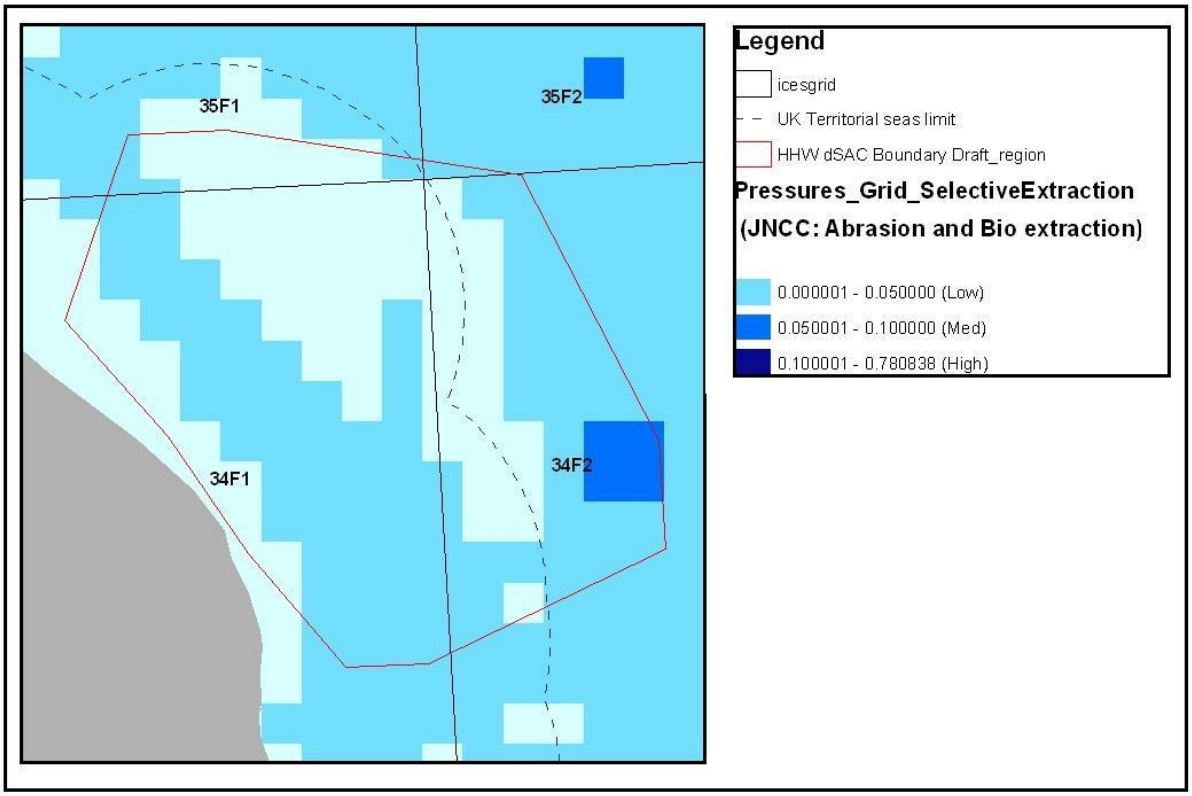
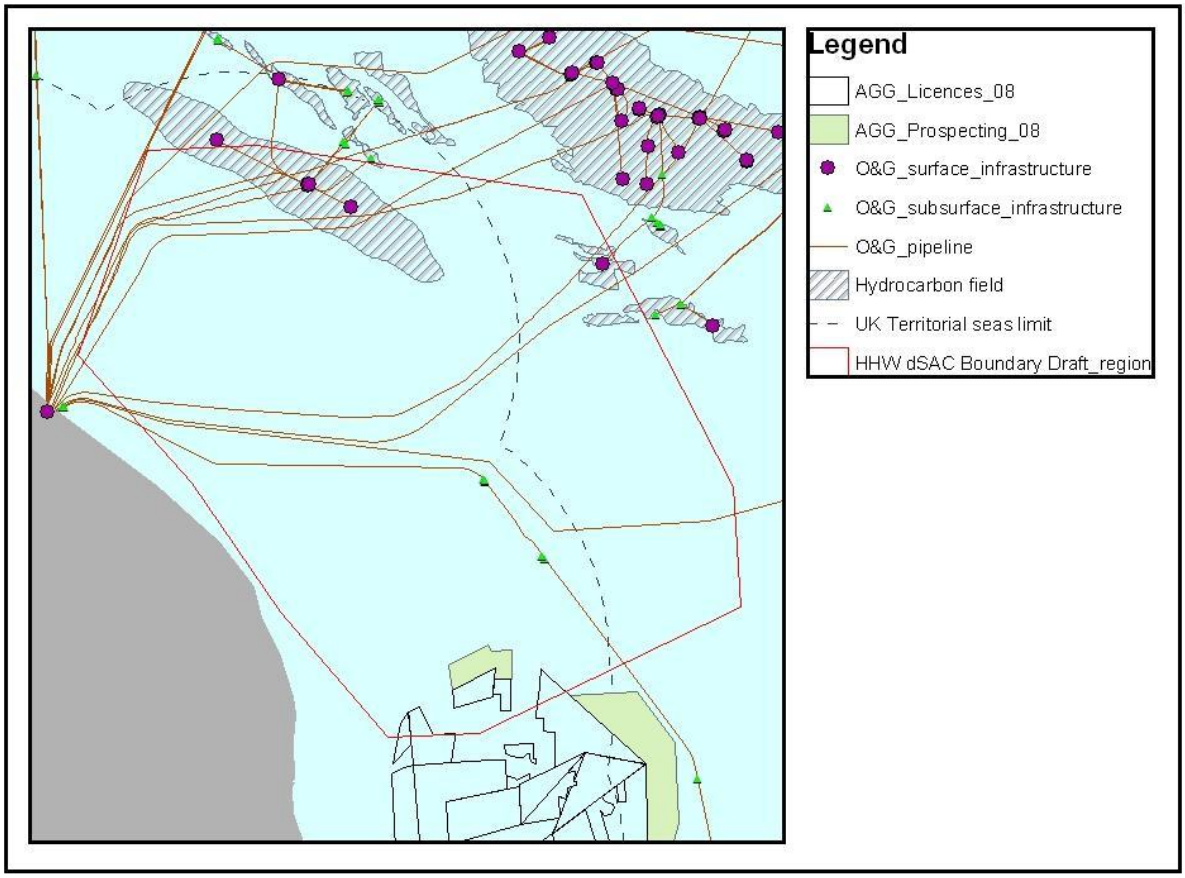
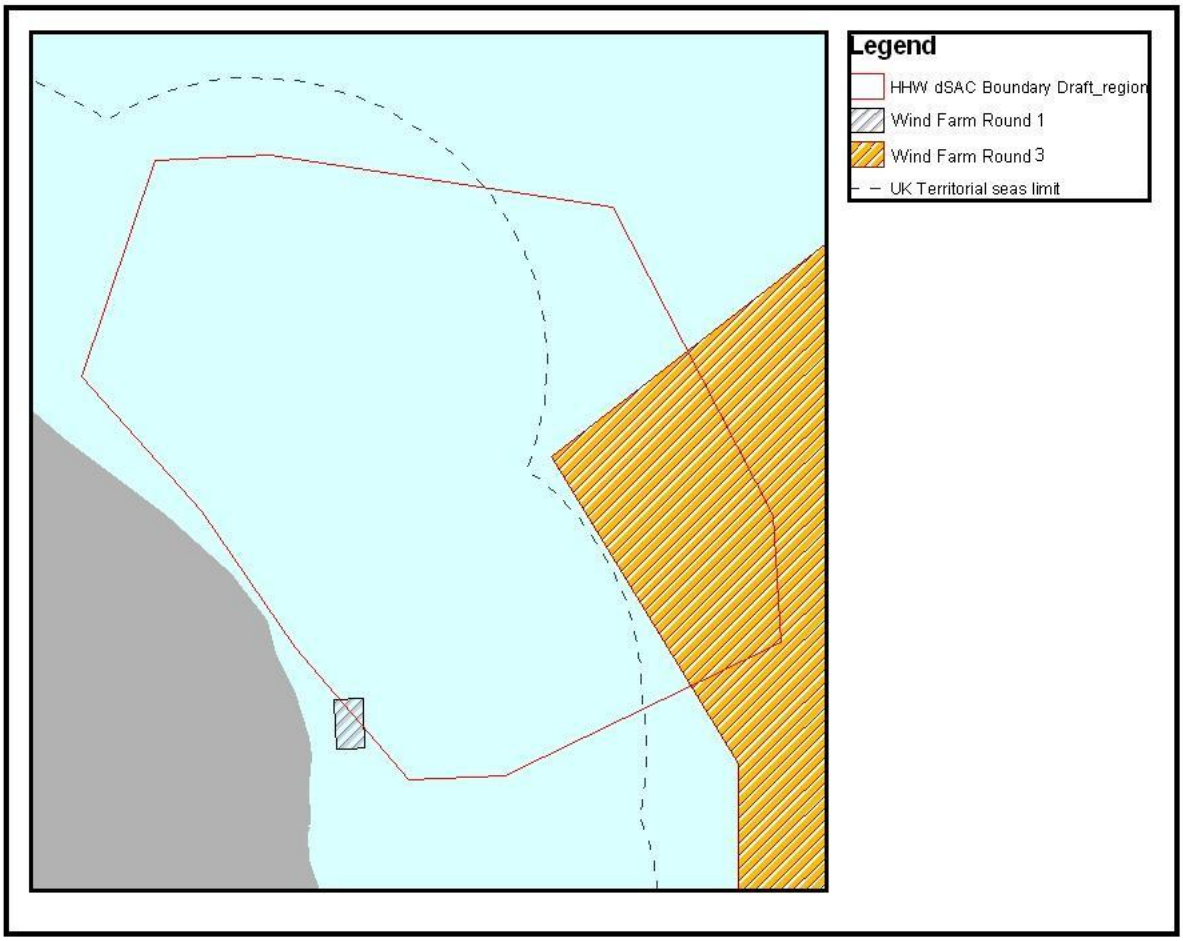


Figure1: Haisborough, Hammond and Winterton pSAC, demersal fisheries activity 2004 (after Eastwood et al, 2007). Note: the map shows only the activities of larger demersal fishing vessels (i.e. over 15 m) on the site, it gives no indication of the location or scale of activity of vessels under this size.



Copyright information: World Vector Shoreline copyright US Defence Mapping Agency; aggregate data supplied by Crown Estate (2008); Oil and Gas information supplied by UK Deal (2008)

Figure 2: Haisborough, Hammond and Winterton pSAC, location and extent of gas and aggregates activity, 2008.



Copyright information: World Vector Shoreline copyright US Defence Mapping Agency; Windfarm data supplied by Crown Estate (2008)

Figure 3: Haisborough, Hammond and Winterton, existing and potential offshore wind development areas, 2008. The Round 1 site is Scroby Sands windfarm. The Crown Estate has issued an Invitation to Tender to registered developers for the Round 3 offshore wind farm leasing programme, one of which currently overlaps with this site. The development zones will be finalised following the Government's decision on the Strategic Environmental Assessment being undertaken by the Department for Energy and Climate Change.

It is likely that over the coming years, more detailed information on the levels of pressures associated with activities at the Haisborough, Hammond and Winterton site will be collected or collated, and this may lead to modification of the advice on operations presented here.

Interest feature exposure to physical, chemical and biological pressures

The interest feature and associated biological communities of the Haisborough, Hammond and Winterton site are exposed to the following pressures.

a) Physical loss

The site features are exposed to **Removal** at low levels (moderate for the reef feature) (aggregate dredging), experiences low levels (moderate levels for the reef feature) of **Obstruction** (gas and windfarm industry infrastructure) and low levels of **Smothering** (drill cuttings)

Licensed aggregate extraction occurs within the site boundary. The primary impact of aggregate extraction will result in the removal and lowering of seabed surface (along with associated infauna and epifauna) within the path of the dredgehead.

A number of gas fields overlap the northern and eastern boundaries of the site, along with associated surface and seabed infrastructure, and pipelines carrying gas and other chemicals to shore also run throughout the site. Habitats within the site boundary are likely to be affected by seabed infrastructure, either directly during maintenance activities or construction of new infrastructure, or indirectly as a result of scour around existing structures.

Gas and offshore windfarm infrastructure on the site obstructs some of the features, there will also have been some historical loss of habitat in the windfarm construction phase.

Physical damage

The site features are exposed to low levels of Changes in suspended sediment (aggregate dredging, demersal trawling) and moderate levels of Physical disturbance or abrasion (demersal trawling).

Studies have shown that the production of sediment plumes from aggregate dredging are negligible (in context of background suspended sediment concentrations for this area) (Hitchcock & Drucker, 1996; Newell et al, 1998; Newell et al, 2002).

Sections of the Haisborough, Hammond and Winterton site, particularly the south eastern corner, are moderately trawled by vessels greater than 15m in length (Eastwood *et al*., 2007, Scira Offshore Energy Ltd. 2006), and this is expected to cause moderate levels of physical disturbance or abrasion. However, it is not currently possible to adequately assess the levels of physical disturbance or abrasion as information on fishing activity has only been available from Vessel Monitoring Systems which only applies to vessels over 15m in length and at the coarse resolution of ICES rectangles. Thus available information does not indicate where all fishing activities are occurring in relation to the features, and at what intensity.

There is evidence in the Site Assessment Document that part of the reef (Gat reef) has been damaged by benthic trawling.

Toxic contamination

The site features are likely to be exposed to both **Synthetic** and **Non-synthetic compounds** at low levels (onsite oil and gas industry activities and shipping)

Vessel traffic passes through the site on route to and from the inner and outer Wash ports. Whilst this increases the risk of contamination by accidental spillages of fuel or cargo, and means that a level of contamination will exist as a result of normal shipping activities, vessel traffic through the site is not heavy. It is possible that the extraction of gas from fields in the outer sections of the site will contribute to the level of toxic contamination to which the benthic communities are exposed.

Non-toxic contamination

The site feature is likely to be exposed to **Changes in nutrient loading** at unknown but likely to be low levels (sewage from gas industry and shipping) and both features are exposed to low levels of **Changes in turbidity** (demersal trawling, aggregate dredging).

Although the western section of the Haisborough, Hammond and Winterton site is located close to the shore, there are no significant point sources of nutrient or organic input to the site, or any thermal or low salinity discharges.

Studies (Hitchcock & Drucker, 1996; Newell et al, 1998; Newell et al, 2002) have shown that the production of sediment plumes and thus **Changes in Turbidity** from aggregate dredging at this site is negligible (in context of background suspended sediment concentrations) and thus it can be inferred that the same will be true of demersal fisheries.

Biological disturbance

The site features are exposed to moderate levels of **Selective extraction of species** (demersal fishing).

Some sections of the site are actively trawled (see Figure 1, above), probably for sand eel and shrimp, and static gear is used in other parts of the site (largely for crab) (Royal Haskoning/LPC Norfolk Offshore Wind, 2002).

It has not been possible to determine the degree to which the interest feature is exposed to **Noise (acoustic)**, **Introduction of radionuclides, Introduction of microbial pathogens** or **Introduction of non-native species**.

Vulnerability assessment
The vulnerability of the interest feature to external pressures is determined by integrating the sensitivity evaluation with that of exposure. Only if a feature is both sensitive *and* exposed to a human activity is it considered vulnerable (see Appendix III). In this context, therefore, 'vulnerability' has been defined as the exposure of the habitat, community or individual (or individual colony) of a species to an external factor to which it is sensitive (Hiscock, 1996). An assessment of the interest feature's vulnerability (column 5 in Table 1) helps to guide site management decisions by highlighting potentially detrimental activities that may need to be managed (or continue to be managed) by the competent authorities.

The vulnerability of the SAC to climate change is not considered in the tables below, given the uncertainties surrounding the effects of global change on the oceans. Possible effects of climate change, based on best available information are set out in Appendix IV.

Interest feature vulnerability to physical, chemical and biological pressures

The **Haisborough, Hammond and Winterton Sandbank: *Moderate diversity stable sand communities*** are:

- Moderately vulnerable to **Physical disturbance or abrasion** and **Selective extraction of species** (from demersal trawling)

- Vulnerable at low levels to **Removal** (aggregate dredging, renewables industry), **Smothering** (oil and gas industry**), Obstruction** (gas and renewables industry infrastructure) **Introduction of synthetic compounds and Introduction of non-synthetic compounds** (from gas industry operations and shipping), **Changes in suspended sediment** (aggregate dredging, demersal trawling), **Changes in turbidity** (demersal trawling, aggregate dredging)

The ***Low diversity dynamic sand communities*** have a similar levels of vulnerability in all respects except that they are vulnerable at only low levels to **Physical disturbance or abrasion**:

There is currently insufficient information to assess the vulnerability to **Noise**, **Introduction of radionuclides, Introduction of microbial pathogens** and **Introduction of non-native species** for this feature.

The **Haisborough, Hammond and Winterton *Sabellaria spinulosa* Reefs** are:

- Highly vulnerable to **Removal** (aggregate dredging, demersal trawling, and benthic dredging for seed mussels), **Obstruction** (renewables infrastructure and cables), and **Physical disturbance or abrasion** (aggregate extraction, demersal trawling, and benthic dredging and turbine and cable installation)

- Moderately vulnerable to **Selective extraction of species (**by demersal trawling, benthic dredging), and **Smothering** (aggregate dredging, demersal trawling, and benthic dredging and turbine installation and disposal of drill arisings)

- Vulnerable at low levels **Introduction of synthetic and non-synthetic compounds** (shipping), **Changes in suspended sediment (**demersal trawling, aggregate dredging, maintenance dredging, renewable energy infrastructure), **Changes in turbidity** (aggregate dredging, demersal trawling, renewable energy infrastructure and benthic dredging).

There is currently insufficient information to assess the vulnerability to **Noise**, **Introduction of radionuclides, Introduction of microbial pathogens** and **Introduction of non-native species** for this feature.

3.4.3 Risk Assessment

JNCC/NE considers 'risk' to be the likelihood of deterioration of the feature due to an activity. It is the vulnerability of the feature to an activity, assessed against the level of management of that activity.

High risk activities will be those to which the feature has high or moderate vulnerability *and* which lack appropriate management. For example, industries which are not location specific and not subject to prior consent procedures and/or those which can lack consistent enforcement mechanisms are more likely to cause damage/disturbance to the interest feature. However, clearly not all activities associated with such industries are detrimental to interest features.

Low risk activities will be those where there is no feature vulnerability (i.e. the activity does not interact with the feature) or where the high vulnerability is mitigated for by consenting procedures or management. For example, for industries which are location specific, are always subject to prior consent and have clear reliable methods of enforcement, there is generally a lower likelihood of causing damage or disturbance to interest features.
For the offshore environment, this includes the activities of the oil and gas, aggregates and renewable energy industry sectors. Only high or medium-high risk activities are noted here.

Within the Haisborough, Hammond and Winterton site, the following offshore activities are currently considered, by JNCC [and NE?] to pose a high risk to the interest features:

- **Demersal fishing**

Demersal fishing is ~~also~~ regarded as a high risk activity to the interest features within the site as the features of the site are vulnerable to pressures from this activity, and the activity is not subject to location specific prior consent or approval.

Competent Authorities are advised to consider management actions that might need to be taken to reduce the risk of damage associated with this activity to the SAC features.

Natural England is currently undertaking a risk assessment process for all of its existing inshore marine SACs, and will extend this process to include new sites. NE and JNCC will assess further the risks to the Haisborough, Hammond and Winterton site.

Natural England is currently undertaking a risk assessment process for all of its existing inshore marine SACs. Natural England and JNCC will extend this process to include proposed sites and will assess furtherrisks to the Haisborough, Hammond and Winterton site.

Table 4: Sensitivity, exposure and vulnerability of the Haisborough, Hammond and Winterton Sandbank sub-features Low diversity dynamic sand communities and Moderate diversity stable sand communities to physical, chemical and biological pressures

Sensitivity key: ••• = High sensitivity •• = Moderate sensitivity • = Low sensitivity, ○ = No known sensitivity* and **?** = Insufficient information to make assessment (*Meaning: 'Sensitivity of the feature has been researched and no evidence of sensitivity to this pressure has been found')
Exposure key: High = High exposure, Medium = Medium exposure, Low = Low exposure, None = No known exposure, Unknown level = Exposure of an unknown level and **?** = Insufficient information to make assessment.

List of pressures which may cause deterioration or disturbance (with example activities)		Low diversity dynamic sand communities	Moderate diversity stable sand communities		
		Sensitivity	Sensitivity	Exposure	Vulnerability
Physical Loss	**Removal** (e.g. aggregate dredging, isolated rock dump, infrastructure development)	••	••	Low	Low
	Obstruction (e.g Permanent constructions [oil & gas infrastructure, windfarms, cables] & wrecks)	••	••	Low	Low
	Smothering (e.g. drill cuttings)	•	•	Low	Low
Physical Damage	**Changes in suspended sediment** (e.g. screening plumes from aggregate dredging)	•	•	Low	Low
	Physical disturbance or abrasion (e.g. mobile benthic fishing, anchoring, windfarm scour pits, pipeline burial, potting)	•	••	Moderate	Low / Moderate
Non-physical disturbance	**Noise** (e.g. boat activity, seismic)	○	○	Unknown Level	No known vulnerability
	Visual presence (e.g. recreational activity)	○	○	None	No known vulnerability
Toxic contamination	**Introduction of synthetic compounds** (e.g. TBT, PCBs, industrial chemical discharge, produced water, fuel oils)	••	••	Low	Low
	Introduction of non-synthetic compounds (e.g. heavy metals, crude oil spills)	••	••	Low	Low
	Introduction of radionuclides (e.g. nuclear energy industry)	Insufficient information	Insufficient information	Unknown Level	Insufficient information
Non-toxic contamination	**Changes in nutrient loading** (e.g. outfalls)	••	••	None	No known vulnerability
	Changes in thermal regime (e.g. cooling water discharges)	••	••	None	No known vulnerability
	Changes in turbidity (e.g. laying of pipelines, aggregate dredging)	•	•	Low	Low
	Changes in salinity (e.g. outfalls from rigs, ships)	••	••	None	No known vulnerability
Biological disturbance	**Introduction of microbial pathogens** (e.g. outfalls)	Insufficient information	Insufficient information	Unknown Level	Insufficient information
	Introduction of non-native species and translocation (e.g. ballast water, hull fouling)	Insufficient information	Insufficient information	Unknown Level	Insufficient information
	Selective extraction of species (e.g. bioprospecting, scientific research, demersal fishing)	••	••	Moderate	Moderate

***Table 5: Sensitivity, exposure and vulnerability of the Haisborough, Hammond and Winterton Sabellaria spinulosa* Reef to physical, chemical and biological pressures**

Sensitivity key: ••• = High sensitivity •• = Moderate sensitivity • = Low sensitivity, ○ = No known sensitivity* and **?** = Insufficient information to make assessment (*Meaning: 'Sensitivity of the feature has been researched and no evidence of sensitivity to this pressure has been found')
Exposure key: High = High exposure, Medium = Medium exposure, Low = Low exposure, None = No known exposure, Unknown level = Exposure of an unknown level and **?** = Insufficient information to make assessment.

List of pressures which may cause deterioration or disturbance (with example activities)		***Sabellaria spinulosa* reef**		
		Sensitivity	**Exposure**	**Vulnerability**
Physical Loss	**Removal** (e.g. aggregate dredging, isolated rock dump, infrastructure development)	•••	**Moderate**	**High**
	Obstruction (e.g Permanent constructions [oil & gas infrastructure, windfarms, cables] & wrecks)	•••	**Moderate**	**High**
	Smothering (e.g. drill cuttings and wind farm infrastructure installation)	•••	**Low**	**Moderate**
Physical Damage	**Changes in suspended sediment** (e.g. screening plumes from aggregate dredging)	•	**Low**	**Low**
	Physical disturbance or abrasion (e.g. mobile benthic fishing, anchoring, windfarm scour pits, pipeline burial, potting, installation of turbines and cables)	•••	**Moderate**	**High**
Non-physical disturbance	**Noise** (e.g. boat activity, seismic, piling)	○	**Unknown Level**	**Insufficient information**
	Visual presence (e.g. recreational activity, offshore wind farms)	○	**None**	**No known vulnerability**
Toxic contamination	**Introduction of synthetic compounds** (e.g. TBT, PCBs, industrial chemical discharge, produced water, fuel oils)	••	**Low**	**Low**
	Introduction of non-synthetic compounds (e.g. heavy metals, crude oil spills)	••	**Low**	**Low**
	Introduction of radionuclides (e.g. nuclear energy industry)	**Insufficient information**	**Unknown Level**	**Insufficient information**
Non-toxic contamination	**Changes in nutrient loading** (e.g. outfalls)	••	**None**	**No known vulnerability**
	Changes in thermal regime (e.g. cooling water discharges)	••	**None**	**No known vulnerability**
	Changes in turbidity (e.g. laying of pipelines and wind farm cables, aggregate dredging installation of turbines)	•	**Low**	**Low**
	Changes in salinity (e.g. outfalls from rigs, ships)	••	**None**	**No known vulnerability**
Biological disturbance	**Introduction of microbial pathogens** (e.g. outfalls)	**Insufficient information**	**Unknown Level**	**Insufficient information**
	Introduction of non-native species and translocation (e.g. ballast water, hull fouling)	**Insufficient information**	**Unknown Level**	**Insufficient information**
	Selective extraction of species (e.g. bioprospecting, scientific research, demersal fishing)	••	**Moderate**	**Moderate**

References

CROWN ESTATE. 2008. *UK Licensed marine aggregate dredging areas* (GIS data). Provided by Royal Haskoning on behalf of the Crown Estate, London

DAVIES, J., BAXTER, J., BRADLEY, M., CONNOR, D., KHAN, J., MURRAY, E., SANDERSON, W., TURNBULL, C. & VINCENT, M., (2001), Marine Monitoring Handbook, 405 pp, ISBN 1 85716 550 0

DEAL. 2008a. *UK Offshore Oil, gas and condensate fields* [online] Deal: UK Offshore Oil and Gas Information. Available from: http://www.ukdeal.co.uk [Accessed August 2008]

DEAL. 2008b. *UK Offshore Oil and Gas well positions and descriptive attributes* [online] Deal: UK Offshore Oil and Gas Information. Available from: http://www.ukdeal.co.uk [Accessed August 2008]

DEAL. 2008c. *UK Offshore Oil and Gas Sub-sea pipelines and umbilicals* [online] Deal: UK Offshore Oil and Gas Information. Available from: http://www.ukdeal.co.uk [Accessed August 2008]

DEAL. 2008d/e. *UK Offshore Oil and Gas Surface infrastructure* [online] Deal: UK Offshore Oil and Gas Information. Available from: http://www.ukdeal.co.uk [Accessed August 2008]

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.

EASTWOOD, P. D., MILLS, C. M., ALDRIDGE, J. N., HOUGHTON, C. A., & ROGERS, S. I. 2007. Human activities in UK offshore waters: an assessment of direct, physical pressure on the seabed. *ICES Journal of Marine Science*, 64: 453–463. (Supporting GIS datasets provided).

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.

EMU LTD. 2006. *Benthic Survey of the Outer Thames Estuary Sandbank System. Final Report.* Report 06/J/1/03/0837/0572 for English Nature.

ENO, N.C, CLARK, R.A. & SANDERSON, W.G. (eds) (1997) Non-native Species in British Waters: A Review and Directory. Pp. 152. Joint Nature Conservation Committee, Peterborough.

ENTEC UK LTD. 2008b. Stakeholder Identification - Greater Thames estuary. Report produced for Natural England under Contract FST20-18-030, May 2008.

GIERE O. (1993). Meiobenthology: the microscopic fauna in aquatic sediments. Berlin; Springer.

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

HITCHCOCK, D.R., & DRUCKER, B.R. 1996. Investigation of benthic and surface plumes associated with marine aggregates mining in the United Kingdom. In the Global Ocean - towards operational oceanography. Proceedings of Conference on Oceanology International. Spearhead Publications, Surrey Conference Proceedings 2, 221-84.

JNCC, 2007. Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006. Peterborough: JNCC. Available from: www.jncc.gov.uk/article17.

MARLIN. 2006. *Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme* [online] Plymouth: Marine Biological Association of the United Kingdom. Available from: http://www.marlin.ac.uk/ [Accessed August 2008]

MARLIN. 2001. Dense *Lanice conchilega* and other polychaetes in tide-swept infralittoral sand IGS.Lcon. *Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme* [online]. Plymouth: Marine Biological Association of the United Kingdom. Available from: http://www.marlin.ac.uk/biotopes/Bio_BasicInfo_IGS.Lcon.htm [Accessed August 2008]

NEWELL, R.C., SEIDERER, L.J. & HITHCOCK, D.R. 1998. The impact of dredging works in coastal waters: A review of the sensitivity to disturbance and subsequent recovery of biological resources on the sea bed. Oceanography and Marine Biology, 36: 127-178.

NEWELL, R.C., SEIDERER, L.J., SIMPSON, N.M. & ROBINSON, J.E. 2002. Impact of marine aggregate dredging and overboard screening on benthic biological resources in the central North Sea: Production license Area 408. Coal Pit. Marine Ecological Surveys Limited. Technical Report No. ER1/4/02 to the British Marine Aggregate Producers Association (BMAPA). 72pp.

PALMER, M. A. (1988). Dispersal of marine meiofauna: a review and conceptual model explaining passive transport and active emergence with implications for recruitment. Marine Ecology Progress Series. **48**, 81-91.

PEARCE, B., TAYLOR, J. & SEIDERER, L.J. 2007. Recoverability of *Sabellaria spinulosa* following aggregate extraction. Aggregate Levy Sustainability Fund MAL0027.Marine Ecological Surveys Limited, 24a Monmouth Place, Bath, BA1 2AY. 87pp. ISBN 978-0-9506920-1-2.

THE ROYAL SOCIETY (2005) Ocean acidification due to increasing atmospheric carbon dioxide, Policy document 12/05, June 2005 ISBN 0 85403 617 2

ROYAL HASKONING/LPC NORFOLK OFFSHORE WIND. 2002. *Cromer offshore windfarm Environmental Statement.*

RPS GROUP PLC. 2005. Environmental Statement. Volume 1: Offshore Works. London Array Ltd.

SCIRA OFFSHORE ENERGY LTD. 2006. *Sheringham Shoal Offshore Windfarm Environmental Statement*

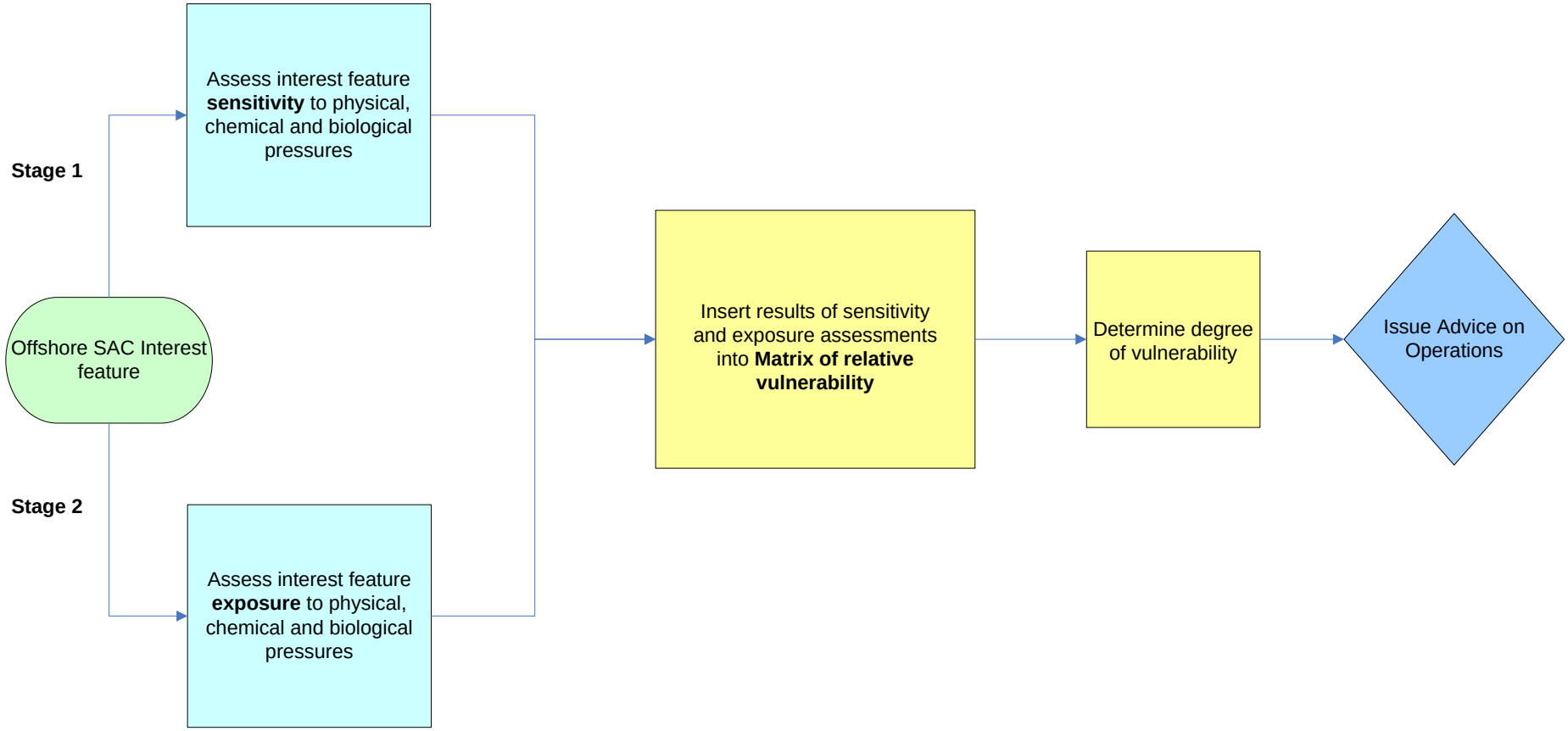
SEIDERER, L.J. 2005. Government View Application Area 202: Cross Sands Extension. An update of the Environmental Statement - 5 years post-dredging. Prepared for Hanson Aggregates Marine Limited. Marine Ecological Surveys Ltd

SHERMAN, K. M., & COULLLI, B.C. 1980. The response of meiofauna to sediment disturbance. Journal of Experimental Marine Biology and Ecology **46**, 59-71

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]

UNITED KINGDOM CABLE PROTECTION COMMITTEE (2007) Distribution of submarine cables in the UK offshore area (GIS data).

Appendix I: Flow diagram illustrating process of determining vulnerability of interest features



Appendix II: Limitations of Cefas' assessments of physical pressures in offshore waters, as outlined in Eastwood *et al.*, 2007

- Estimates of the **spatial extent** or the '**footprint'** of each activity were used as a **proxy for direct, physical pressure. Pressure intensity** (e.g. the number of times a pressure was superimposed, such as the number of passes of a trawl per m^2) was not quantified.
- This 'footprint' assessment is based on **2004 data only**, and is a snapshot of offshore activities in **'English'** and **'Welsh'** offshore waters alone.
- **Cumulative pressure** leading up to 2004 was not quantified.
- No **time element** was attributed to the pressures, which would have allowed an assessment of the duration of the pressures in 2004
- **Recovery of benthic environments** depends on biological sensitivity to pressure type and intensity, but will also be affected by **cumulative pressures** from a single source and **in-combination pressures** from multiple sources.
- The European **VMS database** only contains positions for **18m vessels in 2004** and **under-represents the total number of vessels.** The spatial extent of demersal trawling may therefore be much higher than estimated
- Other types of fishing, such as **potting** and the use of **certain fixed nets** will also cause direct, physical pressure on the seabed. Information on the sites of these activities is currently difficult to derive from **quantitative sources**.
- **Oil spills** will cause direct, physical pressure, but again **spatial data are not commonly available**.
- In addition to physical pressures, human activities cause a range of **direct and indirect chemical and biological pressures** on the seabed: many of these are more problematic to assess, but are essential for a more complete assessment of human pressure in offshore waters.

Appendix III: Matrix of relative vulnerability

The relative vulnerability of an interest feature is determined by combining the sensitivity and exposure assessments according to the table below.

Relative exposure of the interest feature at the site	Relative sensitivity of the interest feature				
		High ●●● (3)	Moderate ●● (2)	Low ● (1)	None detectable ○ (0)
	High (3)	9	6	3	0
	Medium (2)	6	4	2	0
	Low (1)	3	2	1	0
	Exposure at an unknown level				0
	None (0)	0	0	0	0

Note that if there is insufficient information to assess either the exposure OR sensitivity of a given interest feature, vulnerability will always be categorised 'insufficient information to make any assessment'.

Categories of relative vulnerability

High vulnerability	6 to 9
Moderate vulnerability	5 to 3
Low vulnerability	1 to 2
Vulnerability identified, but not quantified as level of exposure unknown.	
No known vulnerability	0
Insufficient information to make any assessment	

Appendix IV: The effects of climate change on the Haisborough, Hammond and Winterton site

According to the UKCIP (2002), sea temperatures in this area may rise by between 0.5-1 °C by the 2020s, and by 1.5-3 °C by the 2080s (under low and high emissions scenarios respectively). Salinity and nutrient status may change with increased seasonality in runoff from the catchments in the east of England. (Stephen Dye (FRS), Pers. Comm., February 2006). Tides are unlikely to be affected by climate change. Due to its shallow, well-mixed waters, this site is likely to experience the full change in surface ocean acidity over the next 100 years (The Royal Society, 2005). The biological outcomes of climatic changes are difficult to forecast. Minor changes are expected over the next 10-25 years, with major biological shifts potentially occurring in the longer term (100 years). It is unknown how this site's biological communities will be affected. However, there is potential for rapid alterations in the nature of benthic communities and a northwards migration of both benthic and pelagic organisms as temperatures increase (Stephen Dye (FRS), Pers. Comm., February 2006). Increases in global ocean acidity are likely to reduce the resilience of marine ecosystems (The Royal Society, 2005), particularly affecting calcifying benthic species (Baker, 2005). Changes in the frequency and direction of storms is likely to change the amount of light penetration and potentially production at the sea bed.

Appendix V: Typical species criteria

Identification of a species as typical is not in itself sufficient to indicate the importance of the species or any need for management. The importance of the species should be judged on the contribution made by the species to ecological integrity of the feature. These criteria are intended to help identify or classify typical species and are not limited to the benthos and are relevant to the Annex 1 habitat feature and its component parts at the *site* level.

A typical species should meet one or more of the following criteria a – e below:

a) Consistently associated with, but not necessarily restricted to, the feature
For example
- Can be predicted to occur at certain seasons/times (e.g. seasonal & temporal)
- Stages of life cycle associated with the feature (e.g. spawning)
- Species is dependent upon feature (for food, shelter, nest)

b) A species on which identification of the habitat is founded
- This criterion is unlikely to apply to complex physiographic features which may be composed include other Annex 1 features (e.g. H1130 Estuaries, H1160 Large Shallow Inlets and Bays which may include 'H1170 Reefs', 'H1110 Sandbanks which are slightly covered by seawater all the time' etc.)

c) Characteristic of the habitat
For example
- *Ammodytes tobianus, Zostera marina* for 'H1110 Sandbanks which are slightly covered by seawater all the time'

d) An integral part of the structure of the habitat
For example
- Any species that gives the habitat structural complexity (e.g. kelp)
- Any species that forms the habitat (e.g. biogenic reef species, maerl)

e) A species which influences the habitat's structure and function
For example:
- Bioturbators
- Grazers
- Animals which bore into the substratum
- Predators
- Keystone species (i.e. A species that influences the ecological composition, structure, or functioning of its community far more than its abundance would suggest (EEA, 2008)

Note: the above criteria should not be used to describe non-native species as typical

Non-Native – These are marine species and plants and algae are transported from their native range to 'new' areas. Species can be introduced to non-native environments accidentally or deliberately. Introductions and transfer of non-native marine species to their non-native environment mainly occurs by the transport and discharge of ballast water , and to a lesser extent by transport of fouling organisms on hulls or through aquaculture (JNCC, 2008b)