Northern Ireland Environment Agency
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DOE

Inshore Special Area of Conservation:

Skerries and Causeway

SAC Selection Assessment

1. Introduction

This document provides detailed information about the Skerries and Causeway site and evaluates its interest features according to the Habitats Directive (Council Directive 92/43/EEC of 21 May 1992) selection criteria and guiding principles (Aish *et al.* 2008).

The advice contained within this document is produced to fulfil requirements of the Department of the Environment (Northern Ireland) under The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995, SR 1995 No. 380, relating to the conservation of natural habitat types and species through the identification of Special Areas of Conservation (SAC) in NI territorial waters. Under these Regulations the Department is required to provide certain advice to DEFRA to enable the Secretary of State to fulfil his obligations under Regulation 28(2) of the Regulations.

Sites eligible for designation as Special Areas of Conservation (SACs) are selected on the basis of the criteria set out in Annex III (Stage 1) to the Habitats Directive and relevant scientific information. Sites are considered only if they host a Habitats Directive Annex I habitat or Annex II species. Socio-economic factors are not taken into account in the identification of sites to be proposed to the European Commission following the European Court of Justice 'First Corporate Shipping' judgement C-371/98 (7 November 2000).

In addition to information on Annex I habitats and Annex II species, this document contains;

1. a chart of the site
2. its name, location and extent
3. the data resulting from application of the criteria specified in Annex III (Stage 1) of the Habitats Directive

The Department has adhered to the format established by the Commission for providing site information. This format is set out in the 'Natura 2000 Standard Data Form' (CEC, 1995) prepared by the European Topic Centre for Biodiversity and Nature Conservation on behalf of the European Commission to collect standardised information on SACs throughout Europe.

Document Version Control

Version and Issue Date	*Amendments made*	*Issued to and date*
Skerries and Causeway SAC Selection Assessment v 1. 22nd November 2010	Draft prepared by Hugh Edwards. Production of boundary map, centroid position and area.	Howard Platt, Joe Breen, 22nd November 2010
Skerries and Causeway SAC Selection Assessment v 2 25th November 2010	Minor amendments	Howard Platt, Joe Breen, 25nd November 2010
Skerries and Causeway SAC Selection Assessment v 3 17th December 2010	Minor amendments.	Howard Platt, Joe Breen, Gary Burrows, Brian McCullough, Colin McKenna, Graham Seymour 17th December 2010
Skerries and Causeway SAC Selection Assessment v 4 15th December 2010	Amendments to Harbour porpoise selection following additional data and analysis.	Howard Platt, Joe Breen 15th December 2010
Skerries and Causeway SAC Selection Assessment v 5 20th December 2010	Final check and minor amendments.	CDP for Minister DOE. 20th December 2010
Skerries and Causeway SAC Selection Assessment v 6 18th May 2011	Amendments following consultation, including boundary change.	CDP for Secretary of State. 18th May 2011
Skerries and Causeway SAC Selection Assessment v 7 20th July 2012	Final check and minor amendments.	Diane Stevenson CDP. Niall Malone DEFRA Jenny Oates JNCC 20th July 2012

Further Information

This document is available as a pdf file on NIEA's website for download if required.

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2. Skerries and Causeway: SAC Selection Assessment

1. Site Name Skerries and Causeway	2. Site centre location 55° 14.55'N, 006 ° 35.81'W (Datum:WGS 1984)
3. Site surface area 10,862ha/108.62km^2	4. Biogeographic region Atlantic

3. Interest Feature(s) under the EU Habitats Directive

3.1 H1170 Reef

3.2 H1110 Sandbanks which are slightly covered by seawater all the time

3.3 H8330 Submerged or partially submerged sea caves

3.4 1351 Harbour porpoise (*Phocoena phocoena*)

3.5 1365 Common seal (*Phoca vitulina*) – non qualifying

3.6 1364 Grey seal (*Halichoerus grypus*) – non qualifying

3.7 1349 Bottlenose dolphin (*Tursiops truncatus*) – non qualifying

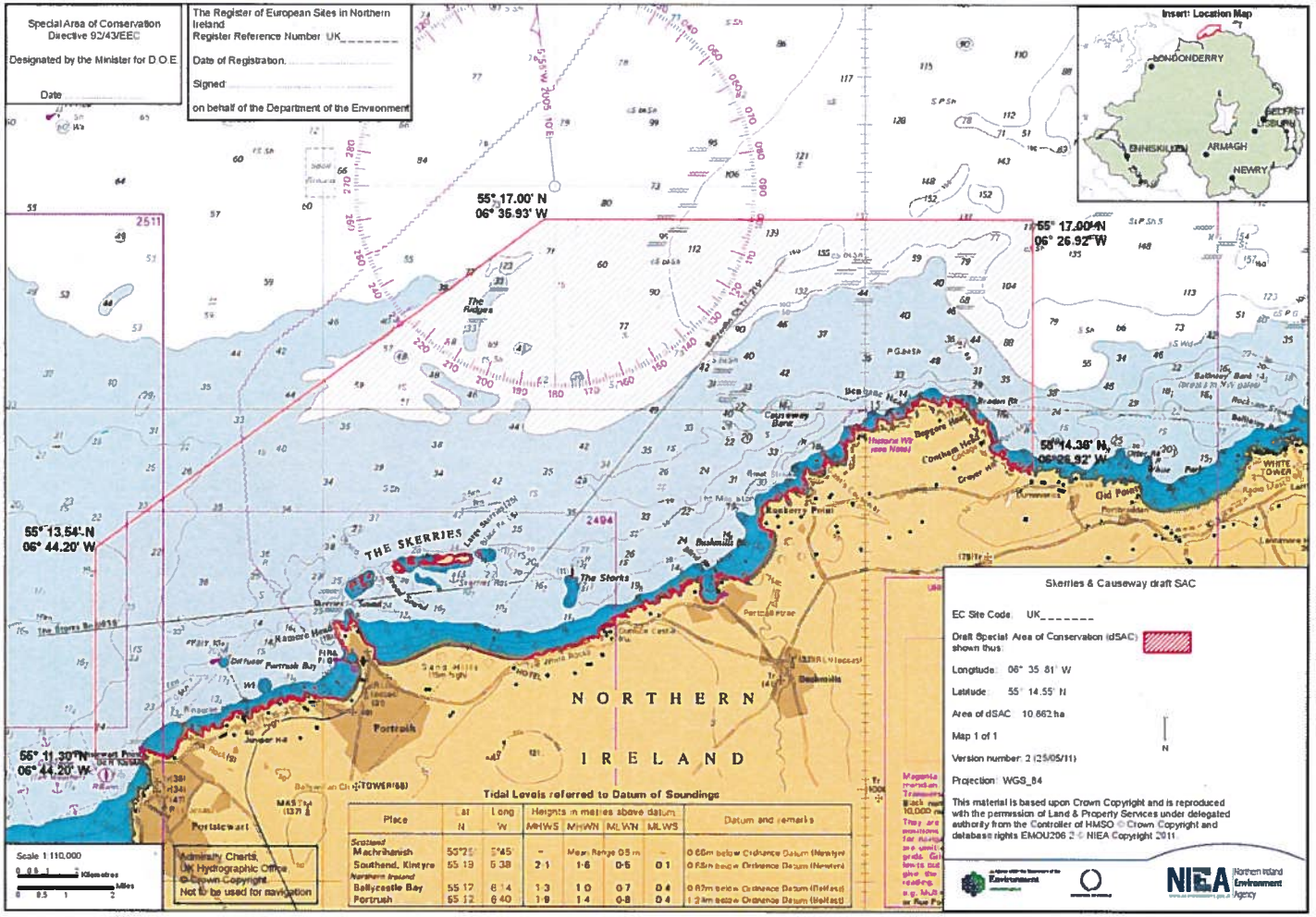

Figure1. Map indicating proposed boundary for the Skerries and Causeway inshore Special Area of Conservation.

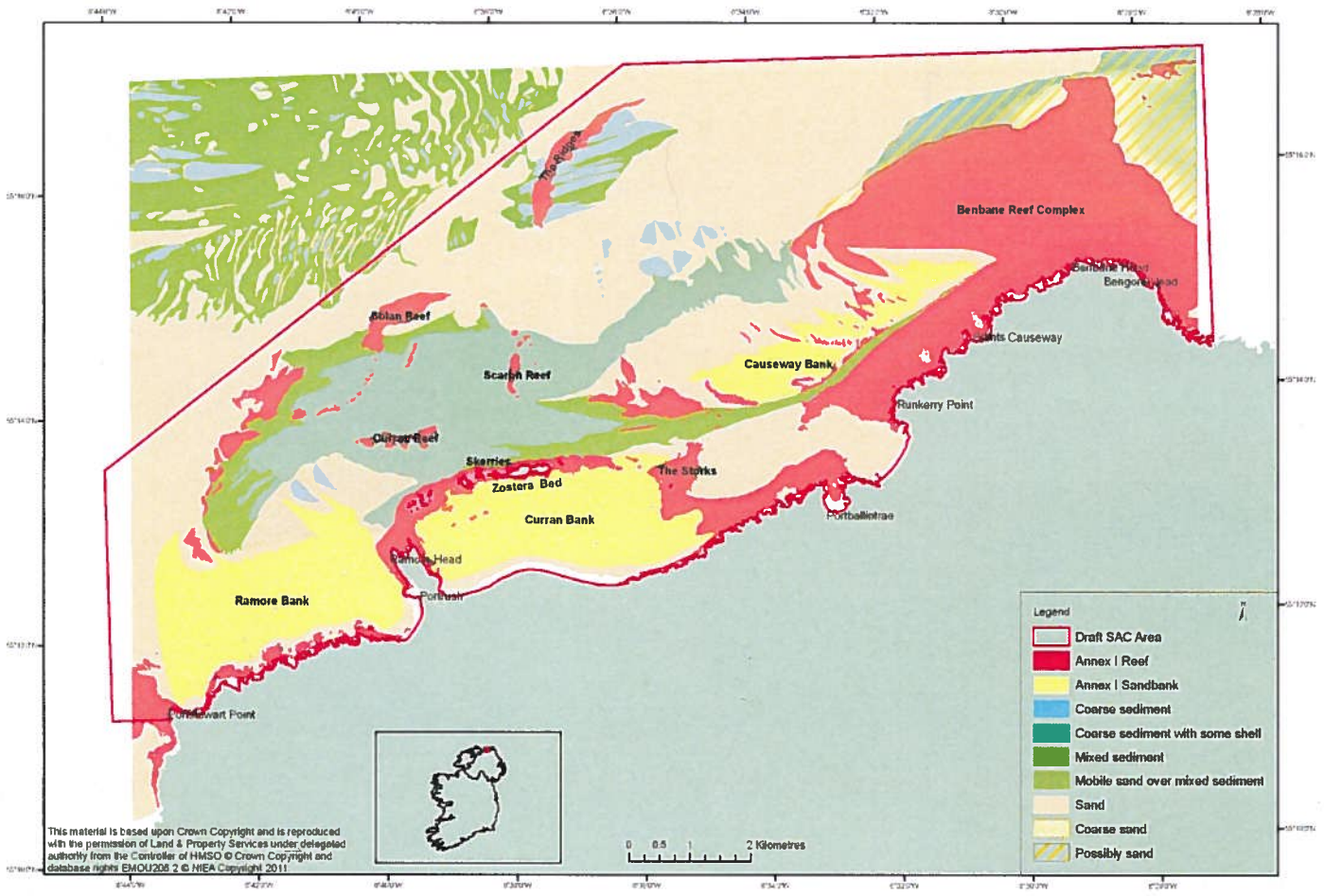

Figure2. ***Map showing Annex I habitat reef and sandbank slightly covered by seawater all the time, other ground types and the proposed boundary for the Skerries and Causeway inshore Special Area of Conservation***

4. Site summary

Skerries and Causeway proposed SAC is sited on the north coast of Northern Ireland. It is the eastern part of a 30km wide embayment that has the Inishowen peninsular to its west and Benbane Head to its east. The site is influenced oceanographically and biologically both by the warming gulf stream and by the strong tidal currents that flow through the North Channel to and from the Irish Sea. It is subject to considerable wave action being open to the Atlantic to the north west, but is relatively sheltered from other prevailing swells and includes areas of relative shelter such as behind the Skerries islands. The site is predominantly marine although there are significant influxes of freshwater, from the River Bann to the west and the River Bush to the east, which can influence the immediate coastal areas.

The Skerries and Causeway site is located adjacent to the coastline of Portstewart, Portrush, Bushmills and the Giant's Causeway World Heritage Site (which lends part of its name to the SAC site; the other half of the SAC name comes from the Skerries islands and rocks off Portrush). The site contains the qualifying Features: Annex I *Reef*; Annex I *Sandbanks slightly covered by seawater at all times*; Annex I *Submerged or partially submerged sea caves;* and Annex II *Harbour porpoise.* It also contains non-qualifying Annex II species, *grey seal, common seal, and bottlenose dolphin.*

Much of the reef in this area is sand scoured reef (which is an unusual type of reef in a Northern Ireland context). This produces a close relationship between the reef and the adjacent sediments: as well as the sand scoured areas of reef and stony reef, there are also large areas of bedrock reef that have a thick veneer of sediment, but still support bedrock epifauna (attached to the bedrock but growing up through the sediment); and conversely, there are also areas of coarse and mixed sediments that support epifauna communities more reminiscent of the reef habitat.

The Annex I *Reef* is noted for its southern species, rare and priority species, and a number of species first described from the Skerries and Causeway area, including one nudibranch species that has not yet been found elsewhere. As well as the coarse and mixed sediments noted above, the Annex I *sandbank slightly covered by sea water all the time* also contains areas of subtidal eel grass *Zostera marina* (sheltered behind the Skerries) and varied and dramatic sand waves, some over 30m high. There are also many Annex I *Submerged and partially submerged sea caves* that can be found in a range of rock type including the basalts of the Giant's Causeway and the metamorphosed chalk of the Ulster White Limestone series.

This area was first identified as being of marine conservation interest in the Northern Ireland Sub-littoral Survey (NISS), (Erwin *et al.* 1986). More recent dive surveys to determine the extent of its conservation interest (2006-2008 as part of the Sub-littoral Survey of Northern Ireland (SSNI) and 2009-2010 as part of the Survey of Nationally Important Marine Features (SNIMF)) were completed by the Northern Ireland Environment Agency/National Museums Northern Ireland partnership (NIEA/NMNI)

(to be reported in Goodwin *et al.* 2011, in draft). . The dive surveys of 2009-2010 also targeted the survey of reefs that had been identified for the first time from the multi-beam mapping of the Joint Irish Bathymetric Survey (JIBS). The JIBS survey also allowed the first sight of the many sand waves and the dramatic submerged cliff of the Benbane Reef Complex (Figure 5 and Figure 6).

5. Sites to which this site is related

The nearest comparable marine SAC to this site is Rathlin Island SAC (which also comprises reef, sea cave and sandbank features) and is situated 9.5km to the east of the Skerries and Causeway. However, the biological communities in the two sites are quite different. Rathlin is dominated by the relatively clear thermally mixed currents flowing through the North Channel, relatively silt free reef and relatively stable sediments. Skerries and Causeway is dominated by silty sand scoured reef, more southern species and a combination of mobile and stable sediments.

North Antrim SAC is adjacent to the Skerries and Causeway and is also a European Marine Site (EMS) although it only extends to mean low water. There are partially submerged sea caves within the North Antrim SAC and some of these constitute the upper part of the Skerries and Causeway H8330 *submerged and partially submerged sea caves*. These caves were not listed as a feature of the North Antrim SAC. Two other European Marine Sites also extend to mean low water to the south and west of the Skerries and Causeway: Magilligan SAC and the Bann Estuary SAC.

Table 1. SACs to which the Skerries and Causeway is related.

Site	Proximity to Skerries and Causeway	Notable Features
Rathlin Island SAC	9.5km to east	*Sandbanks slightly covered by seawater at all times*: consists of soft sediment habitats ranging from gravel, sandy gravels, fine sands and muddy sands. The dominant communities are *Amphiura*-dominated, fine sands, seagrass (*Zostera*) beds and historically, small patchy veneers of maerl (NIEA, 2008)
Rathlin Island SAC	9.5km to east	*Reef*: bedrock and stony reef with important sponge and anthozoan communities.
Rathlin Island SAC	9.5km to east	*Submerged or partially submerged sea caves*
North Antrim SAC	Adjacent	Extends to Mean Low Water where it joins the Skerries and Causeway proposed SAC. This area has many sea caves within its boundary, which were not included as an Annex I features of the North Antrim SAC. The subtidal element of these caves is now proposed as an Annex I feature of the Skerries and Causeway proposed SAC.
Bann Estuary SAC	1.5km to south	Extends to Mean Low Water. Estuary and sand dune.
Magilligan SAC	11.5km to west	Extends to Mean Low Water. Sand dune.

6. Site boundary

The boundary around the Skerries and Causeway site has been drawn using the guidance provided by the Joint Nature Conservation Committee (JNCC) (2004, amended by Aish *et al.* 2008), and was defined through GIS modelling using data from the mapping survey and considered against the guidelines. The key parts of this guidance are that the boundary should be restricted to only include Annex I habitat or that which is required for the maintenance of that habitat and the boundary line defined in whole degrees and minutes and seconds where possible. NIEA have used minutes to two decimal places as an equivalence of seconds as it is more commonly displayed on vessel Global Positioning System (GPS)/Chartplotter systems. The guidance also states that the boundary should include as little non-Annex I habitat as possible and should also be sufficient to allow for elimination of potential damage to the area from activities such as trawling and dredging.

The seaward boundary of the Skerries and Causeway site conforms to the guidance of JNCC in Aish *et al.* (2008) in being "drawn as straight lines to ensure ease of identification on charts and at sea" (Brown *et al.* 1997, McLeod *et al.* 2002). The northern limit of the site is therefore based on a line of latitude that allows inclusion of the Benbane Reef Scarp Complex and the reef marked on the Admiralty Charts as The Ridges. The eastern boundary is a line of longitude that allows the inclusion of the deep reef to the east of the Benbane Reef Scarp Complex. The western boundary is a line to allow the inclusion of a part of the Portstewart stony reef and the outlying reefs north west of the Skerries. The southern boundary is the coastal Mean Low Water mark which permits a clearly defined 'real' boundary; while the rocks and islands of the Skerries have a boundary of Mean High Water to include seal haul-out areas, an area already designated in national legislation as an Area of Special Scientific Interest (ASSI).

7. Assessment of interest feature(s) against selection criteria

A full explanation of the application of the site selection criteria can be found on the JNCC website: http://www.jncc.gov.uk/page-1473.

7.1 Reef

The Annex I habitat *Reef* is the primary reason for the selection of the Skerries and Causeway as a potential SAC. This habitat covers 22.8 km^2, which is approximately 16.7% of the entire site.

a) Representivity

The Skerries reef area has been recognised as being an area of conservation importance since the Northern Ireland Sublittoral Survey (Erwin *et al.* 1986). The reefs in this area include a diversity of reef type and community structure: bedrock and stony reefs; flat, sloping and terraced bedrock reef; vertical reef including 30m high sublittoral cliffs; silt covered and sand scoured reef; coastal shallow infralittoral reefs and reefs that are five miles from the coast and extend to over 90m deep. The varied reef types and conditions in this area support a number of rare and priority species, and several southern species that are found no where else in Northern Ireland.

Reef has therefore been graded A for representivity.

b) Relative surface

An estimate of the entire Annex I *Reef* resource (bedrock, stony reef and biogenic reef) in UK waters is 7,180,000 hectares. This total extent figure gives the following thresholds for grades of this criterion (CEC,1995);

A - extents between 1,077,000 and 7,180,000 ha (15-100% of total resource)
B – extents between 143,600 and 1,077,000 ha (2-15% of total resource)
C – extents less than 143,600 ha (0-2% of total resource)

The Skerries and Causeway site contains approximately 2,280 ha (22.8 km^2) of reef including reef with a sediment veneer.

The Skerries and Causeway site contains 0.03% of the national Annex 1 Reef resource, and is graded C for reef for the area of habitat criterion.

c) Conservation of structure and function

Degree of conservation of structure

Much of the reef in the Skerries and Causeway area is thought to be in good condition. It is likely that some areas of stony reef and reef with a sediment veneer have been impacted in the past from trawling and scallop dredging, but there is no evidence of this from the surveys. A small intact *Modiolus modiolus* biogenic reef extending over an area of perhaps 0.5km^2 existed on the inside of the Skerries in 1979, in an area that still has scattered live *Modiolus* and much *Modiolus* shell. This area was known to be used for trawling and scallop dredging. Another known area of *Modiolus* shell accumulation exists on the Benbane Reef Complex.

The historical *Modiolus* areas were last surveyed in an intact state in 1979. Although substantially damaged in the past this area represents less than 2% of the total reef area within the proposed SAC therefore:

The Skerries and Causeway reef has been graded II (structure well conserved).

Degree of conservation functions

The prospects of the reefs maintaining their structure in the future is good.

Part of the conservation value of this site is that it has a range of relatively southern species, and with the predicted warming of the seas from climate change it may be expected that these species would grow in number and extent. One species that may be expected to increase and extend its range is the purple urchin *Paracentrotus lividus*, which is currently confined to rock pools in the western part of the site.

Some low lying reefs and some stony reef areas may be vulnerable to mobile fishing gear. However, relatively little fishing takes place in this area.

The Skerries and Causeway site is graded II (good prospects).

Restoration possibilities

Small areas within the site are possibly in need of restoration: mainly the band of mixed and coarse sediment inside of the Skerries called Broad Sound. This area has been subject to trawling and dredging and has lost its characterising *Modiolus modiolus* biogenic reef (last surveyed intact in 1979, now just scattered live individuals and shell material). Experience within Strangford Lough SAC, including the restoration trials of the *Modiolus* Restoration Research Group, has shown that restoration of this habitat is difficult and that a high level of protection is required to aid what slow natural regeneration may be possible.

Some of the deeper reef areas have communities including long lived sponges that would also be difficult to restore in the event that damage occurred in those areas.

Given the experience of *Modiolus modiolus* restoration trials in Strangford Lough SAC, and long lived sponge species in the deeper reef communities:

The Skerries and Causeway has been graded III (restoration difficult or impossible) for the restoration possibilities sub-criterion for reef.

Overall grade:

When grade II for the first sub-criterion, and grade II for the second sub-criterion are combined, the overall grade for the criterion is B: good conservation, irrespective of the grading assigned to the third sub-criterion: **Grade B (good conservation).**

d) Global assessment

The Skerries and Causeway area includes an important diversity of reef types within a small area. Despite its small area, a Global Assessment grade of B (good conservation value) is therefore suggested.

7.2 Sandbanks which are slightly covered by seawater all the time

a) Representivity

Both in the area shallower than 20m and in the deeper flanks and sandwaves there is a diversity of sandbank type and communities in a relatively small area: within the Broad Sound there are relatively stable areas of mixed sediment; inside of the Skerries Islands there is an area of eelgrass *Zostera marina*; and there are also large areas of mobile sandwaves with a relatively poor fauna that provide an important habitat for sand eels which are characteristic of this type of sandbank.

Sandbanks which are slightly covered by seawater all the time has therefore been graded B for representivity.

b) Relative surface

The evaluation of relative surface area is approximate as it is not possible to calculate an accurate total extent for Annex I shallow sandbank habitat for UK waters. A best minimum estimate, based on the mapped area of sandy sediments less than 20m water depth, of 1,720,000 hectares has been used to assess area habitat. Using the following thresholds for grades of this criterion (CEC,1995);

A - extents between 258,000 and 1,720,000 ha (15-100% of total resource)
B – extents between 34,400 and 258,000 ha (2-15% of total resource)
C – extents less than 34,400 ha (0-2% of total resource)

The Skerries and Causeway site contains approximately 1601 ha (16.0 km²) of Annex I sandbank: 903 ha (9.0 km²) of sandbank in less than 20m water depth, with an additional 699 ha (7.0 km²) of sandbank greater than 20m water depth.

The Skerries and Causeway site contains 0.01% of the national sandbank resource, and is graded C for sandbank for the area of habitat criterion.

c) Conservation of structure and function

Degree of conservation of structure

Much of the Skerries and Causeway sandbank area is thought to be in good condition. There has been no aggregate extraction, and the structure and function of the more mobile sandbank features is therefore probably unchanged. In less than 20m water depth the more mixed sediments of the sandbank inside the Skerries have been subject to mobile fishing gear and longer lived infauna and epifauna have almost certainly been lost.

The Skerries and Causeway reef has been graded II (structure well conserved).

Degree of conservation functions

The prospects of the sandbanks maintaining their structure in the future is good. Aggregate extraction requires a licence from NIEA for which an appropriate assessment would have to be made.

Some mixed sediments may continue to be vulnerable to mobile fishing gear. However, relatively little fishing currently takes place in this area.

The Skerries and Causeway site is graded II (good prospects).

Restoration possibilities

Small areas within the site are possibly in need of restoration: mainly the band of mixed and coarse sediment inside of the Skerries called Broad Sound. This area has been subject to trawling and dredging and it is probable that it has lost a characterising long lived infauna, probably including *Atrina fragilis* (as well as its *Modiolus modiolus* biogenic reef, last surveyed intact in 1979, now just scattered live individuals and shell material). Empty shells of *Atrina fragilis* have been found in Broad Sound in recent surveys, but no live individuals.

Given the national rarity of a characterising long lived species *Atrina fragilis* (only found now in Plymouth Sound and the Sound of Canna):

The Skerries and Causeway has been graded III (restoration difficult or impossible) for the restoration possibilities sub-criterion.

Overall grade:

When grade II for the first sub-criterion and grade II for the second sub-criterion are combined, the overall grade for the criterion is B: good conservation, irrespective of the grading assigned to the third sub-criterion: **Grade B (good conservation).**

d) Global assessment

The Skerries and Causeway area includes an important diversity of sandbank types within a small area. Despite its small area, a Global Assessment grade of B (good conservation value) is therefore suggested.

7.3 Submerged or partially submerged sea caves

Much of the Skerries and Causeway coastline is characterised by rocky cliffs; and those cliffs have perhaps 30 *submerged or partially submerged sea caves.* Additional to these caves in coastal cliffs, there are an unknown number of fully submerged sea caves including one known swim-through tunnel through the Great Skerrie Island. Sea conditions have not allowed for the survey of these sea caves by the NIEA/NMNI dive team however similar sea caves to the east of the proposed SAC were surveyed by Seasearch (grant-aided by NIEA) and found to have several Species of Conservation Concern.

a) Representivity

From the limited data currently available, it is apparent that the sea caves exhibit a wide variety of size, shape, water depth; rock type (including basalt, Ulster White Limestone, and Waterloo mudstone) and aspect relative to the predominant wave surges and tides. Three

Species of Conservation Concern (SOCC) (*Stelletta grubii, Stryphnus ponderosus* and *Parazoanthus anguicomus*) have so far been identified from very similar caves to the east of the SAC at Carrickarede and it is likely that those species and others will be present in the SAC. The deep vertical cliffs (50-80m depth) of the Benbane Reef Complex scarp may also yield caves as caves are known from similar submerged cliffs off Rathlin at a depth of 55-60m. Runkerry Cave, within the proposed SAC, may be Ireland's longest sea cave at around 300m long (historical records).

Submerged or partially submerged sea caves have therefore been graded B for representivity.

b) Relative surface

The area of sea cave habitat is unknown. It is estimated that there are at least 40 submerged or partially submerged sea caves, but it has not been possible to assess relative surface, therefore **a grade of unknown has been assigned**.

c) Conservation of structure and function

Degree of conservation of structure

For the majority of the sea caves that are along the coast there may be very limited damage to some sensitive communities within the sea caves from diffuse pollutants carried down rivers but this is not thought to be significant.

The physical structure of the caves along the coast is naturally eroding, which should both add to and take away from the cave habitat. This active erosion is likely to be happening at a faster rate in the softer Ulster White Limestone.

Submerged or partially submerged sea caves has therefore been graded II: structure well conserved.

Degree of conservation functions

The prospects of the sea caves to maintain their structure in the future, taking into account both the creative and destructive natures of erosion, are good.

Submerged or partially submerged sea caves has therefore been graded II: good prospects.

Restoration possibilities

Sea caves are a naturally dynamic and difficult to access environment. If damage was to occur to either the physical structure or the biological communities, then **restoration would be 'difficult or impossible' hence grade III.**

Overall grade

When grade II for the first sub-criterion and grade II for the second sub-criterion are combined, **the overall grade for the criterion conservation of structure and function is B: good conservation.**

d) Global assessment

The suggested grades for Stage 1A criteria a)-c) are B, C and B respectively. Given these evaluations, and taking into account the diversity of sea caves in the area, the Species of Conservation Concern, and the possibility of finding important deeper sea caves, the Global Assessment grade is B ('good conservation value').

7.4 Harbour porpoise (Phocoena phocoena)

a) Size and density of the population (defined by the following five attributes)

Continuous or regular presence (subject to seasonal variation)
When considering the 6 year period 25/01/04 - 11/10/10, under both the NIEA Cetacean Monitoring Programme and the Irish Whale and Dolphin Group observer programme harbour porpoises have been consistently recorded during more than 140 dedicated effort watches at six sites within the proposed boundary. These records span every month of the year, including months outside of the breeding and calving seasons and confirm the continuous presence of harbour porpoise within this area.

Continuous or regular presence is **graded A (excellent conservation).**

Good population density (in relation to neighbouring areas)
When the sightings rates of the three most intensively effort-watched sites in Northern Ireland (with comparable sample sizes of >115 watches) are compared, 'Ramore Head' compares favourably against the very best sites:

- Grey Point (Co Down), 117 effort watches – 0.243 HP/hour
- Ramore Head (Co Antrim), 140 effort watches – 0.314 HP/hour
- Bloody Bridge (Co Down), 115 effort watches – 0.396 HP/hour

The assessment here against sites with equally high sample sizes reduces the artefact of high rates resulting from inadequate factoring of seasonal lows e.g. minimum counts outside the main breeding and calving periods and allows a more statistically reliable comparison.

Only for two sites with c. 40% fewer watches, are sightings rates higher, as is expected for monitoring at sites with smaller sample sizes, with lesser factoring in of seasonal lows:

- Black Head (Co Antrim), 81 watches – 0.503 HP/hour
- Portmuck (Co Antrim), 88 watches – 0.568 HP/hour

The resulting figure of less than two animals per hour results in a **grade D.**

High ratio of young to adult during certain periods of the year

For effort watches at the three most intensively monitoring sites in Northern Ireland, where age profiles are recorded, a comparison of the young to adult ratios indicates that the most intensively watched site within the pSAC boundary contains the highest calf-adult ratio and the second highest young-adult ratio:

- Ramore Head (Co Antrim), 15.3% (young), juveniles (10.2%), **calves (5.1%)**
- Grey Point (Co Down), 17.3% (young), juveniles (14.9%), **calves (2.4%)**
- Bloody Bridge (Co Down), 13.1% (young), juveniles (11.1%), **calves (1.9%)**

If comparison of calf-adult ratios is made among the five sites in Northern Ireland with the greatest number of effort watches, figures indicate that Ramore Head has the second highest ratio.

- Black Head (Co Antrim), 15.6% (young), juveniles (8.9%), **calves (6.7%)**
- Portmuck (Co Antrim), 5% (young), juveniles (4.7%), **calves (0.3%)**

Whilst it is not possible to determine from visual observations whether juveniles recorded were biologically dependent animals, their strong association with adults would suggest that many are at least socially dependent.

High ratio of young to adult during certain periods of the year is therefore graded C.

Other biological elements
No specific porpoise behavioural studies have been undertaken within the study area; hence no evidence is available to identify any distinguishing use of the area for social or sexual purposes.

This attribute is graded **unknown**.

Proportional population size
No estimates of the absolute abundance of harbour porpoises are available for Northern Ireland territorial waters and so no proportional assessments are possible at this time.

This attribute is scored **unknown**.

When considered collectively, the assessment of overall size and density of population is grade C.

b) Degree of conservation of features of the habitat that are important for the species concerned and restoration possibilities

Bathymetric data derived through the Joint Irish Bathymetric Survey demonstrates that the seabed within the pSAC is characterized by complex geomorphology relative to many other maritime areas. As a result, the area encompasses various oceanographic features which provide enhanced foraging opportunities for feeding on aggregations of prey items, including coastal headlands, strong tidal currents, tidal races and eddies.

The site provides prey species of sufficient quantity, quality and availability to support individual growth, reproduction and development. Agri-Food and Biosciences Institute (AFBI) grab surveys and scallop by-catch data record the presence of a diverse range of prey items including mainstay species such as gobies (*Gobius paganellus)*, sandeels (*Ammodytes spp.*, *Hyperoplus spp.)* and whiting (*Merlangius merlangus).*

The current absence of artificial structures allows for the unimpeded passage necessary for movement, rest and foraging.

These features are in good conservation condition and are **graded B**.

*c) **Degree of isolation of the population***
In UK waters, JNCC recognises two discrete harbour porpoise populations - the Irish and Celtic Seas, and the North Sea. The 'Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas' (ASCOBANS) has, however, proposed two separate management units within the North Sea. However, the large scale movements of porpoises recorded between the northern and southern North Sea between the two 'Small Cetaceans in the European Atlantic and North Sea' (SCANS) surveys have created some debate over this view.

This places greater importance on harbour porpoise in the Irish Sea that will need to be reflected in the selection of representative sites. Designations within this region, in conjunction with wider management measures for Annex IV species, will make a practical contribution to maintaining the favourable conservation status of this species.

The harbour porpoise population using Northern Ireland territorial waters is well within the extended distribution range for the harbour porpoise and is likely to represent the northern extreme of the Irish and Celtic Seas population.

There is no evidence to indicate that porpoises using Northern Ireland waters are in any way isolated within the Irish and Celtic Sea population.

Degree of isolation of the population is assessed as Grade C.

d) Global assessment

When the individual grades a) – c) are combined the overall Global assessment is a Grade C.

Annex II species	Overall size and density (a)	Conservation of features (b)	Isolation of population (c)	Global assessment (d)
Porpoise	C	B	C	C

7.3 Grey seal (Halichoerus grypus)

Annex III selection criteria (Stage 1B)

Size and density of the population of the species present on the site (a)

Grey seal (*Halichoerus grypus*), Annex II and Annex V. Up to 35 adults (July 2006) and 1 pup (February 2007) were recorded on NIEA surveys. **Graded D, non-significant presence.** As such no other indication required for the evaluation criteria concerning this species within the site.

7.4 Common seal (Phoca vitulina)

Annex III selection criteria (Stage 1B)

Size and density of the population of the species present on the site (a)

Common seal (*Phoca vitulina*), Annex II and Annex V. Up to three adults (May 1998) recorded on NIEA surveys. However, on NMNI/NIEA diving surveys (casual sightings, August 2006-2009) up to six juveniles were frequently observed inside the Skerries. **Graded D, non-significant presence.** As such no other indication is required for the evaluation criteria concerning this species within the site.

7.5 Bottlenose dolphin (Tursiops truncatus)

Annex III selection criteria (Stage 1B)

Size and density of the population of the species present on the site (a)

Bottlenose dolphin (*Tursiops truncatus*), Annex II and Annex IV. Casual sightings data reported to the Irish Whale and Dolphin Group (IWDG) from 1990-2010 data showing an average group size of 15 individuals. Monthly effort watches that were conducted by NIEA for 100 minutes each month (2009) recorded two sighting events (March and May). **Graded D, non-significant presence.** As such no other indication is required for the evaluation criteria concerning this species within the site.

7.6 Summary

Summary of scores for Stage 1A criteria for Annex I habitat

Annex I habitat	Representivity (a)	Area of habitat (b)	Structure and function (c)	Global assessment (d)
Reef	B	C	B	B
Sandbank	B	C	B	B
Caves	B	Unknown	B	B

Summary of scores for Stage 1A criteria for Annex II species

Annex II species	Overall size and density (a)	Conservation of features (b)	Isolation of population (c)	Global assessment (d)
Porpoise	C	B	C	C

8. Supporting scientific documentation

Reference	Description/Purpose of study	Data Type
Erwin, D.G., Piction, P.E., Connor, D.W., Howson, C.M., Gilleece, P. and Bogues, M.J.(1986). The Northern Ireland Sublittoral Survey. Report for the Department of the Environment Northern Ireland, Ulster Museum, Belfast.	Comprehensive diving survey of Northern Ireland designed to identify Marine Nature Reserves.	999 sites, written descriptions, species lists, photographs and particle size analysis of sediments.
Goodwin, C., Picton, B., Breen, J., and Edwards, H., 2008. Sublittoral Survey Northern Ireland: A review of the status of Northern Ireland Priority Species of marine invertebrates. National Museums Northern Ireland/Northern Ireland Environment Agency.	Diving survey to identify potential marine SACs, provide Condition Assessment data for SACs and record Priority Species and Priority Habitats.	Dive survey records on MNCR forms, with photographs, video and samples.
Joint Irish Bathymetric Survey (JIBS), 2008.	Multi-beam echo sounding (MBES) seabed survey, (2008). The data from this report was analysed and reported by the University of Ulster (2010).	Multi-beam Echo Sounder (MBES) surveys. Bathymetry and backscatter data.
University of Ulster, 2010. Habitat Mapping of the Skerries/Causeway Proposed Marine SAC. Clements, A., Plets, R., and Quinn, R. Report prepared for the Northern Ireland Environment Agency.	Compilation of all known data on Skerries and Causeway proposed SAC, analysis of MBES backscatter, habitat and biotope mapping.	Dive surveys, drop and towed video, grab samples.

9. Site overview and conservation interest

The Skerries and the surrounding area have been noted as having a unique assemblage of habitats and benthic species (Erwin *et al.* 1986; Erwin *et al.* 1990). The area is subject to strong tidal streams (reaching up to six knots in the Skerries Sound between Ramore Head and the most western island of the Skerries) and highly exposed to wave action, resulting in mobile sand offshore with sand scour dominating the biological community composition. Bedrock reefs in the region are often covered by a sand veneer of varying thicknesses, therefore supporting only sand tolerant species. Larger reefs protruding from the surrounding mobile sediment harbour a greater diversity of species.

The presence of south western species in this region has been documented and makes this area unique within Northern Ireland. This phenomenon may be explained by the proximity of the warmer Atlantic oceanic water mass in the region. The Skerries are located between the Islay front (to the northwest) and a second salinity front to the east that separates the waters of the southern Malin Shelf and the North Channel of the Irish Sea (Gowen *et al.* 1998). Consequently, water temperature is elevated by comparison to coastal regions east of Benbane Head (Gowen *et al.* 1998). Frequent occurrence of the bryozoans *Bugula turbinata, Bugula plumosa,* the sea cucumber *Holothuria forskali* and the red algae *Myriogramme heterocarpum* and *Rhodymenia holmesii* were noted in the Northern Ireland Sublittoral Survey (Erwin *et al.* 1990).

The islands themselves act as a wave-breaker for Atlantic swell; therefore the northern side of the islands is very exposed, while the southern side of the islands and seabed between the islands and the Antrim coast is only moderately exposed. Due to the high energy regime of this area, there are no fine substrates, as these would be rapidly winnowed away. However, the shelter the islands do afford to the south have resulted in communities occurring here that are rarely found elsewhere on the North Coast of Northern Ireland, such as eelgrass *Zostera marina* beds.

A total of 43 biotope/biotope complex/habitat categories were identified from the available ground-truthing datasets, with a good proportion (75%) of ground-truthing classified to levels 4 or higher (Table 2).

Table 2: Number of ground-truthing samples classified to MNCR levels 3-6

Ground-truthing type	MNCR Level 3 – main habitat	MNCR Level 4 – biotope complex	MNCR Level 5 - biotope	MNCR Level 6 – sub-biotope	Totals
CEDAR-recorded dives		30	47	36	113
CMA dives	4	15	1	1	21
ROV survey	7				7
Video tows	2	14			16
Sediment samples	34				34
Totals	47	59	48	37	191

The Skerries and Causeway area has varied reef and sea cave habitats that partly reflect the complex geology that includes a sublittoral part of the Giant's Causeway geological World Heritage Site; with reefs and caves in Jurassic Waterloo mudstones, Cretaceous Ulster White Limestone, and Tertiary Antrim Lava.

Annex I *bedrock reef* (4.9 km^2 of the proposed SAC area), extends from coastal fringe reefs to deeper reefs, harbouring examples of both infralittoral and circallitoral biotopes. All bedrock reef areas are subject to strong tidal currents and significant wave exposure, which, coupled with significant sand scour, strongly drives the community composition which has been well documented through diver surveys. Infralittoral zones are dominated by the kelp *Laminaria hyperborea* and dense foliose red algae, and circalittoral zones dominated by bryozoan and hydroid turf, with some significant patches of sponges and often an understorey of silt dwelling ascidians, including *Synoicum incrustatum,* and the anemone *Actinothoe sphyrodeta* is also well represented.

Annex I *stony reef* has (4.9 km^2 of the proposed SAC area), is a diverse, heterogeneous habitat including many biotopes found on the bedrock reef areas, with exposure to sand scour dominating community structure. Bryozoan turf may be equally dominated by *Flustra foliacea* and *Securiflustra securifrons,* and additionally *Eucratea loricata* may be locally abundant. The hydroid turf is usually composed of *Nemertesia antennina, Hydrallmania falcata* and *Halecium muricatum.* In infralittoral areas adjacent to mobile coarse sediment the kelp *Saccorhiza polyschides* may be found in addition to the dominant kelp *Laminaria hyperborea.*

The sponge *Ciocalypta penicillus* has been identified adjacent to two reefs offshore from the Skerries, growing through a coarse sand bedrock veneer. This species is rare in Northern Ireland, being a more southern species, and this may be the only area in Northern Ireland where it is found. 13 km^2 of Annex I bedrock with a sediment veneer has been mapped within the proposed SAC area, however this habitat has received less survey than other types of reef in the area.

The sea cucumber *Holothuria forskali* is rare in Northern Ireland, but is frequently found on bedrock and stony reef areas surrounding the Skerries.

The ross coral *Pentapora fascialis* var *foliacea* has been found in bedrock reef and stony reef habitats in the study area; this species is considered rare within Northern Ireland's inshore waters.

The biotope "deep sponge communities" (CR.HCR.DpSp) appears to occur in the study area in atypical shallower depths (18-26m), possibly warranting a new biotope description.

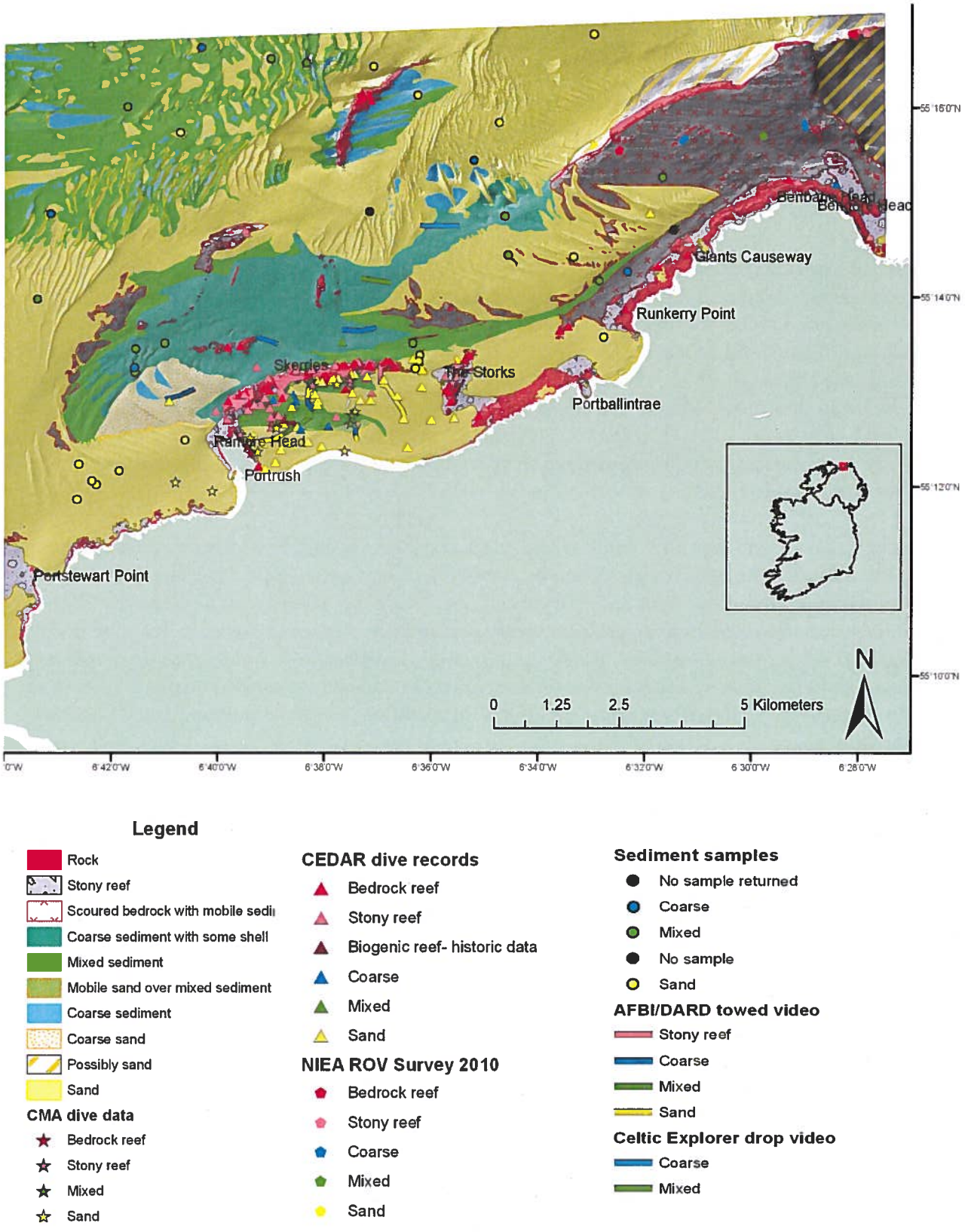

Figure 3. Ground type and ground truthing within the Skerries and Causeway proposed SAC.

9.1 Annex I Reef

1) Bedrock Reef

The bedrock areas may be split into infralittoral and circalittoral biotopes with the distinction falling around the 20-22m depth band.

Infralittoral zone: bordered at the shallowest depths by a band of the kelp *Alaria esculenta* and mussels *Mytilus edulis* grading to *Laminaria hyperborea* kelp forest with dense foliose red seaweeds and then kelp park as depth increases. These biotopes are noted on coastal fringe basalt and limestone rock substratum. Key species included the red alga *Delesseria sanguinea,* the anemone *Actinothoe sphyrodeta*, the cup coral *Caryophyllia smithii*, the topshell *Calliostoma zizyphinum*, the seaweed *Dictyota dichotoma*, the sponges *Dysidea fragilis, Hemimycale columella, Stelligera regida* and *Haliclona viscosa*, the ascidians *Synoicum incrustatum, Morchellium argus, Aplidium punctum, Dendrodoa grossularia* and the crabs *Cancer pagurus* and *Necora puber.* Sediment-affected or disturbed kelp communities were noted on the western side of Ramore Head including the kelps *Saccorhiza polyschides* and *Laminaria hyperborea* and a lower diversity of species, particularly sponges, with increased abundance of barnacles and keel worms (*Pomatoceros triqueter)* and sand tolerant species such as the anemone *Urticina felina/eques.*

Circalittoral zone: several deep sponge community biotopes and biotope complexes occur in the shallow-mid circalittoral zone (18-26m), rather than in the deep circalittoral zone where it is more typically found elsewhere, generally found at the wave and tidal stream exposed sites on the more extensive bedrock reefs, and generally located on sloping bedrock, but not near the base of the reefs where it would be exposed to sand scour.

A bryozoan and hydroid turf is abundant in this biotope, consisting principally of *Flustra foliacea, Securiflustra securifrons* and *Nemertesia antennina,* with *Helecium muricatum* frequently observed. The soft coral *Alcyonium digitatum* and the cup coral *Caryophyllia smithii* may be common. Patches of dense *Corynactis viridis* anemones were observed on the more vertical rock faces. The sponge community was fairly diverse, though dominated by species that tolerate some sand scour: *Tethya aurantium, Stelligera stuposa, Raspailia ramosa* and *Dysidea fragilis* were frequently observed, with *Cliona celata, Polymastia mamillaris, Polymastia pencillus, Stelligera rigida, Axinella infundibuliformis, Axinella dissimilis* and *Raspailia hispida* occasionally observed. The anemone *Actinothoe sphyrodeta* was observed along with bryozoan and sponge crusts, *Bugula* spp., crisiids, *Alcyonidium diaphanum, Balanus spp., Pomatoceros triqueter, Calliostoma zizyphinum, Dendrodoa grossularia, Sagartia elegans, Aslia lefevrei, Henricia spp., Asterias rubens, Marthasterias glacialis* and *Polycarpa scuba* often noted. An unidentified red silty ascidian was also noted on the northern edge of the Skerries.

It should also be noted that the sea cucumber *Holothuria forskali* was found throughout the bedrock biotopes recorded in this study area with a greater number of dives recording this species on the Skerries than on the coastal fringe reef. This species is not found in other parts of Northern Ireland's inshore waters.

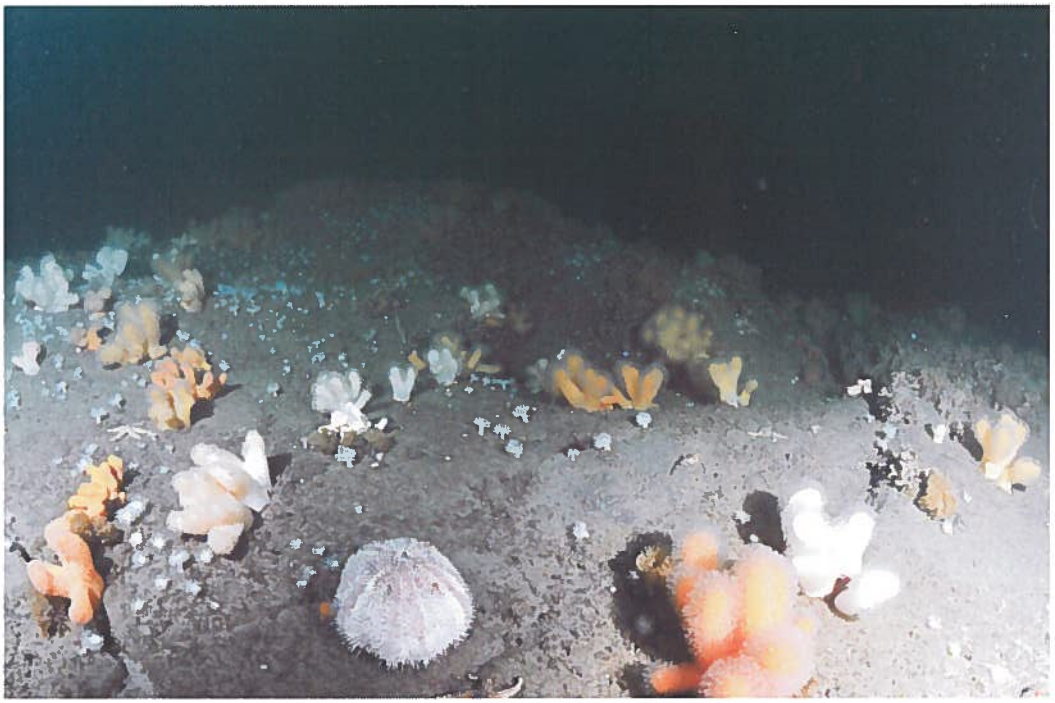

Plate 1. ***Part of Curran Reef: the top of the bedrock outcrop where the soft coral*** **Alcyonium digitatum** ***and the anemone*** **Actinothoe sphyrodeta** ***occur in greater densities***

Plate 2. ***Part of Solan Reef, which has a significant sand veneer and silted appearance. This is the border of two biotopes including the deep sponge community but also where*** **Securiflustra securifrons** ***and*** **Synoicum incrustatum** ***are significant contributors to the community.***

Plate 3. ***Less silted bedrock reef on the northern Storks. Note patchy high densities of*** **Flustra foliacea,** ***the anemone*** **Actinothoe sphyrodeta,** ***dead mans fingers*** **Alcyonium digitatum** ***and sponge*** **Pachymatisma johnstonia**

Plate 4. ***The sponge*** **Ciocalypta penicillus** ***growing on bedrock at Solan Reef but growing up through a significant mobile coarse sand veneer.***

The reefs offshore from the Skerries warrant additional description due to their potentially different oceanographic or hydrodynamic setting compared to the Skerries, the Storks and the coastal fringe reefs:

The Ridges is composed of terraced bedrock with individual vertical faces approximately 1m high. The vertical surfaces are characterised by dense patches of *Corynactis viridis* while the horizontal surfaces are dominated by faunal turf principally consisting of *Flustra foliacea* and *Nemertesia antennina*. *Alcyonium digitatum* is commonly encountered on horizontal surfaces along with silt dwelling ascidians. At the deeper sites *Alyconidium diaphanum* was frequent, close to the stony reef and coarse sediment boundary. Sponges were also fairly notable, including *Pachymatisma johnstonia, Cliona celata, Axinella dissimilis, Myxilla incrustans, Raspailia hispida, Haliclona oculata, Haliclona viscosa* and *Dysidea fragilis.*

Curran Reef is a low bedrock ridge surrounded by cobbles and coarse sediment. *Flustra folicea, Securiflustra securifrons* and *Alcyonium digitatum* dominate the rock surface with the ascidians *Synoicum incrustatum* and *Clavelina lepadiformis* frequently observed. *Cliona celata, Corynactis viridis,* crisids and bryozoan crusts are also found. The surrounding cobbles are dominated by *Nemertesia antennina* with *Rhizocaulus verticillatus, Hydrallmania falcata, Eucratea loriata* and *Securiflustra securifrons* frequent.

Solan Reef is a bedrock reef with small areas of boulders in bedrock hollows, surrounded by mobile sand waves. *Securiflustra securifrons* and *Alcyonium digitatum* dominate the bedrock. *Calliostoma zizyphinum, Synoicum incrustatum, Polycarpa scuba, Stelligera stuposa* and *Urticina felina* are noted. The surrounding sand has *Eucratea loricata* and *Halecium plumosum* attached to any shell pieces or pebbles and the sponge *Ciocalypta penicillus* (Plate 4) was found in the thick sand veneer adjacent to the exposed bedrock (also noted at the Ridges), a species that is not found elsewhere in Northern Ireland as it is considered a southern species. Two dives were completed over this site (~ 34m and ~ 38m) revealing a greater proportion of sponges with depth.

Benbane Reef Complex scarp to the northeast of the proposed SAC area has only so far been sampled by ROV. However, observations suggest dense *Alcyonium digitatum* and sponges are present. It represents the deepest reef in the proposed SAC with a notably steep "drop off" which may harbour biotopes that are not found elsewhere in the study site.

2) Stony Reef

Stony reef has the greatest range of biotopes recorded from ground-truthing. This may be due to the varying nature of the substratum that falls into the category *stony reef*, which includes any substrate with greater than 10% cover of cobbles or boulders but less than 10% bedrock. In many cases, this represents the boundary region between bedrock and surrounding sedimentary habitats, and in some areas it can extend a long distance from bedrock reefs. The presence of a significant cover of usually stable hard substrate allows reef communities to develop, as typified by the rock biotopes, but with less 'deep sponge community' biotope.

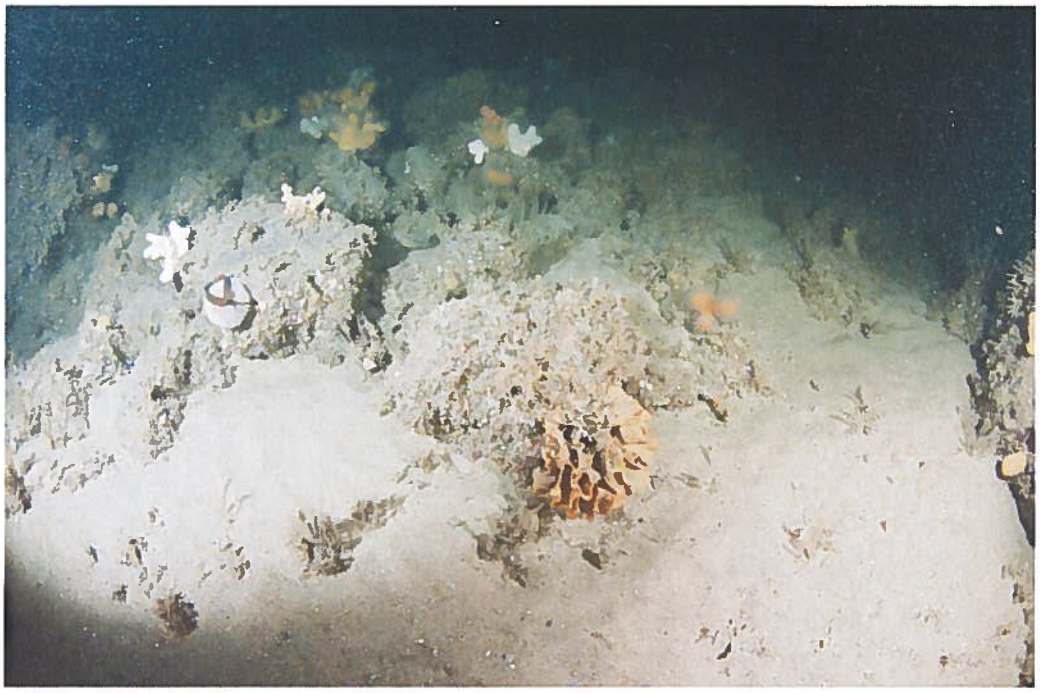

Plate 5. ***Example of boulders (stony reef) surrounding bedrock outcrop at Solan Reef. Dense bryozoan and hydroid turf with*** **Pentapora fascialis** ***is shown, along with notable presence of*** **Alcyonium digitatum.**

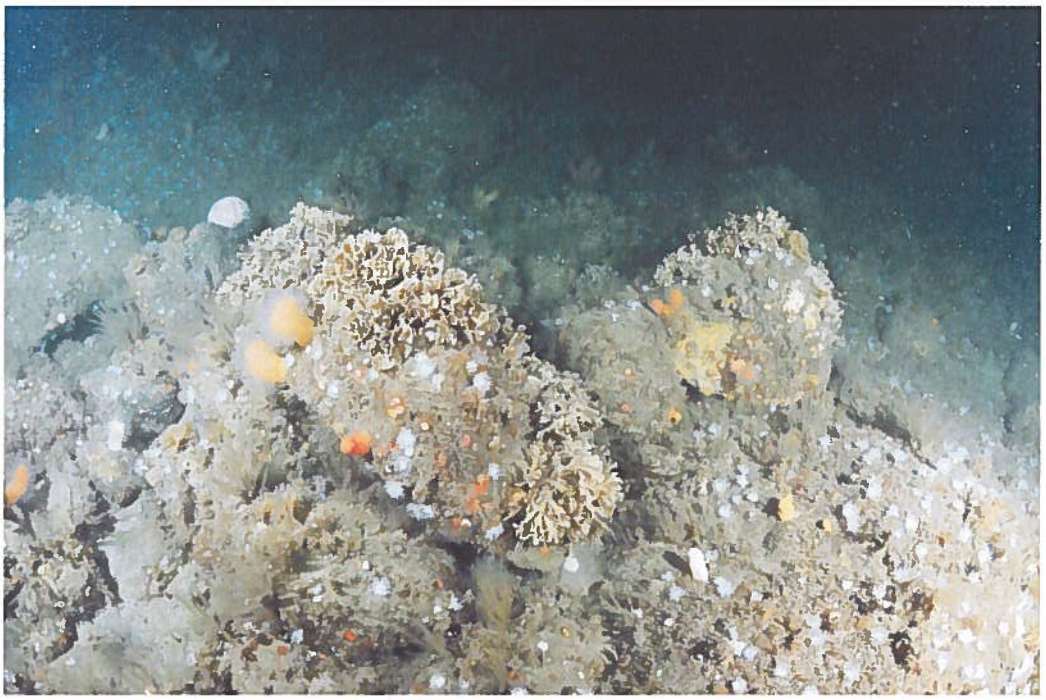

Plate 6. ***Reef near Bushmills Bay, at the base of a steep bedrock outcrop.***

3) Scoured bedrock with veneer of mobile sediment

The most extensive area of this ground type was found as a great expanse of scoured bedrock off Benbane Head, termed here as the 'Benbane Reef Complex'. It was poorly ground-truthed, due to survey conditions, which makes a biological interpretation challenging. The multibeam datasets, particularly the backscatter, were indicative of different substrata from sand through to coarse and mixed sediments while the bathymetry indicated bedrock reef topography underlying the sediment. The ROV survey undertaken by NIEA revealed a diverse array of habitats, from coarse sediments with a large proportion of shell cover (including whole *Modiolus modiolus* shells), to homogeneous coarse sand and exposed bedrock. Where bedrock was exposed or only covered by a thin sediment veneer *Alcyonium digitatum* and other epifauna were clearly dependent on the underlying bedrock and for that reason these areas have been classified as Annex I *Reef.*

9.2 Annex I Sandbank which are slightly covered by sea water all the time

Reef is the primary Annex I habitat feature. However the Annex I habitat *Sandbanks which are slightly covered by seawater all the time* is important as both a habitat in its own right and in maintaining the characteristic silty and sand scoured Annex I *reef.* Annex I *sandbank* covers 16 km^2 down to 55m, of which 9km^2 is shallower than 20m.

Definition of habitat 1110 *Sandbanks which are slightly covered by seawater all the time* (EU, 2007a)
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.

Guidance provided by the Joint Nature Conservation Committee (JNCC) in Aish *et al.* 2008 summarises JNCC's interpretation of the EU definition at the UK level. Under this definition, representative sandbanks:

- are mounds of variable topography rising from horizontal or sloping plains of sandy sediments (and these plains may be included within the Annex I type)
- have summits in waters <20m below Chart Datum (but may have flanks or channels in deeper waters, provided that these features are essential for the maintenance of structure and function of sandbank features)
- may be classed as 'sandy mound' or 'tidal current' sandbanks (see below)
- may have strong or intermediate coastal influence (where strong coastal influence relates to terrestrial inputs being a strong ecological driver for the system, and is usually associated with sandbanks associated in more inshore waters).
- have no lower size limit, provided that the sandbank is large enough to maintain its structure and function

- are composed of 'sand' (particle size in the range of 0.0625 – 2 mm), comprising 'sand', 'muddy sand', 'gravelly sand' or 'sandy gravel' within the Folk Classification Triangle (Folk, 1954).
- may be un-vegetated, or vegetated with maerl, seagrass or seaweed and
- may be in full salinity water or reduced/low/variable salinity water

For the Skerries and Causeway proposed SAC, the Annex I sandbank extends to around 30m depth, in three distinct sandbank areas:

1. The Causeway Bank north west of the Giant's Causeway.

2. Curran Bank between the Skerries islands and Portrush

3. Ramore Bank to the north west of Portrush.

The multibeam echo sounding (MBES) survey data was used to map slope angle (Figure 5.). However, the existence of so many large sand waves made it difficult to set the boundary of the Annex I *sandbank* according to slope analysis (as proposed by Klein, 2006).

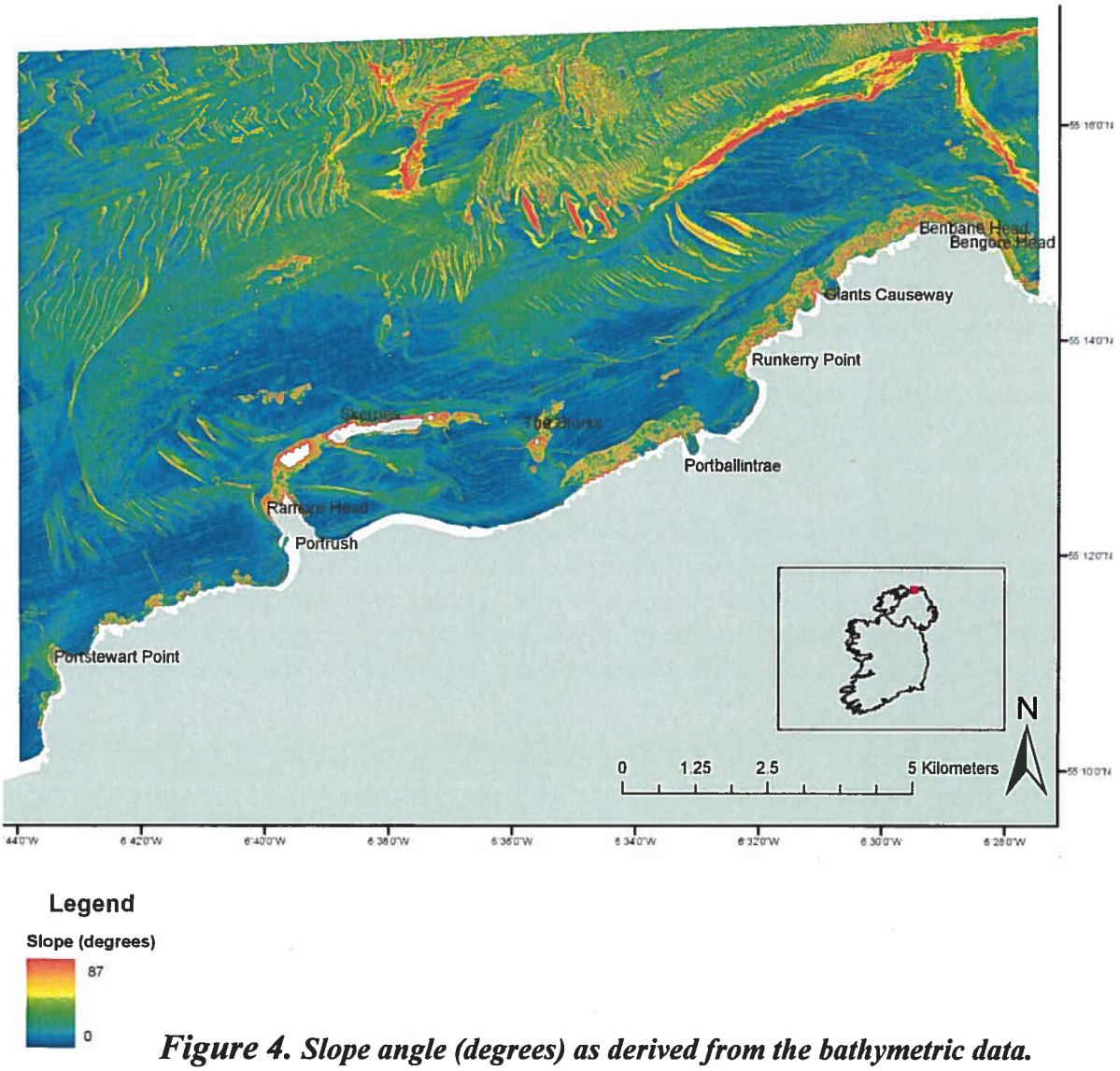

Figure 4. Slope angle (degrees) as derived from the bathymetric data.

Main sediment types

Clements *et al.* (2010) mapped six different sediment types within the proposed SAC boundary (Figure 3). In these maps 'sand' makes up most of the Annex I sandbank, however there is also an important area of Annex I sandbank which is 'mixed sediment', between the Skerries and Portrush.

1) Coarse sediment with some shell.

Mainly composed of coarse sand, fragmented shell and occasional pebbles or cobbles: the largest area of this habitat was found between the Skerries and Solan Reef, in a depth of around 35m. Limited ground truthing was conducted in this habitat, with just a couple of dives, five grab samples and four video tows. Little epifauna was observed from the video tows and video drops, namely: *Asterias rubens*, *Pagurus* spp., *Alcyonidium diaphanum* and *Flustra foliacea*. This habitat was not found within the Annex I sandbank areas but it borders or part covers many of the outer reefs.

2) Mixed sediment

The mixed sediment areas represent perhaps the most biodiverse of the sediment habitats in this area, in particular the Annex I sandbank area between the Skerries and Portrush.

Bryozoans *Flustra foliacea*, *Eucratea loricata* and hydroid turf (including *Nemertesia antennina, Halecium muricatum* and *Hydrallmania falcata*) were found occasionally attached to the stable whole shells that covered a significant proportion of the sediment. Many shells were also encrusted by keel worms *Pomatoceros triqueter* and barnacles, and vast quantities of *Modiolus modiolus* shells were observed. Some dives reported extensive patches of the brittlestars *Ophiothrix fragilis* and *Ophiocomina nigra.*

The bryozoan *Eucratea loricata* was commonly encountered on mixed sediment in the proposed SAC, often where *Flustra foliacea* was rare or occasional, and this may require proposal of a new mixed sediment biotope.

In the western part of the Curran Bank (in Broad Sound inshore of the Skerries) the area mapped as mixed sediment was found in the dive surveys to be a mosaic of mixed sediment habitats including patches of shell fragments as well as areas of compacted level gravel with hydroids *Halecium muricatum, Halecium plumosum* and *Nemertesia antennina.* The crab *Corystes cassivelaunus* and sand eels *Ammodytes* spp. were also noted from dive surveys in this region.

Plate 6. ***Mixed sediment with dense whole shell in the Broad Sound, consisting of predominantly bivalve shells with notable quantity of*** **Modiolus modiolus** ***shell.***

3) Sand

The mobile medium-grained sand appears to support a polychaete dominated infauna, with deeper waters possibly representing the biotope '*Abra prismatica, Bathyporeia elegans* and polychaetes in circalittoral fine sand'. Sand eels and plaice have been recorded. The inshore Annex I sandbank extending between Portrush and Portstewart is moderately well sorted medium sand with an infaunal community characterised by *Nephtys cirrosa, Lumbrineris gracilis, Scoloplos armiger, Spio armata, Chaetozone christiei, Bathyporeia elegans, Megaluropus agilis, Abra prismatica, Monopseudocuma gilsoni, Pseudocumo longicornis* and *Spisula* spp.

Sand waves can be found on some areas of the Annex I sandbank as well as in deeper water within and adjacent to the proposed SAC. Most of these large sandwaves are asymmetrical showing an eastward direction of sand movement. However, in deeper water there are also barchan (crescent shaped) sandwaves (adjacent to the proposed SAC, to the north west) and trochoidal sandwaves to the north west of the Causeway Bank. The largest of the trochoidal sandwaves is about 900m in length and 30m height from the scour to the crest.

4) *Zostera marina* and adjacent medium-fine sand areas

A *Zostera marina* bed (Figure 5) exists in the shallow sublittoral (approximately 2m-10m deep), extending along the southern shore of the largest of the Skerries islands. This appears to be an isolated *Zostera marina* bed with the next nearest known bed 28km to the east in Church Bay, Rathlin Island. From the dive surveys, the adjacent sandy area of medium-fine sand appears to be relatively species rich characterised by: *Arenicola marina, Lanice conchilega, Cerianthus lloydi, Labidoplax digitata* and *Ophiura albida.*

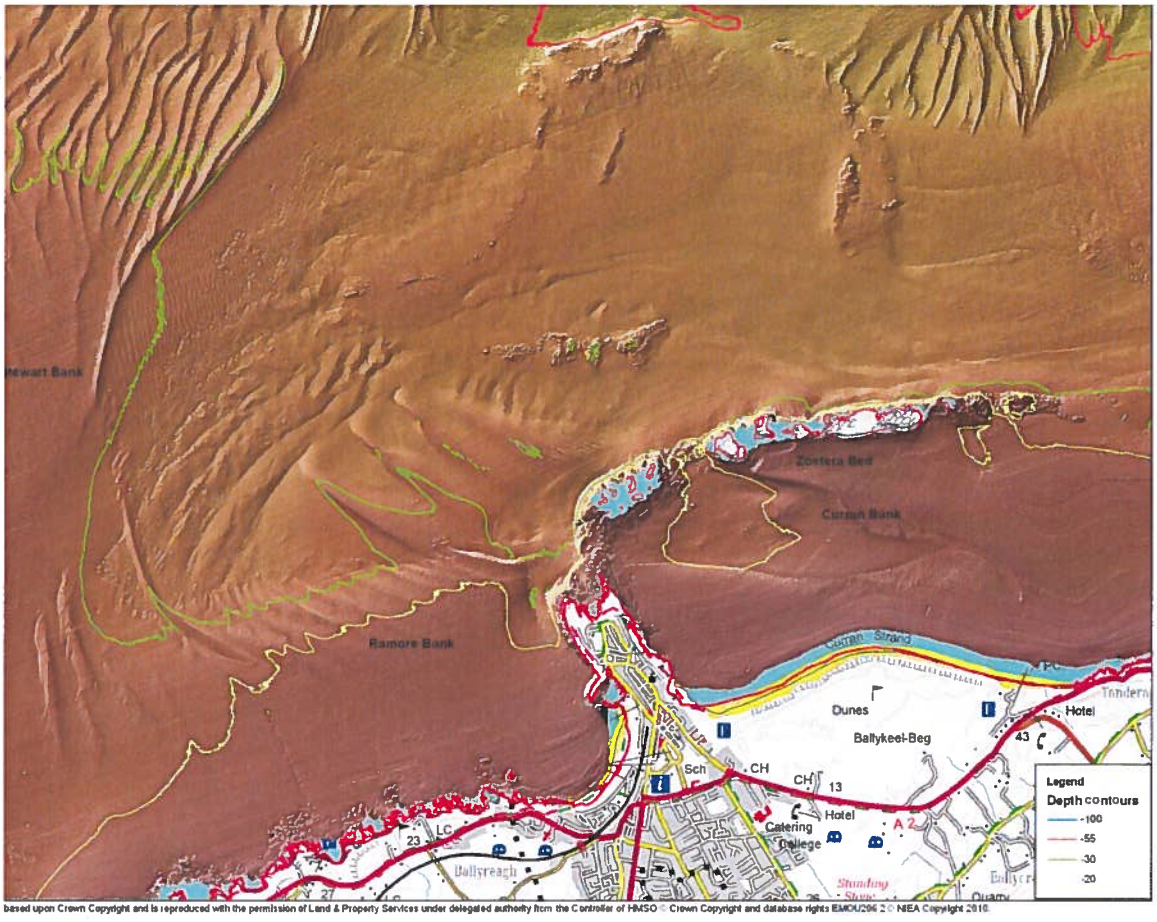

***Figure 5** Part of the Skerries and Causeway proposed SAC, showing reef and sandbank, including the sublittoral eelgrass* **Zostera marina** *bed inshore of the Skerries islands (centre right).*

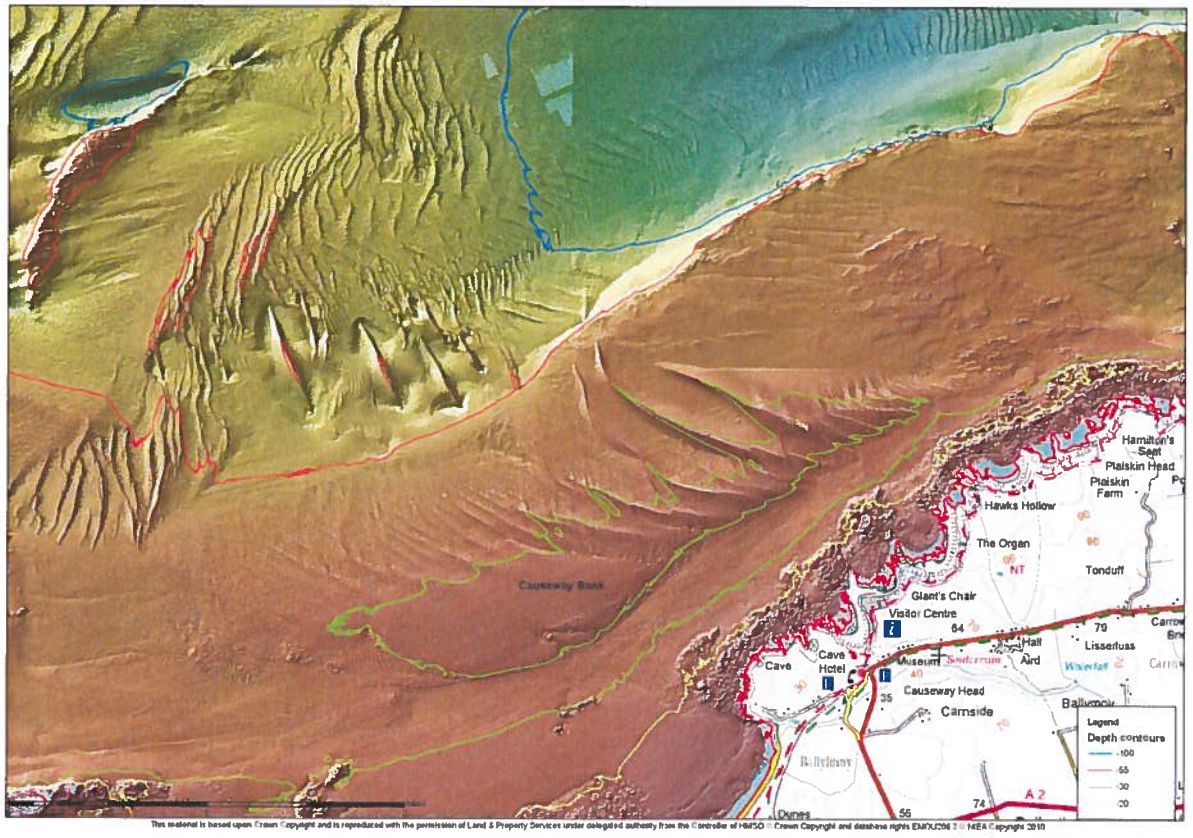

Figure 6 Part of the Skerries and Causeway proposed SAC, showing reef and sandbank, including the Causeway Bank, the Trochoidal sandwaves, and two reef areas (The Ridges top left and the Benbane Reef Complex top right).

9.3 Submerged and partially submerged sea caves

There are perhaps around 40 *submerged and partially submerged sea caves* thought to occur in the proposed SAC in all three of the main rock types. There is potential for several undiscovered submerged caves (including the deep vertical cliff, 50m-80m deep, off the Benbane reef complex - sea caves occur at this depth around Rathlin Island). Dive surveys to the east of the proposed SAC have revealed a number of Species of Conservation Concern (SOCC) in the fully submerged caves, namely *Stelletta grubii, Stryphnus ponderosus* and *Parazoanthus anguicomus*. Further surveys in sea caves by the NIEA/NMNI dive team, scheduled for 2009 and 2010, were restricted by frequent large swells and poor visibility underwater.

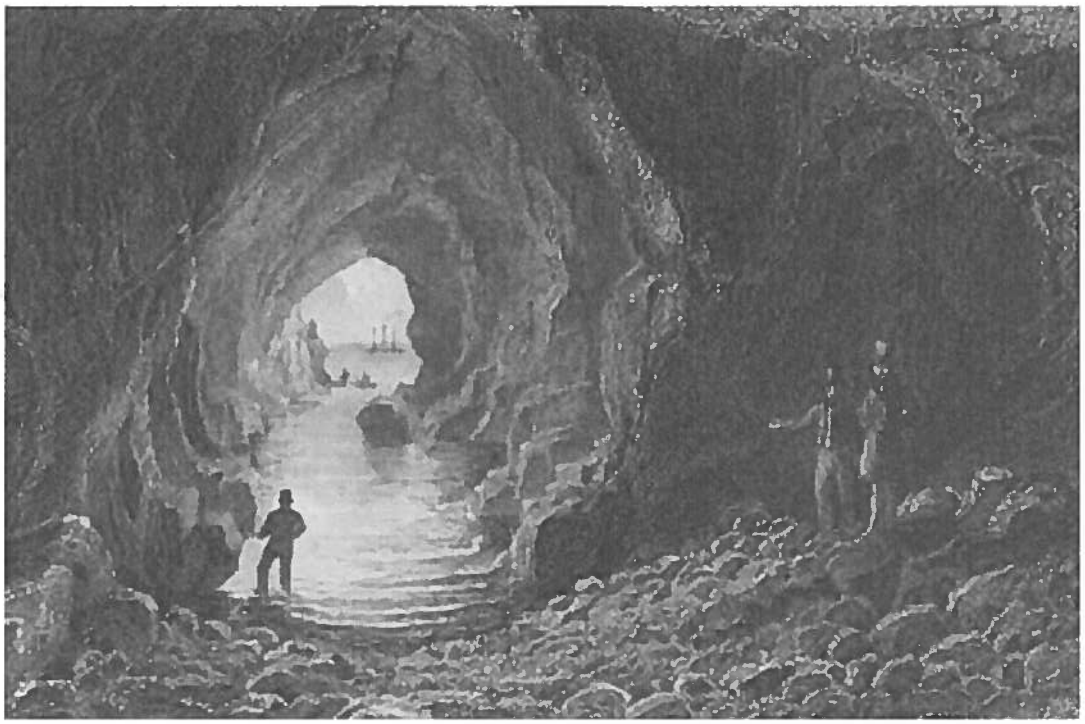

Plate 7. Portcoon Cave. Etching by T.M.Baynes in 'Ireland Illustrated' by George Newenham Wright, published 1831.

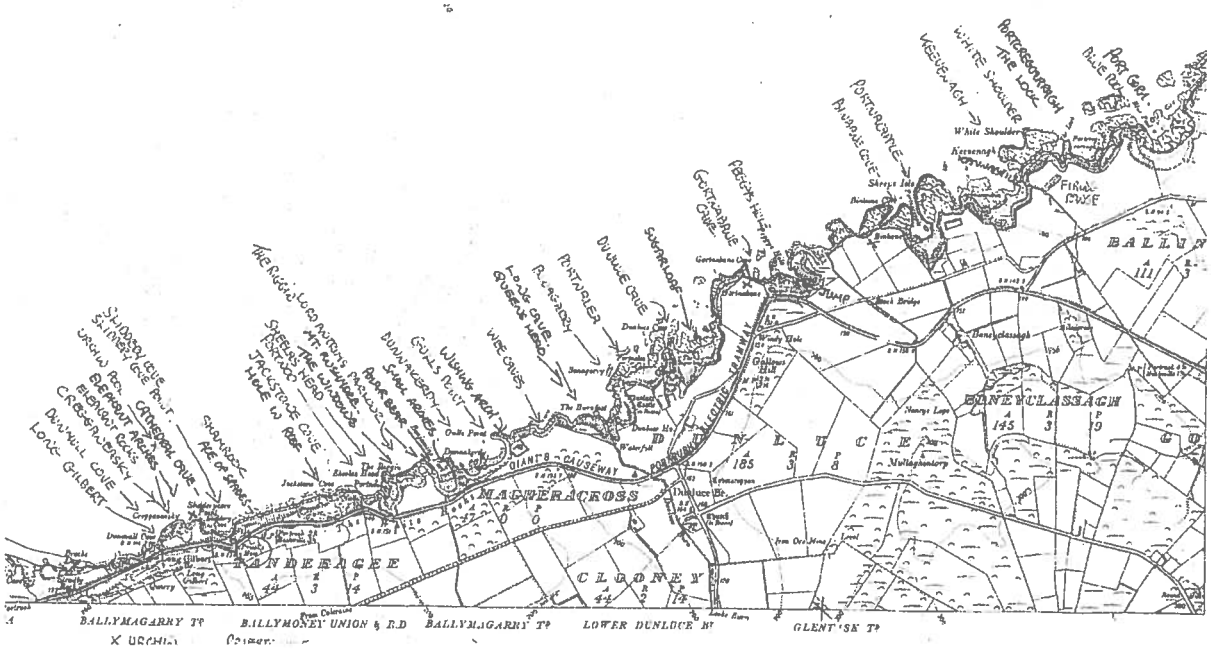

Figure 7. Map of a central part of the Skerries and Causeway proposed SAC coastline, annotated with sea cave names and locations by Robin Ruddock (pers.comm.).

9.4 Harbour porpoise

When considering the 6 year period 25/01/04 - 11/10/10, harbour porpoises have been consistently recorded during more than 140 dedicated effort watches at 6 sites within the proposed boundary. Specifically, the monthly effort watches conducted from Ramore Head recorded the presence of harbour porpoise in every month of 2009, demonstrating continuous or regular presence. In addition, calves and juveniles are regularly recorded during effort watches. When the sightings rates of the three most intensively effort-watched sites in Northern Ireland (with comparable sample sizes of >115 watches) are compared, Ramore Head has the second highest sighting rate, the highest calf-adult ratio and the second highest young-adult ratio. The oceanographic features at this site are thought to provide suitable conditions for aggregations of prey species in sufficient quantity and quality to support individual growth, reproduction and development and to allow for movement rest and foraging.

Plate 8. ***Harbour Porpoise.***

10. Conclusions

The Skerries and Causeway proposed SAC area contains a wide variety of ground types, depths (down to 155m), tidal strength (up to 6 knots) and exposure to wave action (to a wave base 70-80m deep). This produces a complex mosaic of habitats that contain many rare and priority species.

The primary reason for designation is the areas of Annex I *Reef* that include bedrock and stony reef subject to varying degrees of silt, sand scour, or sediment veneer and these conditions largely determine the communities that are found there, including the presence of the colonial ascidian *Synoicum incrustans* which is rare in Northern Ireland and is designated a Species of Conservation Concern. A small *Modiolus modiolus* biogenic reef also existed here intact in 1979, although only remnant scattered individuals now remain.

The Annex I *Sandbank* areas include stable coarse sediments with cobbles and shell that can support a diverse epifauna and is thought to have provided habitat for the long-lived bivalve *Atrina fragilis* (dead fan shells *Atrina fragilis* found on diving surveys included a young clean shell, recorded in 2007, indicating that living fan shells may still be present). Other sediment areas include the bryozoan *Eucratea loricata* on mixed sediment areas where *Flustra foliacea* is rare or occasional, which may require proposal of a new mixed sediment biotope. There are also good densities of sea grass *Zostera marina* on the inside of the Skerries, sediment areas that interact closely with the reef and dramatic sand waves.

The Annex I *sea caves* of this area have not been well surveyed due to adverse weather conditions. However, the ones that have been investigated to the east of the proposed SAC have been found to have priority species (*Stelletta grubii, Stryphnus ponderosus* and *Parazoanthus anguicomus)*. The sea caves are found in at least three main rock types and some are known to be large enough to take a boat in if the conditions allow.

The islands and rocks of the Skerries provide haul-outs that are used by both grey seals and common seals, though both species were only recorded in small numbers and have been graded 'D' a non-significant presence. Bottlenose dolphins have also been graded 'D' a non-significant presence.

Harbour porpoise were regularly recorded in the proposed SAC: monthly effort watch data by NIEA staff have shown consistently high numbers of sightings here compared with other Northern Ireland waters. The oceanographic features at this site are thought to provide suitable conditions for aggregations of prey species in sufficient quantity and quality to support individual growth, reproduction and development and to allow for movement rest and foraging.

The Skerries and Causeway proposed SAC has important areas of Annex I *Reef*, *Sandbank*, and *sea caves*. Many of the rare habitats and species present are there as a result of the warming influence of the Gulf Stream, the variation in underlying geology of the reef, the complex tidal currents and the interaction between reef and sandbank in this area. It is also an important site for marine mammals, particularly the harbour porpoise *Phocoena phocoena.*

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