3.2 Selection Assessment Documents for rRAs

MARINE CONSERVATION ZONE: SELECTION ASSESSMENT DOCUMENT
RRA A MUD HOLE

Version and issue date	Amendments made
v1.0 August 2011	

1. Site name

rRA A - Mud Hole

2. Site centre location

54° 20' 32.101" N, 3° 52' 34.138" W
54.34225 Lat, -3.876149 Long. Lambert Azimuthal Equal Area projection, ETRS89 datum

3. Site surface area

20.37Km^2 (2036.62 Ha)

4. Biogeographic region

JNCC regional sea: Irish Sea.
OSPAR region III: Celtic Seas.

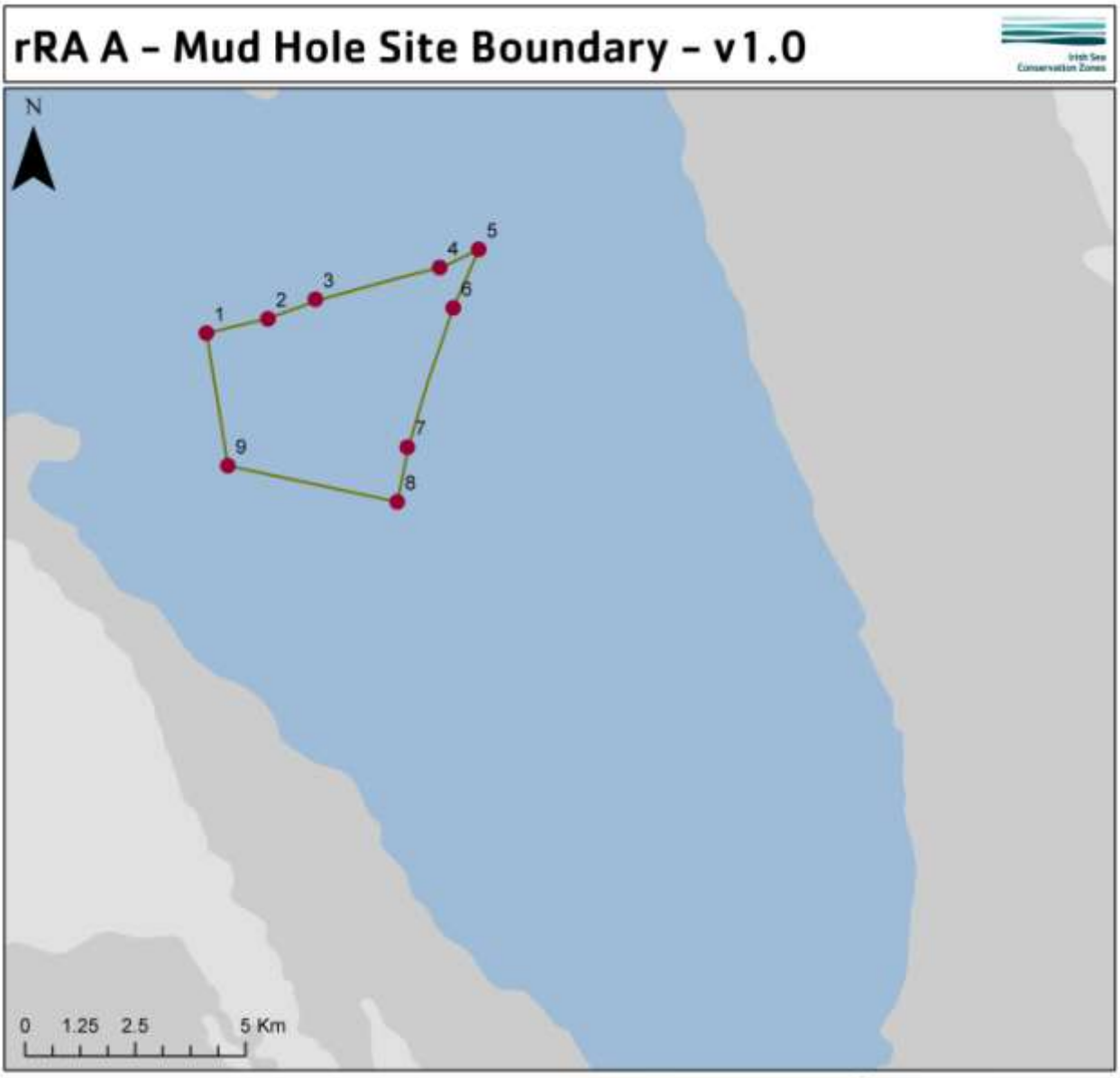
5. Features proposed for designation within rRA A

Feature type	**Feature name**	**Area covered within site (for broad scale habitats and habitats of conservation importance)**
Broad scale habitat	A5.3 Subtidal mud	20.37 Km^2 (2056.62 Ha)
Habitat of conservation importance	Mud habitats in deep water Sea-pens and burrowing megafauna communities	8.52 Km^2 (852.22 Ha) 8.52 Km^2 (852.22 Ha)
Species of conservation importance	n/a	
Geological feature	n/a	
Other feature	n/a	

6. Features within rRA: A not proposed for designation

Feature type	Feature name	Reason that feature has not been proposed for designation
Broad scale habitat	n/a	
Habitat of conservation importance	n/a	
Species of conservation importance	n/a	

7. Map of site



Bounding coordinates:

1: 54° 20' 49.140" N, 3° 55' 25.311" W
2: 54° 21' 8.099" N, 3° 54' 12.654" W
3: 54° 21' 28.697" N, 3° 53' 18.971" W
4: 54° 22' 8.928" N, 3° 50' 52.987" W
5: 54° 22' 27.462" N, 3° 50' 9.305" W
6: 54° 21' 41.980" N, 3° 50' 26.382" W
7: 54° 19' 55.495" N, 3° 50' 49.291" W
8: 54° 19' 14.870" N, 3° 50' 48.497" W
9: 54° 19' 17.097" N, 3° 54' 26.390" W

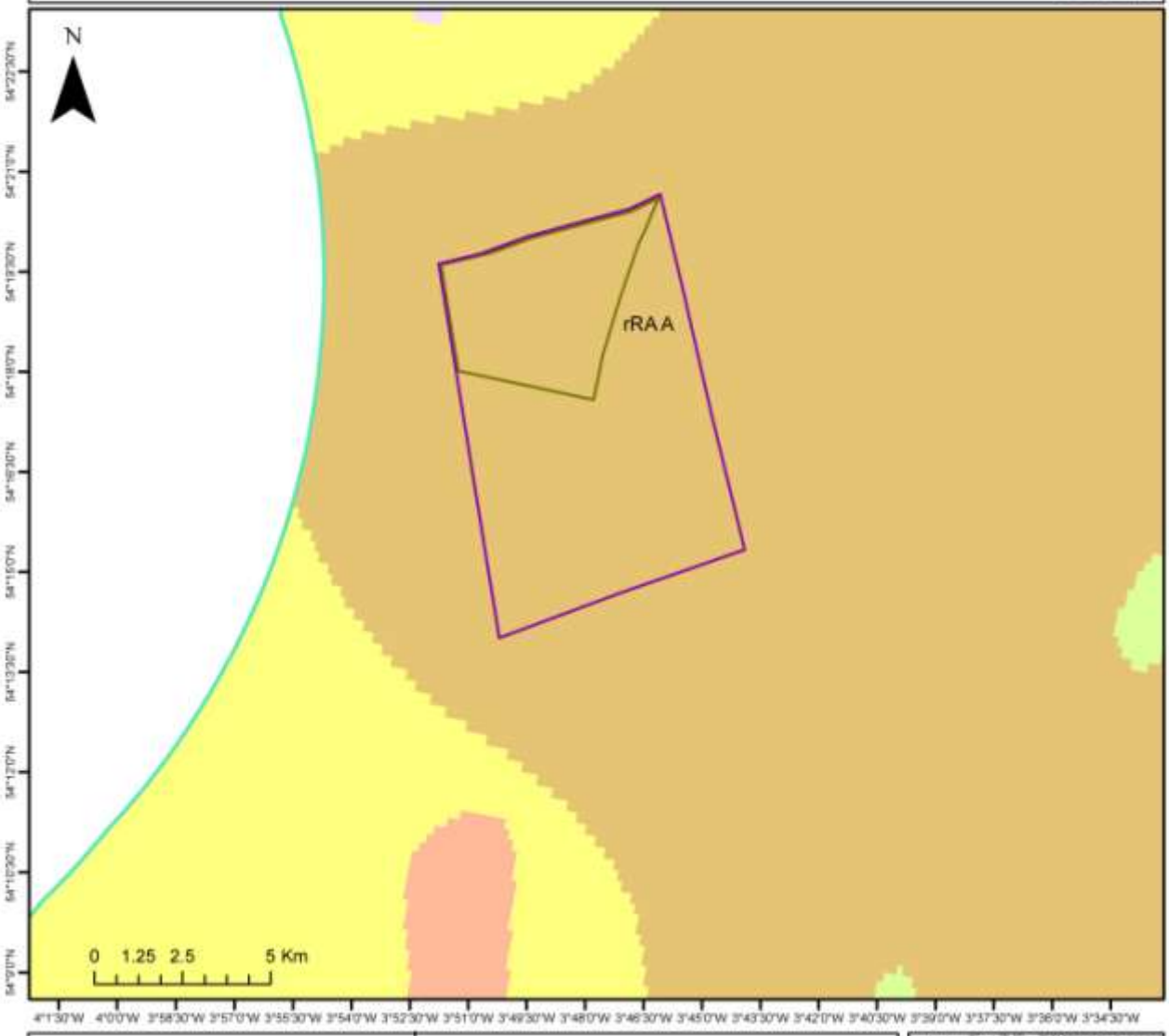
Legend

Depth (m)

- Intertidal
- 1 - 10
- 11 - 25
- 26 - 50
- 51 - 100
- 101 - 200
- >200

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

rRA A – Mud Hole – Broad-scale Habitats



This area is designated for the following BSHT:

- A5.3 - Subtidal mud

Area: 20.37 km^2

Minimum dimension: 3.11 km

Key

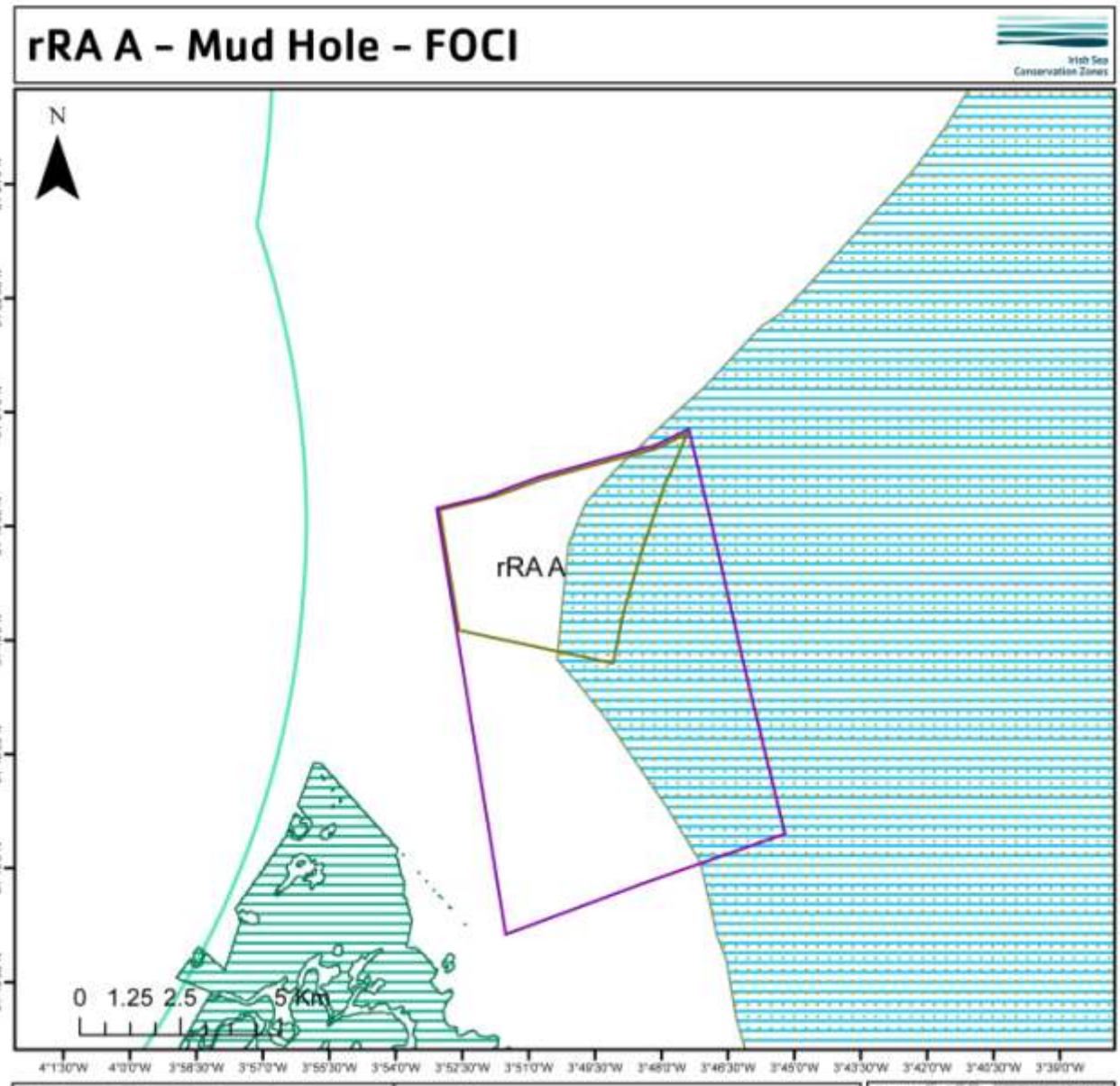
rMCZ Project Boundary

rRA

Broad-scale Habitats

- A4.2, Moderate energy circalittoral rock
- A5.1, Subtidal coarse sediment
- A5.2, Subtidal sand
- A5.3, Subtidal mud
- A5.4, Subtidal mixed sediments

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)



This rRA is designated for the following FOCI:

- **Mud habitats in deep water**
- **Sea pens and burrowing megafauna communities**

Area: 20.37 km²

Minimum dimension: 3.11 km

Key

- rMCZ
- rRA
- Project Boundary

FOCI

- Mud habitats in deep water
- Sea pens and burrowing megafauna communities
- Subtidal sands and gravels

Location of map in relation to UK

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

8. Site summary

rRA A is situated within the northwest corner of rMCZ 1 some 24km off the coast of northwest England. rRA A has a depth range of 50 -100m and captures part of the mud in deep water and sea-pens and burrowing megafauna benthic habitats along the length of its eastern boundary. The mud habitat present in rRA A forms part of the eastern Irish Sea mud patch, an area that is geographically isolated from the deep water mud habitat that is present in the western Irish Sea (Clements 2010). This mud is of high commercial interest, as it is the habitat of *Nephrops norvegicus*, the Dublin Bay prawn. There are, however, a number of other species which inhabit this seabed type, including the brittlestar *Amphiura chiajei* and the burrowing sea urchin *Brissopsis lyrifera*. Lumb et al. (2011) mapped the expected distribution of sea-pens and burrowing megafauna within this part of the Irish Sea. The expected distribution was inferred from survey data and from the presence of the suitable underlying habitat type (Hughes and Atkinson 1997). Historically, sea-pens were abundant in this region (Jones et al. 1952 cited in Swift 1993), but relatively recent video survey data indicated that they have become rare in this part of the eastern Irish Sea (Hughes and Atkinson 1997). Designation of rRA A may allow for the potential recovery of sea-pens and burrowing megafauna, a habitat type which is known to be vulnerable to otter trawl impacts (Hinz et al. 2009).

9. Detailed site description

rRA A is being recommended for designation for the presence of the broad-scale habitat type subtidal mud and two characteristic sub-habitat features, mud habitats in deep water and sea-pens and burrowing megafauna.

rRA A is located on the edge of a wider area of subtidal mud in the eastern Irish Sea. The habitat has been mapped from a combination of both physical and biological data (UK Seamap, the Mapping European Seabed Habitat projects (MESH). This area is subject to moderate energy wave and tidal energy (UK SeaMap, 2010) and, as such, is a relatively stable, depositional environment.

To the south of rMCZ1, the biological community has been surveyed. From video surveys it appears that the inshore the muddy sand community is characterised by a high abundance of bivalves *Kurtiella bidentata* and brittle stars *Amphiura filiformis*, whilst the burrows present were characteristic of the burrowing mud shrimp *Callianassa subterranean* (Walney and Ormonde 2009, 2010, & Lumb et al. 2011). In contrast, offshore (where rMCZ1 is located) the predominant bivalves present were *Mysella bidentata* and *Abra nitida* which are suspension and detritus feeders, respectively. Due to the low light levels no plants tend to grow at this depth. This means that the marine invertebrates, found within the seabed are a key part of the food chain, linking energy from the plankton to higher trophic levels, such as predatory fish (Bolam et al. 2010).

There is survey data to verify the presence of the habitat features sea-pens and burrowing megafauna within this wider area of subtidal mud. Lumb et al. (2011) reviewed previous survey data for the presence of this habitat type and mapped the expected distribution of sea-pens and burrowing megafauna, including the area of rMCZ1. It is important to note that the presence of sea-pens and burrowing megafauna within the current boundaries of rMCZ1 is *not* confirmed from direct biological sampling, but inferred from their presence in the surveyed mud to the south.

The most well known burrowing marine invertebrate that makes up the sea-pen and burrowing megafauna habitat (and is also found in deep water mud habitats) is the Dublin Bay prawn *Nephrops norvegicus*. This habitat corresponds with valuable commercial fishing grounds in this part of the project area. The eastern

Irish Sea *Nephrops* population is known to be smaller than the population in the western Irish Sea, which occurs on a geographically separate mud patch. The two populations are not thought to be connected larvally. (Clements 2010). There are, however, a suite of other animals which inhabit deep water mud habitats including the brittlestar *Amphiura chiajei* and the burrowing sea urchin *Brissopsis lyrifera.*

These burrowing animals (including *Nephrops*) provide an important ecological function termed bioturbation which refers to the disturbance and mixing of sediments by organisms especially by burrowing, boring or ingestion. The activities of these animals, which can take many varied and species-specific forms, leads to the disturbance of sediments on the seafloor. For example, suspension feeders such as the burrowing mud shrimp *Callianassa subterranean* ingest the particles present within the sea water that they draw into their burrows and the excreted material acts as a cement to form the rigid structure of their burrow tubes; this provides stability to the sediment substrate (Kogure and Wada 2005).

10. Stakeholder and boundary considerations

In order to meet the ENG target, most stakeholders on the RSG accepted the inclusion of rRA A in the final suite of Reference Areas. For a fuller context on the RSG discussions associated with the selection of Reference Areas, readers of this report are encouraged to consult meeting reports from the ISCZ RSG workshops held in May, June and July 2011 (ISCZ, 2011b,c,d).

11. Conservation objectives

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Mud** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent • diversity • community structure • natural environmental quality, and natural environmental processes Representative of the **Subtidal Mud** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Seapens and Burrowing Mega Fauna Communities** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent • diversity • community structure • natural environmental quality, and natural environmental processes Representative of the **Seapens and Burrowing Mega Fauna Communities** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Deep Water Mud Habitats** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Deep Water Mud Habitats** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

12. Sites to which this site is related

rRA A is located within rMCZ 1. The distance between rMCZ1 and other MCZs which are being recommended for the designation of the same EUNIS level 2 habitat types was calculated. rMCZ1 is 15 km (8 nm) from rMCZ2, 55 km (30 nm) from rMCZ8 and 77 km (41 nm) from rMCZ6. Like rMCZ1, these three other MCZs have been recommended to protect sublittoral sediment.

rMCZ1 is in the vicinity of the following existing and draft conservation areas that have marine associated features. Vicinity is in this context been defined as a distance less than 80 km. Morecambe Bay (SPA, SSSI), Drigg coast (SAC) and Duddon estuary (SPA / SSSI) are within 40 km of rMCZ1. Within 80 km of this site are: Solway Firth (SAC), Upper Solway flats and marshes (SPA), Luce Bay and Sands (SAC), Ribble and Alt Estuaries (SPA).

13. Supporting documentation

Information	Type of information	Source
Location of subtidal mud	Combined physical and biological surveying with habitat modelling	MESH
Location of mud habitats in deep water	Combined physical and biological surveying with habitat modelling	MESH
Location of sea-pens and burrowing megafauna	Inferred distribution based on suitable habitat type, and biological sampling.	Hughes and Atkinson 1997, Lumb et al. 2011, Swift 1993

References

BOLAM, S.G., BARRIO-FROJAN, C.R.S. & EGGLETON, J.D. 2010. *Macrofaunal production along the UK continental shelf*. Journal of Sea Research **64**: 166-179.

CLEMENTS, A.J. 2010. *Broad-scale ecological investigation of Nephrops norvegicus (L.) Burrow distribution in the Western Irish Sea*. Ph.D. Thesis, Queen's University Belfast.

HINZ, H., PRIETO, V. & KAISER, M.J. 2009. *Trawl disturbance on benthic communities and chronic effects and experimental predictions.* Ecological Applications **19** (3) 761-773.

HUGHES, D.J. & ATKINSON, R.J.S. 1997. *Towed video survey of the megafaunal bioturbation in the North Eastern Irish Sea.* Journal of the Marine Biological Association. **77** 635-653.

ISCZ. 2011b. *Meeting report from the 6th Irish Sea Conservation Zones Stakeholder Group meeting.* RK Partnership Ltd.

ISCZ. 2011c. *Meeting report from the 7th Irish Sea Conservation Zones Stakeholder Group meeting*. RK Partnership Ltd.

ISCZ. 2011d. *Meeting report from the 8th Irish Sea Conservation Zones Stakeholder Group meeting.* RK Partnership Ltd.

LUMB, C. 2011. *Evidence on the distribution and quality of mud-related features in the Eastern Irish Sea.* A paper presented to the ISCZ Project Team and Regional Stakeholder Group.

KOGURE, K., AND WADA, M. 2005. *Impacts of macrobenthic bioturbation in marine sediment on bacterial metabolic activity*. Microbes and Environments **20** (4) 191-199.

SWIFT, D.J. 1993. *The macrobenthic infauna off Sellafield (north-eastern Irish Sea) with special reference to bioturbation.* Journal of the Marine Biological Association, **73**, 143-162.

WALNEY & ORMONDE. 2009. *Offshore Windfarm Benthic Survey Reports November 2009 & October 2010.* Work undertaken for Dong Energy/Vattenfall by CMACS

MARINE CONSERVATION ZONE: SELECTION ASSESSMENT DOCUMENT RRA B NORTH ST. GEORGE'S CHANNEL (1)

Version and issue date	Amendments made
v1.0 August 2011	

1. Site name

rRA - B North St. George's Channel (1)

2. Site centre location

53° 30' 59.584" N, 4° 56' 38.815" W
53.516551 Lat, -4.944115 Long. Lambert Azimuthal Equal Area projection, ETRS89 datum

3. Site surface area

35.28 Km^2 (3528.29 Ha)

4. Biogeographic region

JNCC regional sea: Irish Sea.
OSPAR region III: Celtic Seas.

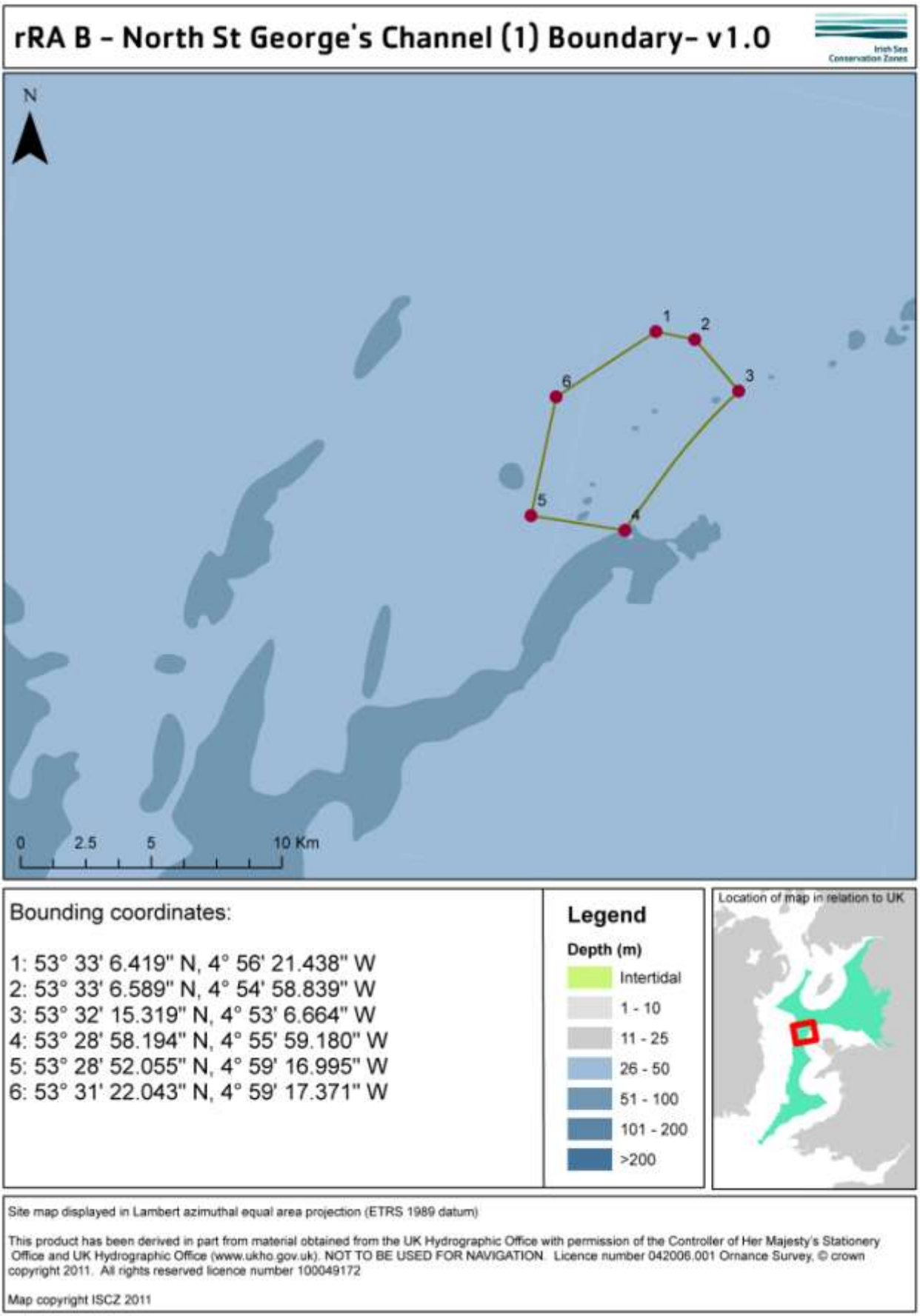
5. Features proposed for designation within rRA B

Feature type	**Feature name**	**Area covered within site (for broad scale habitats and habitats of conservation importance)**
Broad scale habitat	A4.1 High energy circalittoral rock A4.2 Moderate energy circalittoral rock A5.1 Subtidal coarse sediment	8.63 Km^2 (862.84 Ha) 22.73 Km^2 (2272.85 Ha) 3.93 Km^2 (392.61 Ha)
Habitat of conservation importance	Subtidal sands and gravels	35.28 Km^2 (3528.29 Ha)
Species of conservation importance	n/a	
Geological feature	n/a	
Other feature	n/a	

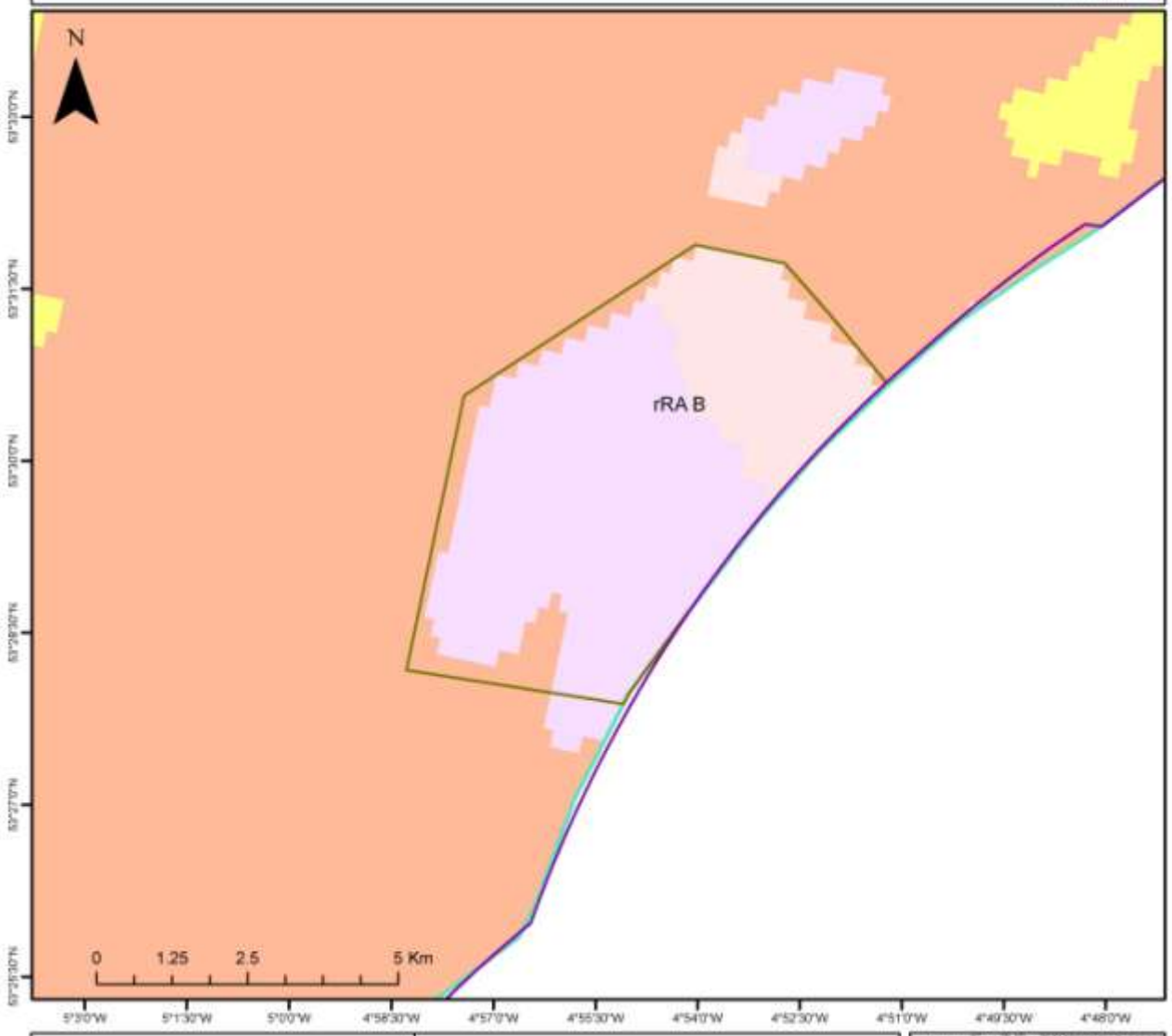
6. Features within rRA B not proposed for designation

Feature type	Feature name	Reason that feature has not been proposed for designation
Broad scale habitat	n/a	
Habitat of conservation importance	n/a	
Species of conservation importance	n/a	

7. Map of site


rRA B – North St George's Channel (1) Boundary– v1.0
Irish Sea Conservation Zones
N
1
2
3
4
5
6
0
2.5
5
10 Km
Bounding coordinates:
1: 53° 33' 6.419" N, 4° 56' 21.438" W
2: 53° 33' 6.589" N, 4° 54' 58.839" W
3: 53° 32' 15.319" N, 4° 53' 6.664" W
4: 53° 28' 58.194" N, 4° 55' 59.180" W
5: 53° 28' 52.055" N, 4° 59' 16.995" W
6: 53° 31' 22.043" N, 4° 59' 17.371" W
Legend
Depth (m)
Intertidal
1 - 10
11 - 25
26 - 50
51 - 100
101 - 200
>200
Location of map in relation to UK
Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)
This product has been derived in part from material obtained from the UK Hydrographic Office with permission of the Controller of Her Majesty's Stationery Office and UK Hydrographic Office (www.ukho.gov.uk). NOT TO BE USED FOR NAVIGATION. Licence number 042006.001 Ornance Survey, © crown copyright 2011. All rights reserved licence number 100049172
Map copyright ISCZ 2011

rRA B – North St George's Channel (1) – Broad-scale Habitats



This area is designated for the following BSHT:

- A4.1, High energy circalittoral rock
- A4.2, Moderate energy circalittoral rock
- A5.1, Subtidal coarse sediment

Area: 35.28 km^2

Minimum dimension: 1.53 km

Key

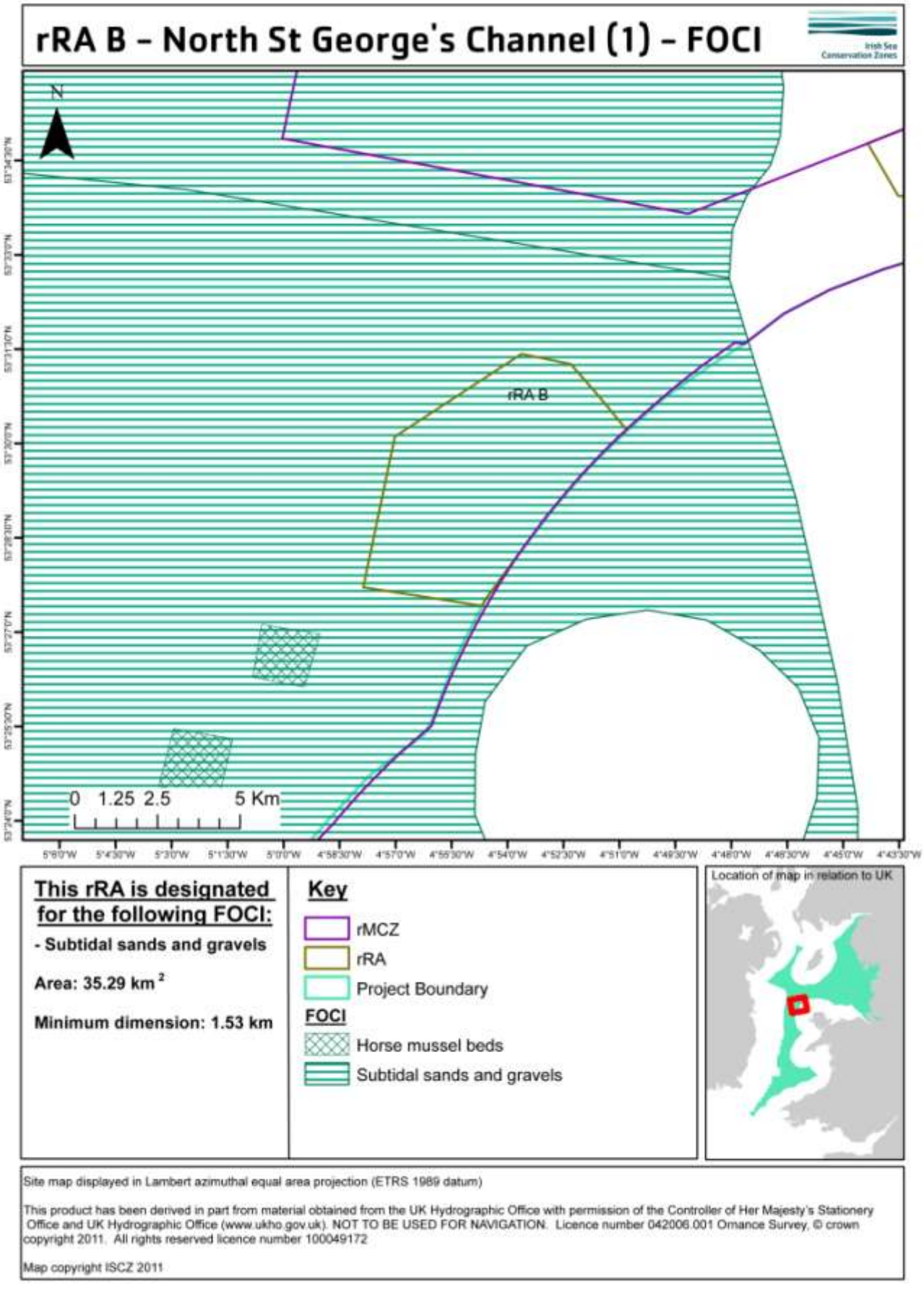
rRA Project Boundary

Broad-scale Habitats

- A4.1, High energy circalittoral rock
- A4.2, Moderate energy circalittoral rock
- A5.1, Subtidal coarse sediment
- A5.2, Subtidal sand

Location of map in relation to UK

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)



Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

8. Site summary

rRA B is situated within rMCZ 3. It is a small area in the mid-Irish Sea and it is located approximately 23 km / 12 nm off the coast of Anglesey in Wales. The depth of the area ranges from 50 to 100 m.

rRA: B has been identified as an Annex I reef habitat listed on the EU Habitats and Species directive, and forms part of the North-West Anglesey reef complex. These reefs are comprised of both high and moderate energy circalittoral rock, which are being recommended for designation. Such reefs are comprised of stable boulders and cobbles that create a habitat that can readily be colonised by a varied plant and animal community. Surveys of rRA: B found the area to be broadly characterised by a complex topography with mixed coarse sediments, which are home to tide swept communities in deep water which is one of only two examples within the ISCZ project area.

9. Detailed site description

r RA B is a small area 35.28 Km^2 (3528.29 Ha) situated in the north eastern aspect of rMCZ3, the largest of the recommended marine conservation zones in the Irish Sea. rRA: B captures both high and moderate energy circalittoral rock, or bedrock on the seafloor which is subject to a high to moderate level of wave and tidal energy (MESH). Parts of these areas of bedrock have been surveyed to verify the presence of specific Annex I reef habitat, listed on the EU Habitats and Species directive. The area within rRA: B is part of the wider North-West Anglesey reef complex. Such rocky reefs occur where the bedrock or stable boulders and cobbles arise from the surrounding seabed creating a habitat that is colonised by many different marine animals and plants. Rocky reefs can be very variable in terms of both their structure and the communities that they support. (Irving, 2009)

Biological and acoustic surveys carried out by JNCC indicated that reef forming boulders and cobbles are present in rRA: B and are home to a variety of animal species such as the opportunistic tube worm *Pomatoceros triquete* that encrusts onto hard substrates such as rock; the soft coral, dead man's fingers *Alcyonium digitatum* which attaches where otherwise dominant algae are unable to grow, they are also closely associated with prevailing strong water movement. Horn wrack *Flustra foliacea* along with hydroids, such as *Abietinaria abietin* were also identified on such wave exposed circalittoral rock habitats. Along video tows, the reef habitat tended to alternate with more gravelly areas of non-reef habitat. (Blyth-Skyrme et al. 2008). Subtidal coarse sediments are also recommended for designation as are the HOCI subtidal sands and gravels that fall within the boundary limits of rRA: B.

The seabed in rMCZ3 has also been mapped using a combination of physical and biological data (UK Seamap, the Mapping European Seabed Habitat projects (MESH), and the HABMAP project). The predominant broad-scale habitat types present in the area are the three which constitute the habitat feature subtidal sands and gravels. In this region, sands and gravels are mainly shell derived (Maddock 2010) and support an abundance of bivalves and polychaete worms. Bolam et al. (2010) identified molluscs and annelid worms which live within the sediment as the main secondary producers in this part of the Irish Sea. These invertebrates are a key part of the food chain, as they recycle organic matter from within the sediment, linking primary production from the plankton to predatory fish, they are able to unlock the energy of primary producers, which in the sea are the phytoplankton (microscopic algae), and make it available to be used as food by other creatures. As such, primary producers are the very basis of the food chain that provides the fish that humans consume. (Bolam et al. 2010).

10. Stakeholder and boundary considerations

In order to meet the ENG target, most stakeholders on the RSG accepted the inclusion of rRA B in the final suite of Reference Areas. For a fuller context on the RSG discussions associated with the selection of Reference Areas, readers of this report are encouraged to consult meeting reports from the ISCZ RSG workshops held in May, June and July 2011 (ISCZ, 2011b,c,d).

11. Conservation objectives

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **High Energy Circalittoral Rock** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality*, and natural environmental processes* Representative of the **High Energy Circalittoral Rock** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Moderate Energy Circalittoral Rock** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality*, and natural environmental processes* Representative of the **Moderate Energy Circalittoral Rock** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Coarse Sediment** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality*, and natural environmental processes* Representative of the **Subtidal Coarse Sediment** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Sands and Gravels** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality*, and natural environmental processes* Representative of the **Subtidal Sands and Gravels** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

12. Sites to which this site is related

rRA B is located in rMCZ 3 in the mid-Irish sea, 88 km (47 nm) to the north of another recommended MCZ (rMCZ4), 80 km (43 nm) from the Lleyn Peninsula and the Sarnau (a Welsh inshore Special Area of Conservation (SAC) with marine components, including horse mussel beds and ross worm *Sabellaria spinulosa* reefs) and 35 km (19 nm) from the Menai Strait and Conwy Bay another Welsh inshore SAC with marine components).

13. Supporting documentation

Information	Type of information	Source
Location of high energy circalittoral rock	Combined physical and biological surveying with habitat modelling	Robinson et al. (2007), MESH, Blyth-Skyrme et al. 2008
Location of moderate energy circalittoral rock	Combined physical and biological surveying with habitat modelling	Robinson et al. (2007), MESH, Blyth-Skyrme et al. 2008
Subtidal coarse sediment	Combined physical and biological surveying with habitat modelling	Robinson et al. (2007), MESH.
Subtidal sand	Combined physical and biological surveying with habitat modelling	Robinson et al. (2007), MESH.
Subtidal sands and gravels	Combined physical and biological surveying with habitat modelling	Robinson et al. (2007), MESH.

References

BLYTH-SKYRME, V. LINDENBAUM, C., VERLING, E., VAN LANDEGHEM, K., ROBINSON, K., MACKIE A., & DARBYSHIRE T. 2008. *Broad-scale biotope mapping of potential reefs in the Irish Sea (north-west of Anglesey)* JNCC Report No. 423.

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IRVING, R. 2009. *The identification of the main characteristics of stony reef habitats under the Habitats Directive. Summary report of an inter-agency workshop 26-27 March 2008*. JNCC Report No. 432

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ISCZ. 2011c. *Meeting report from the 7th Irish Sea Conservation Zones Stakeholder Group meeting*. RK Partnership Ltd.

ISCZ. 2011d. *Meeting report from the 8th Irish Sea Conservation Zones Stakeholder Group meeting.* RK Partnership Ltd.

MADDOCK, A. 2010. *UK Biodiversity Action Plan; Priority Habitat Descriptions*. BRIG (ed. Ant http://www.ukbap.org.uk/library/UKBAPPriorityHabitatDescriptionsRevised20100730.pdf

MARINE CONSERVATION ZONE: SELECTION ASSESSMENT DOCUMENT
RRA C MID ST GEORGE'S CHANNEL

Version and issue date	Amendments made
v1.0 August 2011	

1. Site name

rRA C - Mid St. George's Channel

2. Site centre location

52° 37' 32.293" N, 5° 22' 54.816" W
52.625636 Lat, -5.381893 Long. Lambert Azimuthal Equal Area projection, ETRS89 datum

3. Site surface area

103.45 Km^2 (10344.83 Ha)

4. Biogeographic region

JNCC regional sea: Irish Sea.
OSPAR region III: Celtic Seas.

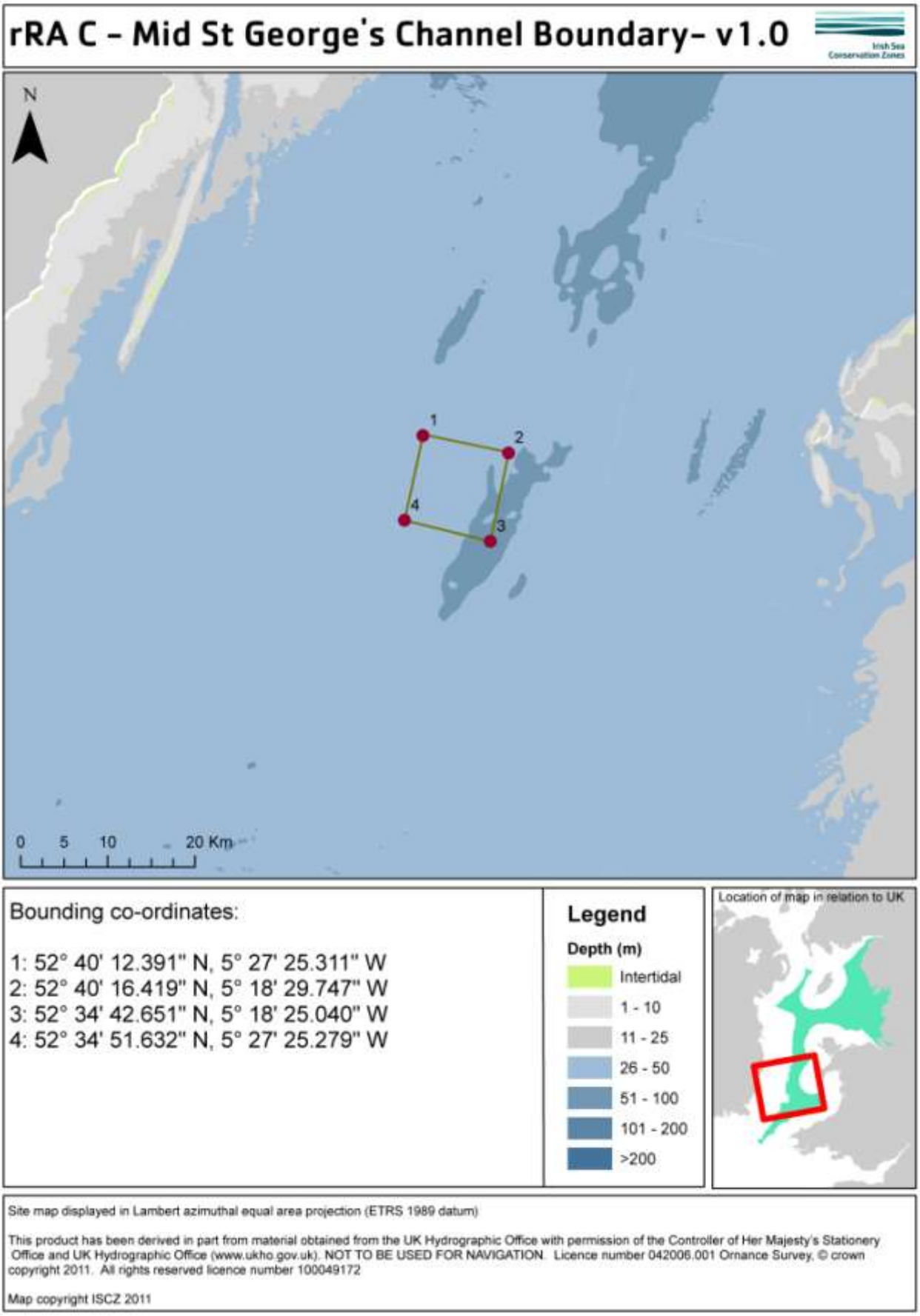
5. Features proposed for designation within rRA C

Feature type	**Feature name**	**Area covered within site (for broad scale habitats and habitats of conservation importance)**
Broad scale habitat	A4.2 Moderate energy circalittoral rock A5.1 Subtidal coarse sediment A5.2 Subtidal sand A5.4 Subtidal mixed sediments	21.16 Km^2 (2116.13 Ha) 34.80 Km^2 (3480.12 ha) 1.04 Km^2 (103.69 Ha) 46.46 km^2 (4644.99 Ha)
Habitat of conservation importance	Subtidal sands and gravels	103.45 Km^2 (10344.73 Ha)
Species of conservation importance	n/a	
Geological feature	n/a	
Other feature	n/a	

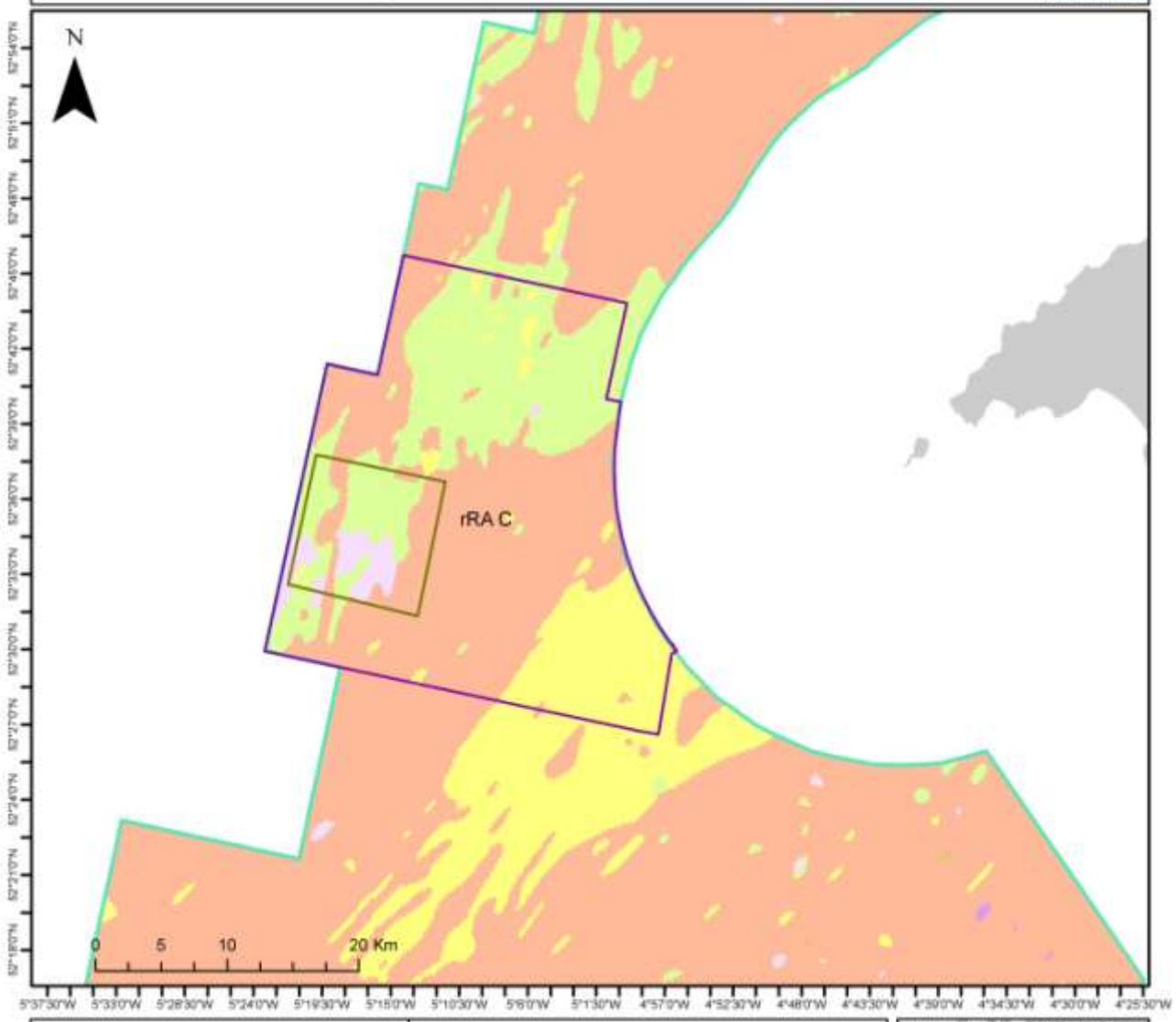
6. Features within rRA C not proposed for designation

Feature type	Feature name	Reason that feature has not been proposed for designation
Broad scale habitat	n/a	
Habitat of conservation importance	n/a	
Species of conservation importance	n/a	

7. Map of site


rRA C – Mid St George's Channel Boundary– v1.0
Irish Sea Conservation Zones
N
1
2
3
4
0 5 10 20 Km
Bounding co-ordinates:
1: 52° 40' 12.391" N, 5° 27' 25.311" W
2: 52° 40' 16.419" N, 5° 18' 29.747" W
3: 52° 34' 42.651" N, 5° 18' 25.040" W
4: 52° 34' 51.632" N, 5° 27' 25.279" W
Legend
Depth (m)
Intertidal
1 - 10
11 - 25
26 - 50
51 - 100
101 - 200
>200
Location of map in relation to UK
Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)
This product has been derived in part from material obtained from the UK Hydrographic Office with permission of the Controller of Her Majesty's Stationery Office and UK Hydrographic Office (www.ukho.gov.uk). NOT TO BE USED FOR NAVIGATION. Licence number 042006.001 Ornance Survey, © crown copyright 2011. All rights reserved licence number 100049172
Map copyright ISCZ 2011

rRA C – Mid St George's Channel – Broad-scale Habitats



This area is designated for the following BSHT:

- A4.2, Moderate energy circalittoral rock
- A5.1, Subtidal coarse sediment
- A5.2, Subtidal sand
- A5.4, Subtidal mixed sediments

Area: 103.46 km^2

Minimum dimension: 9.95 km

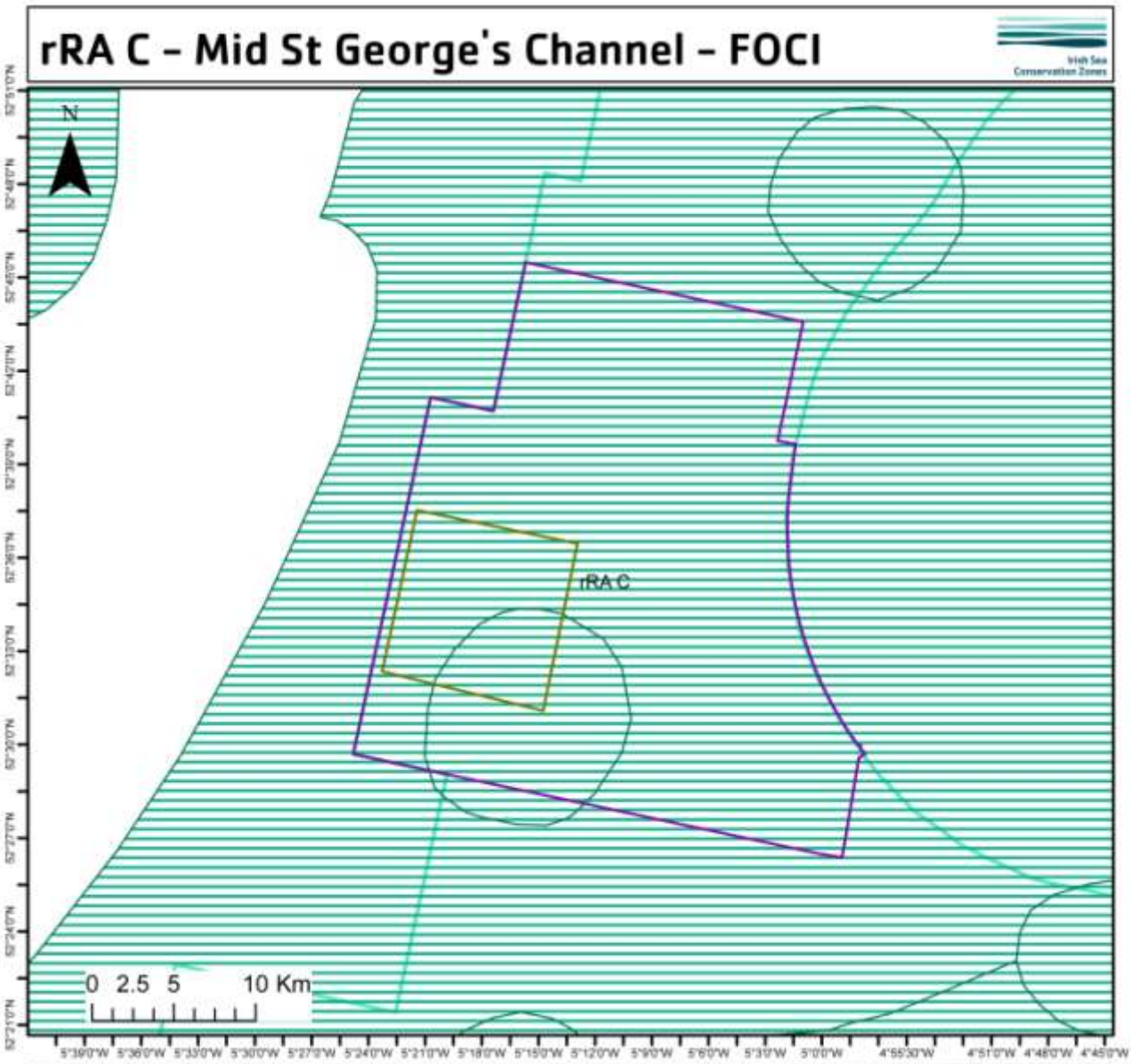
Key

rMCZ
Project Boundary
rRA

Broad-scale Habitats

- A3.1, High energy infralittoral rock
- A3.2, Moderate energy infralittoral rock
- A4.1, High energy circalittoral rock
- A4.2, Moderate energy circalittoral rock
- A5.1, Subtidal coarse sediment
- A5.2, Subtidal sand
- A5.3, Subtidal mud
- A5.4, Subtidal mixed sediments

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)



This rRA is designated for the following FOCI:

- Subtidal sands and gravels

Area: 103.46 km²

Minimum dimension: 9.95 km

Key

- rMCZ
- rRA
- Project Boundary

FOCI

- Subtidal sands and gravels

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

8. Site summary

rRA C is located within the south west region of rMCZ 4 in the offshore waters of the Irish Sea, c.40 km from the coast of Wales. It is situated between Irish offshore waters to the west and Welsh territorial waters to the east. The depth of the site ranges from 50 – 100 m. The seabed type is predominantly subtidal coarse sediment, but there are also areas of subtidal mixed sediments, sand and bedrock, which is potentially reef habitat (Dalkin 2008). Due to the thermal fronts that form in the summer months, this is an area of relatively high biological productivity (Miller et al. 2010). This highlights the importance of this site for general ecosystem processes, as an increase in primary production attracts herbivorous species and, in turn, larger marine predators to the area. Within the subtidal sands and gravel habitat in this area, annelid worms, bivalves and crustaceans are the main secondary producers. These invertebrates provide an essential link in energy flow within the ecosystem, recycling organic matter in the sediment, linking primary production to predatory fish (Bolam et al. 2010).

9. Detailed site description

A combination of physical and biological surveys have been used to identify the seabed habitat types within the area (UKSeaMap: Connor et al. 2006, the Mapping European Seabed Habitat projects (MESH), and HABMAP: Robinson et al. 2007). The predominant marine habitat type in rRA C is subtidal mixed sediment, amongst which are smaller areas of coarse sediment sand, and bedrock. A JNCC commissioned survey collected data from around this region to verify the presence of potential reef habitat amongst the areas of rocky habitat (Dalkin 2008). From the JNCC survey, technical issues precluded video and still photographs from being collected of the seabed and therefore the presence of reef habitat within site rMCZ4 and therefore rRA C has not been verified through biological sampling. However, inferences on the biological community in rRA C can be drawn from the shared broad-scale habitat type (moderate energy circalittoral rock, or subtidal bedrock) that was successfully surveyed to the north of the site within rRA 4.

The subtidal bedrock, namely cobbles and boulders was the reef habitat surveyed to the north of the site. This habitat is of ecological importance because it supports a diverse animal community. Barnacles and worms, including *Pomatoceros triqueter* were found within the offshore circalittloral coarse sediment , whilst the subtidal mixed sediments contained pebbles, cobbles and boulders that were home to a diverse range of fauna, including barnacles, hydroids, anemones and sponges, for example, dead man's fingers (Dalkin et al. 2008; Figure 1).

Sand and gravel sediments are the most common habitat types found in the site and these are host a range of different invertebrate species. Within and around rRA C annelids, worms and crustacean species are the main secondary producers in the food web (Bolam et al. 2010). These species, which live within or on the seabed, play a key role in recycling organic matter within the sediment, and linking the primary production (in the plankton) with predatory fish.

In addition, this site covers an area of high primary productivity, due to the thermal fronts which commonly form in this location (Miller et al. 2010). An increase in solar energy during spring causes the relatively warm, less dense, water to sit on top of colder, denser, deep water. This increase in temperature triggers an increase in biological productivity, similar to the increase in productivity later on in the year when water cooling allows for nutrient rich deeper waters coming in from the Atlantic to mix with the surface waters (Brown et al. 2010).

Figure 1. Silty cobbles and boulders with gravel and sand surveyed to the north of rRA C. These habitat types are home to barnacles, hydroids, anemones and dead man's fingers (Image taken from Dalkin 2008).

10. Stakeholder and boundary considerations

In order to meet the ENG target, most stakeholders on the RSG accepted the inclusion of rRA C in the final suite of Reference Areas. For a fuller context on the RSG discussions associated with the selection of Reference Areas, readers of this report are encouraged to consult meeting reports from the ISCZ RSG workshops held in May, June and July 2011 (ISCZ, 2011b,c,d).

This site was included in the first iteration to capture the large amount of subtidal mixed sediments in the project area. Its boundary has changed very little since the first iteration but, most recently, it's southern boundary has been altered slightly so that there is relatively little overlap with Belgian beam trawl activity.

11. Conservation objectives

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Mixed Sediment** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Subtidal Mixed Sediment** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Moderate Energy Circalittoral Rock** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Moderate Energy Circalittoral Rock** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Coarse Sediment** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Subtidal Coarse Sediment** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Sands and Gravels** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Subtidal Sands and Gravels** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Sands** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Subtidal Sands** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

12. Sites to which this site is related

rRA C is located within the south west region of rMCZ 4. rMCZ 4 is placed between two other recommended MCZs in the Irish Sea Conservation Zone region, rMCZ 5 which is 75 km (40 nm) to the south and rMCZ 3 which is 88 km (47 nm) to the north. All three of these sites are offshore and have been recommended to protect the EUNIS level 2 habitat types, sublittoral sediment and circalittoral rock.

There are two Welsh marine Special Areas of Conservation (SAC) in the vicinity of rMCZ4 (vicinity being defined as less than 80 km). Lleyn Peninsula and the Sarnau, a marine SAC is within 50 km (27 nm) while the SAC in Cardigan Bay is 65 km (35 nm) away. There are also four Irish Natura 2000 sites in the vincinity of rMCZ 4: Long Bank is 57 km away, Carnsore Point 61 km away, Saltee Islands 47 km away and Wicklow Reef SAC 37km away.

13. Supporting documentation

Information	Type of information	Source
Location of moderate energy circalittoral rock	Combined biological and physical data were used to generate predictive habitat maps of the seabed	Connor et al. 2006, MESH project, Robinson et al. 2007
Location of subtidal coarse sediment	Combined biological and physical data were used to generate predictive habitat maps of the seabed	Connor et al. 2006, MESH project, Robinson et al. 2007
Location of subtidal sand	Combined biological and physical data were used to generate predictive habitat maps of the seabed	Connor et al. 2006, MESH project, Robinson et al. 2007
Location of subtidal mixed sediments	Combined biological and physical data were used to generate predictive habitat maps of the seabed	Connor et al. 2006, MESH project, Robinson et al. 2007
Location of subtidal sands and gravels	Combined biological and physical data were used to generate predictive habitat maps of the seabed	Connor et al. 2006, MESH project, Robinson et al. 2007

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MARINE CONSERVATION ZONE: SELECTION ASSESSMENT DOCUMENT
RRA F SOUTH RIGG

Version and issue date	Amendments made
v1.0 August 2011	

1. Site name

rRA F - South Rigg

2. Site centre location

54° 24' 43.772" N, 4° 54' 13.501" W
54.412158 Lat, -4.90375 Long. Lambert Azimuthal Equal Area projection, ETRS89 datum

3. Site surface area

15.82 Km^2 (1581.64 Ha)

4. Biogeographic region

JNCC regional sea: Irish Sea.
OSPAR region III: Celtic Seas.

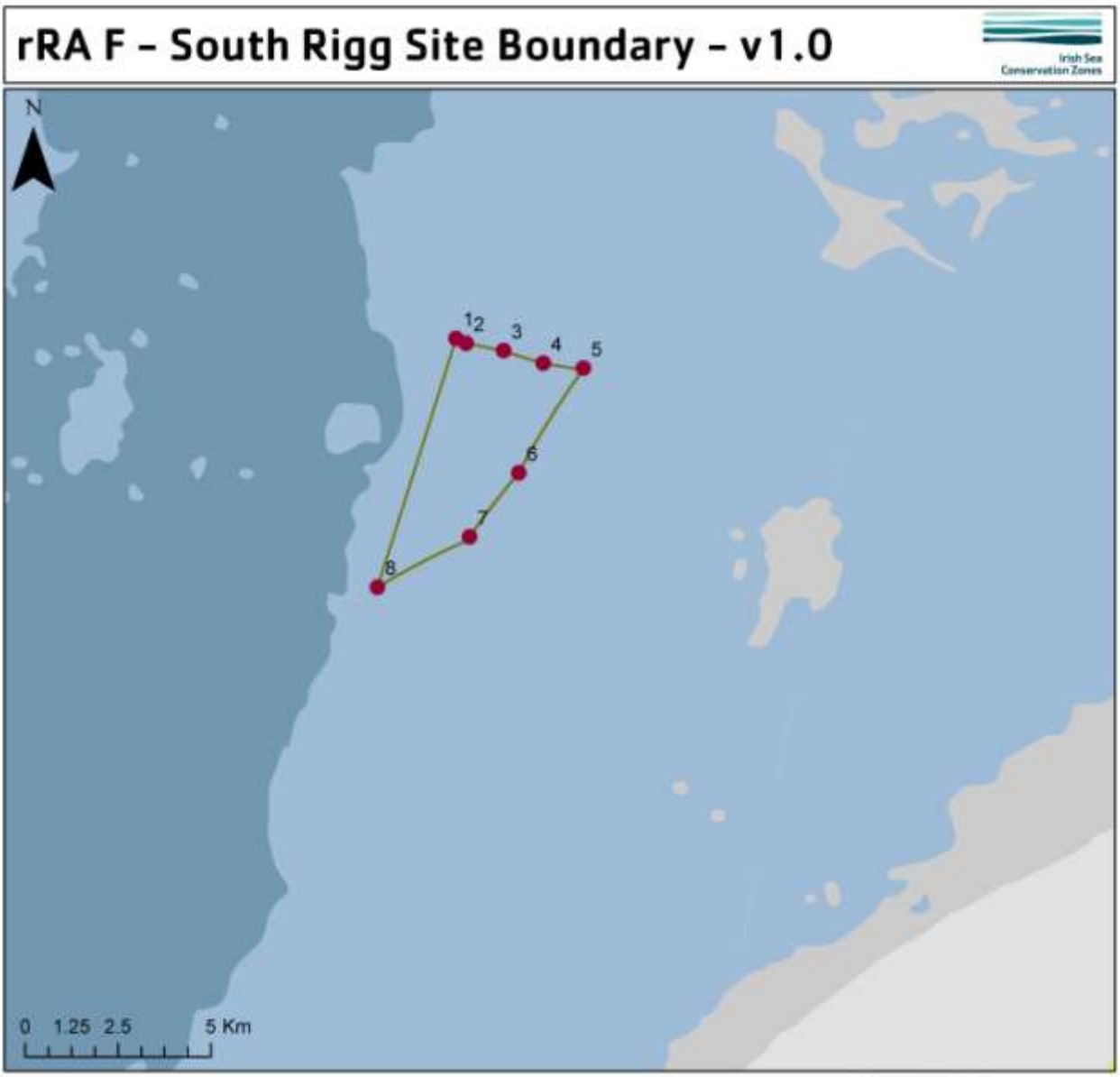
5. Features proposed for designation within rRA F

Feature type	**Feature name**	**Area covered within site (for broad scale habitats and habitats of conservation importance)**
Broad scale habitat	A5.2 Subtidal sand A5.3 Subtidal mud	15.44 Km^2 (1544.26 Ha) 0.37 Km^2 (37.38 Ha)
Habitat of conservation importance	Sea-pen and burrowing megafauna communities	-
Species of conservation importance	Ocean quahog *Arctica islandica*	-
Geological feature		
Other feature		

6. Features within rRA F not proposed for designation

Feature type	Feature name	Reason that feature has not been proposed for designation
Broad scale habitat	n/a	
Habitat of conservation importance	n/a	
Species of conservation importance	n/a	

7. Map of site



Bounding coordinates:

1: 54° 26' 13.294" N, 4° 55' 12.560" W
2: 54° 26' 10.938" N, 4° 54' 56.450" W
3: 54° 26' 11.365" N, 4° 53' 59.071" W
4: 54° 26' 7.787" N, 4° 52' 57.176" W
5: 54° 26' 10.713" N, 4° 51' 56.999" W
6: 54° 24' 30.417" N, 4° 52' 58.726" W
7: 54° 23' 27.527" N, 4° 53' 50.836" W
8: 54° 22' 28.354" N, 4° 55' 50.037" W

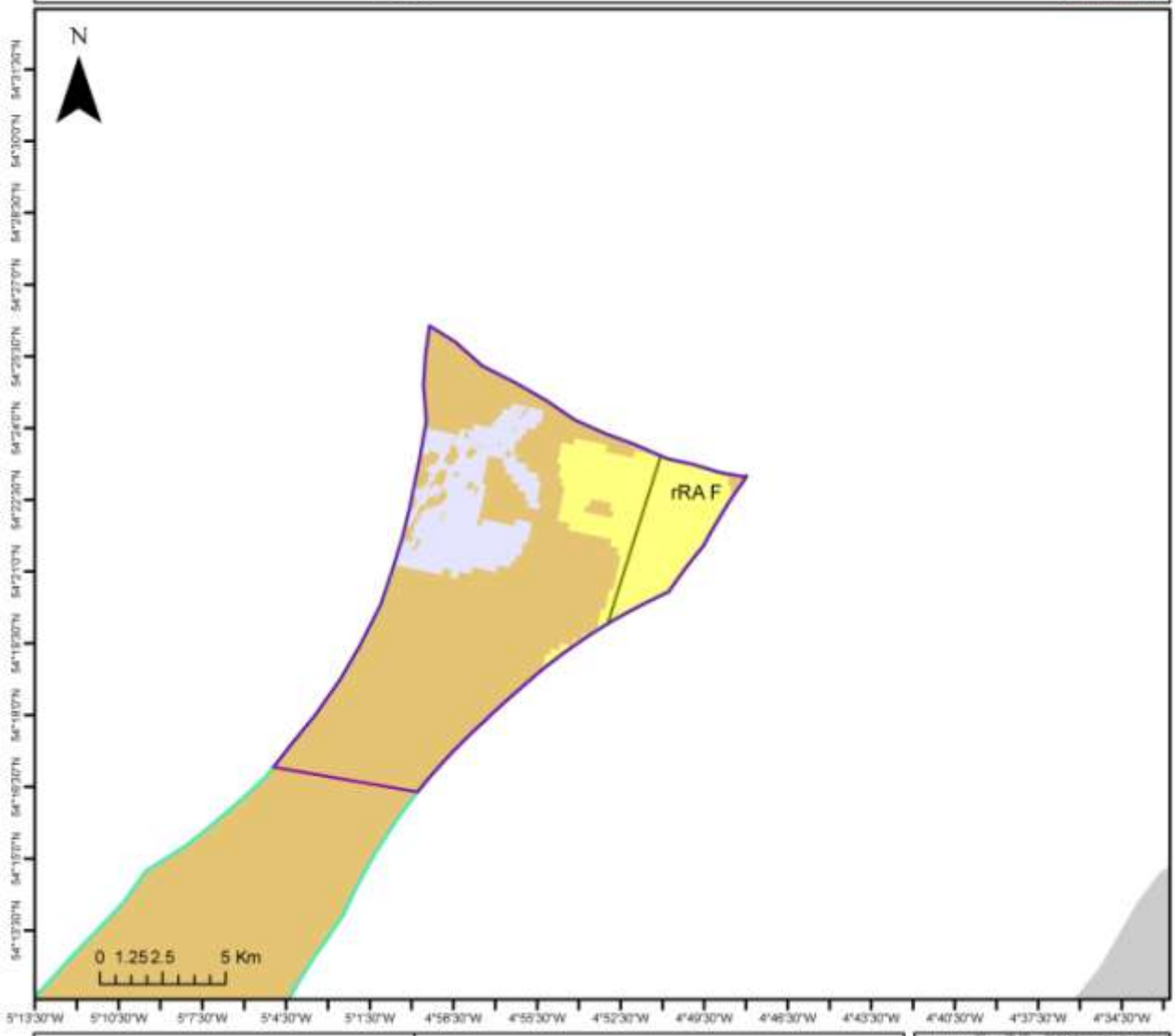
Legend

Depth (m)

- Intertidal
- 1 - 10
- 11 - 25
- 26 - 50
- 51 - 100
- 101 - 200
- >200

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

rRA F – South Rigg – Broad-scale Habitats



This area is designated for the following BSHT:

- A5.2, Subtidal sand
- A5.3 - Subtidal mud

Area: 15.82 km^2

Minimum dimension: 2.73 km

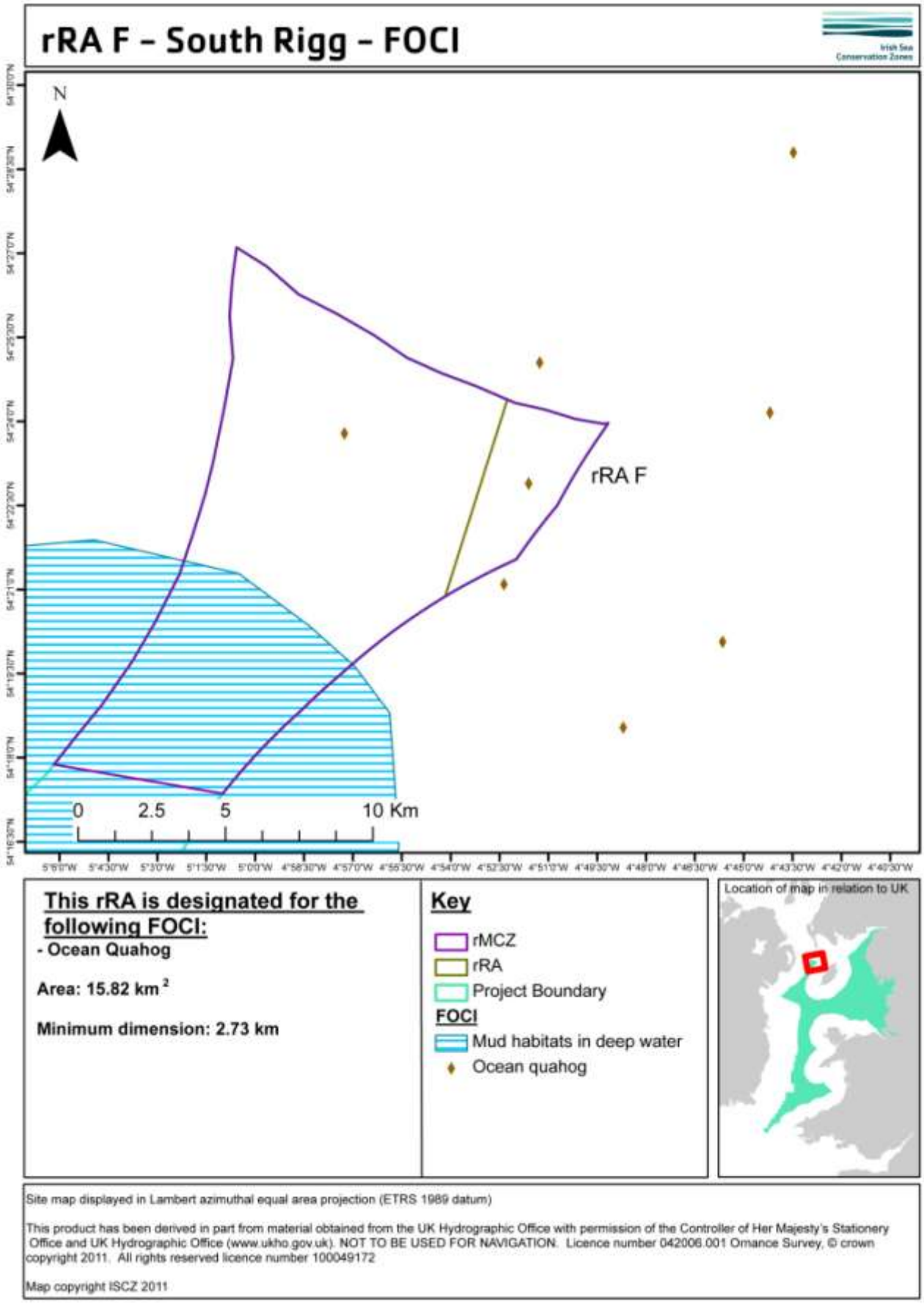
Key

rMCZ
Project Boundary
rRA

Broad-scale Habitats

A4.3, Low energy circalittoral rock
A5.2, Subtidal sand
A5.3, Subtidal mud

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)


rRA F – South Rigg – FOCI
Irish Sea Conservation Zones
N
rRA F
0
2.5
5
10 Km
This rRA is designated for the following FOCI:
- Ocean Quahog
Area: 15.82 km 2
Minimum dimension: 2.73 km
Key
rMCZ
rRA
Project Boundary
FOCI
Mud habitats in deep water
Ocean quahog
Location of map in relation to UK
Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)
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Map copyright ISCZ 2011

8. Site summary

rRA F is located in the north eastern corner of rMCZ 6, in the western Irish Sea between three different territorial seas - northern Irish waters to the west, Scottish waters to the north and the Isle of Man waters to the east. The depth of the seabed in the site ranges from 50 to 100 m.

Adjacent to the NW Irish Sea mounds and subtidal mud area within rMCZ 6, rRA F is located in the most northerly patch of subtidal sand in the ISCZ project area. The ocean quahog, *Arctica islandica* occurs in this area of subtidal sand (Butler 2009). Live juveniles have been recorded within rRA F and are indicative of a breeding population (Butler pers comm. 2011). rRA F therefore represents the only region of known breeding quahogs within the Irish Sea Conservation Zone project area.

9. Detailed site description

rRA F is located in the north-west of the Irish Sea. The habitat data for rRA F stems from the MESH project (Mapping European Seabed Habitats) which includes a JNCC commissioned survey, undertaken by the AFBI (Agri-Food and Biosciences, Northern Ireland).

rRA F is predominantly comprised of the broadscale habitat subtidal sand. This area is known to be highly productive. The infaunal community of species present is relatively diverse and ranges from echinoderms such as sea potato *Echinocardium cordatum*, brittlestar *Amphiura filiformis,* shrimp like crustaceans *Mysidea spp,* and bivalves. There is also a large Annelid worm population (AFBI, unpublished data. Service pers. comm. 2011). Bolam et al. (2010) identified molluscs (bivalves) and annelid worms which live within the sediment as the main secondary producers in this part of the Irish Sea. These invertebrates are a key part of the food chain; they recycle organic matter from within the sediment, linking primary production from the plankton to predatory fish (Bolam et al. 2010).

Within this site the ocean quahog *Arctica islandica* has been recorded (Butler, 2009). The ocean quahog is a long-lived bivalve which, like trees, deposits an annual growth ring, the width of which can be used as a proxy for palaeoenvironmental conditions. Its shell material is therefore an important palaeoclimatic tool that can be used to study the history of changes in sea temperature and other marine environmental variables on multi-centennial timescales (Butler 2009). In addition, breeding populations of quahogs are not generally found in the Irish Sea (possibly because the warmer seawater temperatures in recent years do not favour larval survival). Juvenile quahogs have, however, been collected in the subtidal sand patch within rRA F, making this possibly the only breeding population of this important species in the ISCZ project area (Butler pers comm. 2011).

With the exception of localised areas around the bedrock, there are slow tidal currents around rMCZ6 (and in this area in general: 0.3 m s^{-1}, compared to 1 m s^{-1} in the Eastern Irish Sea; Horsburgh et al. 2000). These deep water, low energy conditions lead to a seasonal stratification in the water column, where during spring and summer there is not enough tidal energy to vertically mix the cold deep water with the warmer surface waters (Brown et al. 2000). This results in a density driven cyclonic gyre (i.e. a vortex or rotating body of water) during summer and spring, which physically entrains *Nephrops* and pelagic juvenile fish larvae within the western Irish Sea gyre (Horsburgh et al. 2000).

CEFAS undertook the Defra MB5301 contract to map spawning and nursery grounds of selective fish species for spatial planning. Within rRA F Herring *Clupea harengus***,** Whiting *Merlangius merlangus* and

Spurdog *Squalus acanthias* were found to be in high intensity of both spawning and nursery grounds. Therefore, designation of rRA F may help further protect these resources.

10. Stakeholder and boundary considerations

In order to meet the ENG target, most stakeholders on the RSG accepted the inclusion of rRA F in the final suite of Reference Areas. For a fuller context on the RSG discussions associated with the selection of Reference Areas, readers of this report are encouraged to consult meeting reports from the ISCZ RSG workshops held in May, June and July 2011 (ISCZ, 2011b,c,d).

11. Conservation objectives

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Mud** to favourable condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Subtidal Mud** in the biogeographic region are all **recovered**, such that the feature makes its contribution to the network.
Advice on operations	
3 Pressures	**Subtidal Mud** is sensitive to the pressures: (feature is not currently exposed to pressures in *italics*.) • Removal of non-target species (lethal) • Removal of target species (lethal) • Structural abrasion/penetration: Structural damage to seabed >25mm • Shallow abrasion/penetration: damage to seabed surface and penetration ≤25mm • *Surface abrasion: damage to seabed surface features* • *Physical loss (to land or freshwater habitat)* • *Organic enrichment* • *Physical change (to another seabed type)* • *Physical removal (extraction of substratum)* • *Siltation rate changes (high)* • *Temperature changes - local* • *Temperature changes - regional/national* • *Salinity changes - local* • *Introduction or spread of non-indigenous species & translocations (competition)*
4 Human activities	Human activities which cause these pressures will need to be managed if they prevent the conservation objectives from being achieved to ensure the MCZ contributes to an ecologically coherent and well-managed network of Marine Protected Areas. Based on a current assessment of activities taking place in the site, the human activities that require additional management are benthic trawling and scallop/queenie dredging. Those activities that are known to take place in the site that will be managed through the current regulatory framework are telecom and power cables and military activity. Those activities that are deemed not to require management but are known to take place in the site are shipping, transit of vessels and other fisheries.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Sand** to favourable condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of **Subtidal Sand** in the biogeographic region are all **recovered**, such that the feature makes its contribution to the network.
Advice on operations	
3 Pressures	**Subtidal Sand** is sensitive to the pressures: (feature is not currently exposed to pressures in *italics*.) • Removal of non-target species (lethal) • Shallow abrasion/penetration: damage to seabed surface and penetration ≤25mm • Surface abrasion: damage to seabed surface features • Structural abrasion/penetration: Structural damage to seabed >25mm • *Siltation rate changes (high)* • *Siltation rate changes (low)* • *Physical change (to another seabed type)* • *Physical loss (to land or freshwater habitat)* • *Siltation rate changes (high)* • *Physical removal (extraction of substratum)* • *Siltation rate changes (low)* • *Temperature changes - regional/national* • *Salinity changes - local* • *Introduction or spread of non-indigenous species & translocations (competition)*
4 Human activities	Human activities which cause these pressures will need to be managed if they prevent the conservation objectives from being achieved to ensure the MCZ contributes to an ecologically coherent and well-managed network of Marine Protected Areas. Based on a current assessment of activities taking place in the site, the human activities that require additional management are benthic trawling and scallop/queenie dredging. Those activities that are known to take place in the site that will be managed through the current regulatory framework are telecom and power cables and military activity. Those activities that are deemed not to require management but are known to take place in the site are shipping, transit of vessels and other fisheries.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the ***Arctica islandica* (Ocean Quahog)** to favourable condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • natural range, • habitat extent, • population structure, • population density, • size structure, • natural environmental quality*, and natural environmental processes* representative of the***Arctica islandica* (Ocean Quahog)** in the biogeographic region are all **recovered**, such that the feature makes its contribution to the network.
Advice on operations	
3 Pressures	***Arctica islandica* (Ocean Quahog)** is sensitive to the pressures: (feature is not currently exposed to pressures in *italics*.) • Removal of non-target species (lethal) • Shallow abrasion/penetration: damage to seabed surface and penetration ≤25mm • Structural abrasion/penetration: Structural damage to seabed >25mm • *Siltation rate changes (high)* • *Physical change (to another seabed type)* • *Physical loss (to land or freshwater habitat)* • *Physical removal (extraction of substratum)* • *Siltation rate changes (high)* • *Temperature changes - local* • *Wave exposure changes – local*
4 Human activities	Human activities which cause these pressures will need to be managed if they prevent the conservation objectives from being achieved to ensure the MCZ contributes to an ecologically coherent and well-managed network of Marine Protected Areas. Based on a current assessment of activities taking place in the site, the human activities that require additional management are benthic trawling and scallop/queenie dredging. Those activities that are known to take place in the site that will be managed through the current regulatory framework are telecom and power cables and military activity. Those activities that are deemed not to require management but are known to take place in the site are shipping, transit of vessels and other fisheries.

12. Sites to which this site is related

rRA F is located within rMCZ6.

rMCZ 6 is approximately 26 km away from rMCZ 7 which is another site that has been recommended for designation for the same EUNIS level 2 habitat types, sublittoral sediment and rock. There are a number of existing protected areas with marine components which fall within the vicinity of rMCZ7. Within 50km on the northern Ireland side of rMCZ6 are the conservation areas with marine feature designations: Murlough (sea inlets), Strangford Lough (reefs and intertidal mud), Killough (SPA), Outer Ards (SPA, intertidal mud), Copeland Islands (SPA). With 40 km of the Scottish side is the Mull of Galloway (SSSI including maritime cliffs), Within 80 km of the site is Luce Bay and sands (a Scottish SAC with marine designations) and Loch Ken.

13. Supporting documentation

Information	Type of information	Source
Location of subtidal sand	Combined physical and biological surveying with habitat modelling	Robinson et al. 2007, Mellor et al 2008
Location of subtidal mud	Combined physical and biological surveying with habitat modelling	Robinson et al. 2007, Mellor et al 2008
Location of sea-pen and burrowing megafauna communities	Video surveys and grab samples	Robinson et al. 2007, Mellor et al 2008
Location of ocean quahog *Arctica islandica*		Butler 2009
Location of spawning and nursery grounds		DEFRA/CEFAS:MB5301

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810. Countryside Council for Wales, Bangor. 233 pp plus appendices.

MARINE CONSERVATION ZONE: SELECTION ASSESSMENT DOCUMENT
RRA G SLIEVE NA GRIDDLE

Version and issue date	Amendments made
v1.0 August 2011	

1. Site name

rRA G - Slieve Na Griddle

2. Site centre location

54° 9' 38.429" N, 5° 15' 12.681" W
54.160674 Lat, -5.253522Long. Lambert Azimuthal Equal Area projection, ETRS89 datum

3. Site surface area

4.46 Km^2 (445.66 Ha)

4. Biogeographic region

JNCC regional sea: Irish Sea.
OSPAR region III: Celtic Seas.

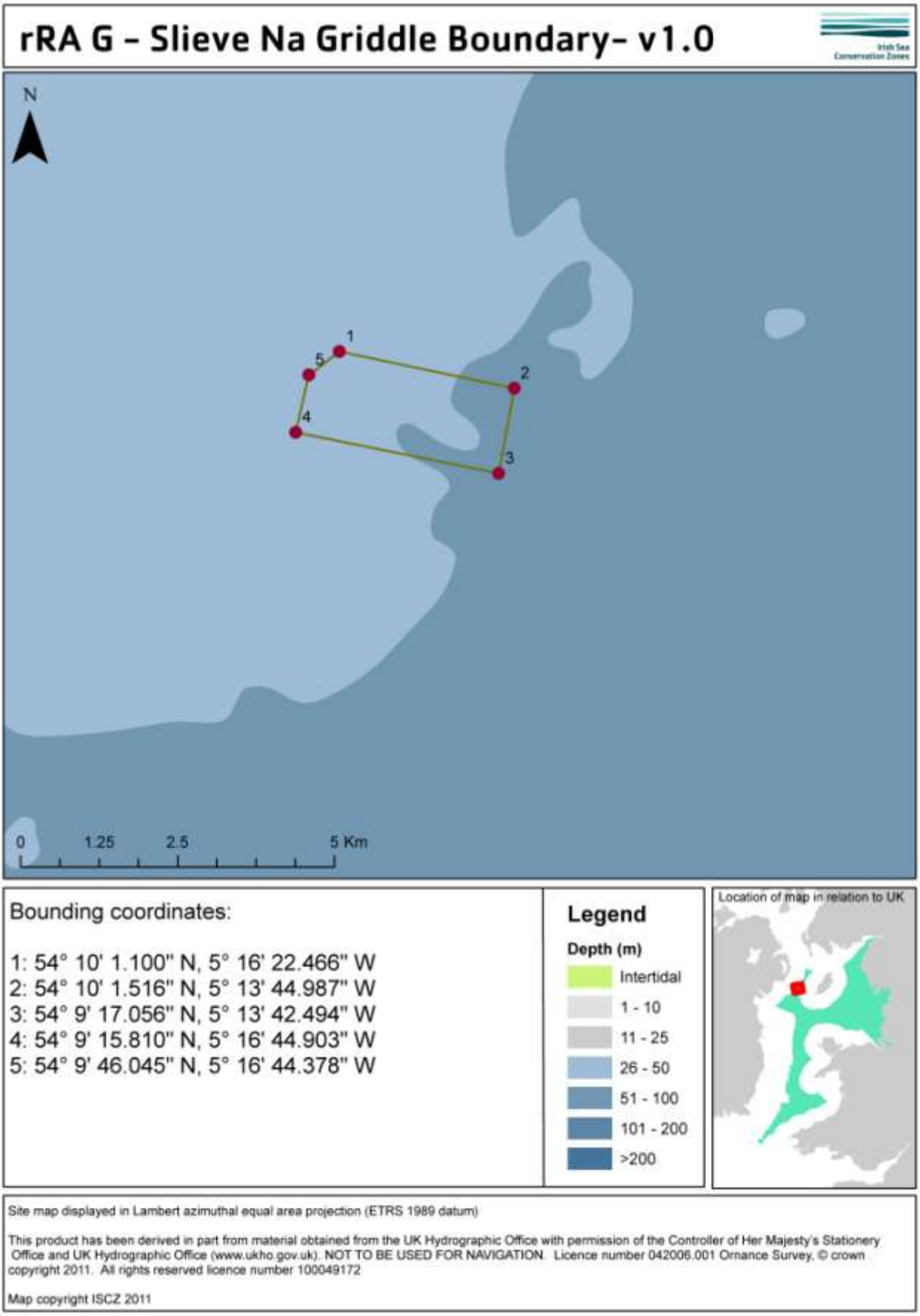
5. Features proposed for designation within rRA G

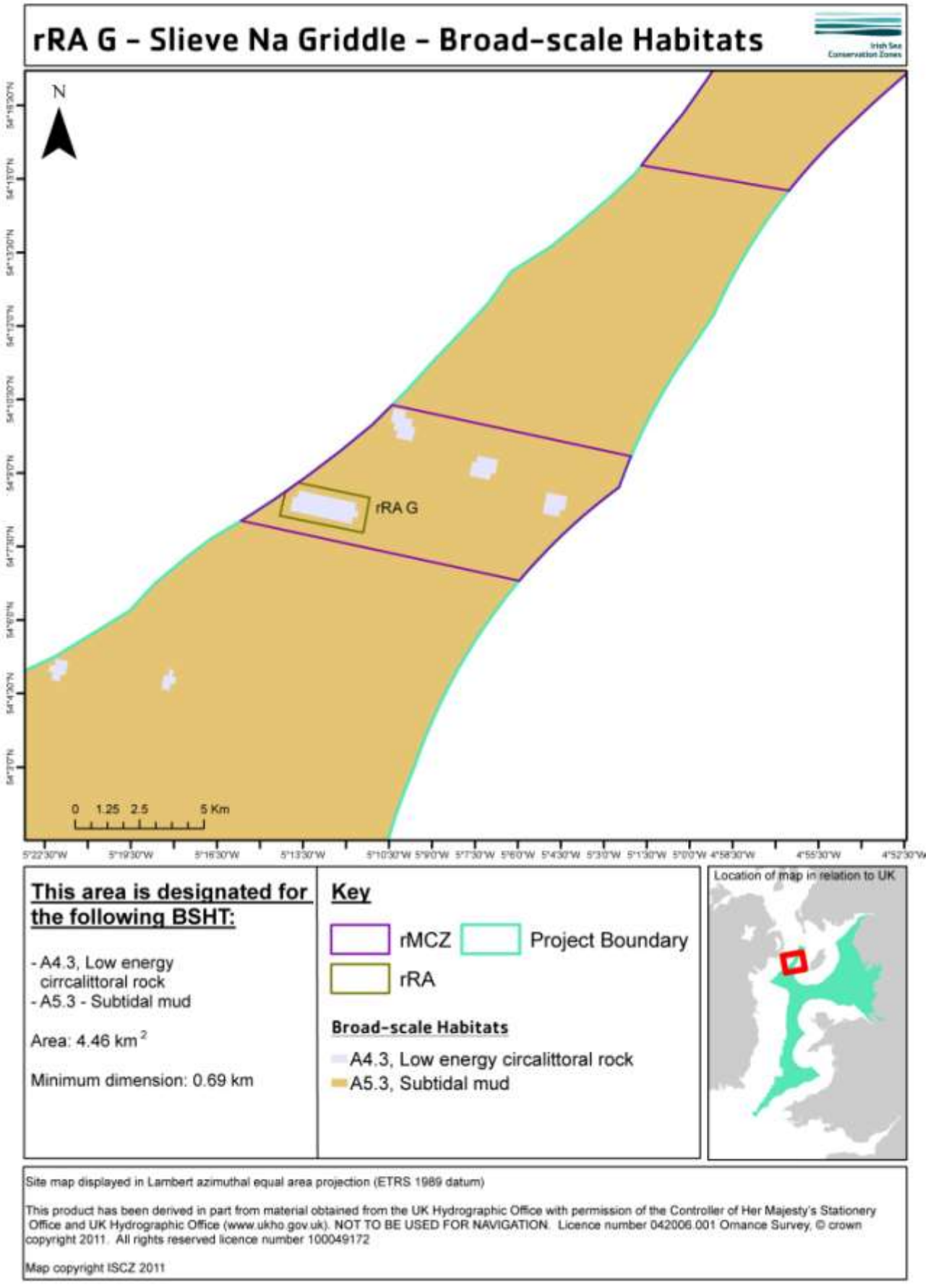
Feature type	Feature name	Area covered within site (for broad scale habitats and habitats of conservation importance)
Broad scale habitat	A4.3 Low energy circalittoral rock A5.3 Subtidal mud	2.04 Km^2 (204.48 Ha) 2.41 Km^2 (241.12 Ha)
Habitat of conservation importance	Mud habitats in deep water	4.46 Km^2 (445.46 Ha)
Species of conservation importance	n/a	
Geological feature	n/a	
Other feature		

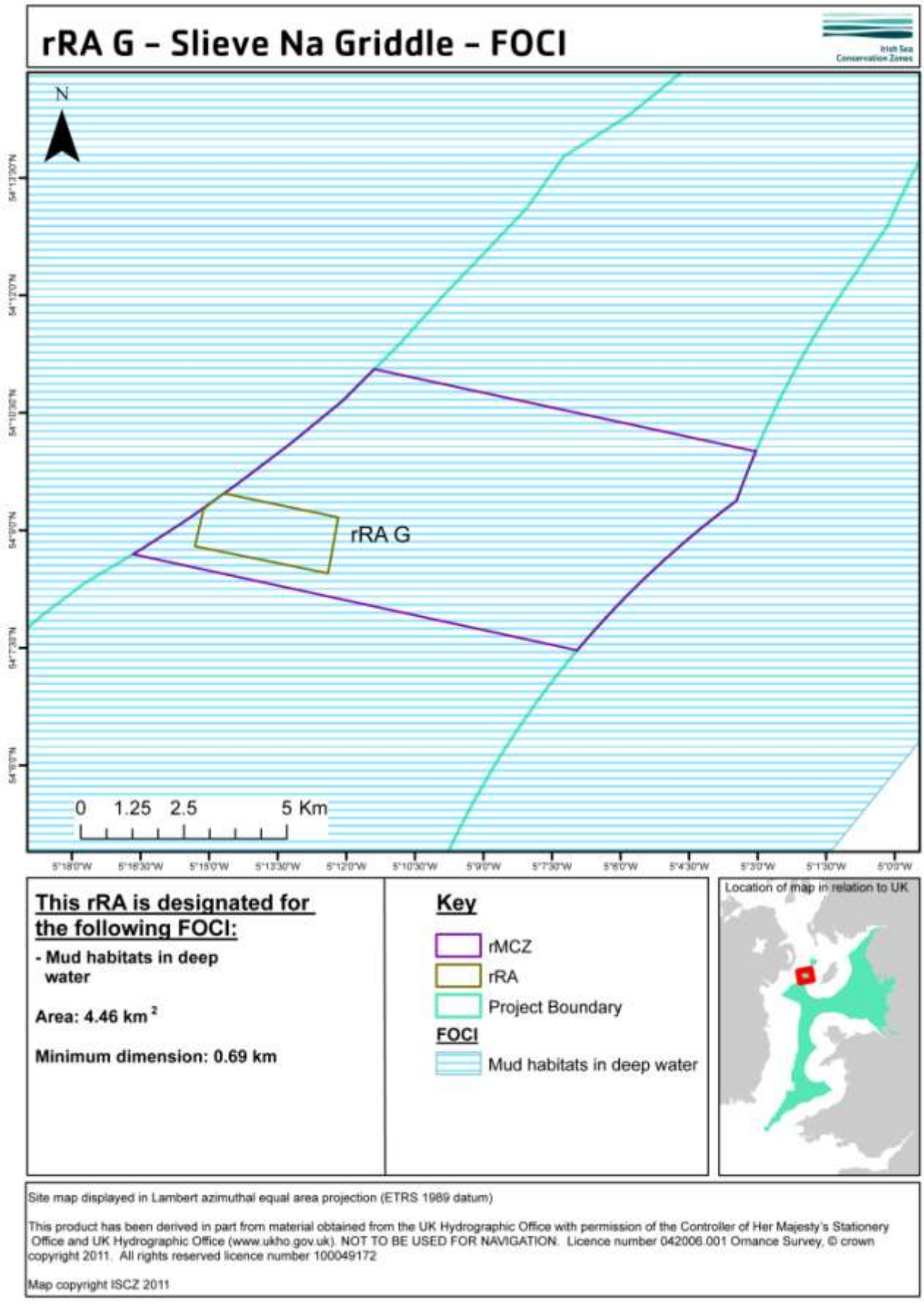
6. Features within rRA: G not proposed for designation

Feature type	Feature name	Reason that feature has not been proposed for designation
Broad scale habitat	n/a	
Habitat of conservation importance	n/a	
Species of conservation importance	n/a	

7. Map of site


rRA G – Slieve Na Griddle Boundary– v1.0
Irish Sea Conservation Zones
N
1
2
3
4
5
0
1.25
2.5
5 Km
Bounding coordinates:
1: 54° 10' 1.100" N, 5° 16' 22.466" W
2: 54° 10' 1.516" N, 5° 13' 44.987" W
3: 54° 9' 17.056" N, 5° 13' 42.494" W
4: 54° 9' 15.810" N, 5° 16' 44.903" W
5: 54° 9' 46.045" N, 5° 16' 44.378" W
Legend
Depth (m)
Intertidal
1 - 10
11 - 25
26 - 50
51 - 100
101 - 200
>200
Location of map in relation to UK
Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)
This product has been derived in part from material obtained from the UK Hydrographic Office with permission of the Controller of Her Majesty's Stationery Office and UK Hydrographic Office (www.ukho.gov.uk). NOT TO BE USED FOR NAVIGATION. Licence number 042006.001 Ornance Survey, © crown copyright 2011. All rights reserved licence number 100049172
Map copyright ISCZ 2011


rRA G – Slieve Na Griddle – Broad-scale Habitats
Irish Sea Conservation Zones
N
rRA G
0 1.25 2.5 5 Km
5°22'30"W
5°19'30"W
5°16'30"W
5°13'30"W
5°10'30"W
5°9'0"W
5°7'30"W
5°6'0"W
5°4'30"W
5°3'0"W
5°1'30"W
5°0'0"W
4°58'30"W
4°55'30"W
4°52'30"W
This area is designated for the following BSHT:
- A4.3, Low energy cirrcalittoral rock
- A5.3 - Subtidal mud
Area: 4.46 km 2
Minimum dimension: 0.69 km
Key
rMCZ
Project Boundary
rRA
Broad-scale Habitats
A4.3, Low energy circalittoral rock
A5.3, Subtidal mud
Location of map in relation to UK
Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)
This product has been derived in part from material obtained from the UK Hydrographic Office with permission of the Controller of Her Majesty's Stationery Office and UK Hydrographic Office (www.ukho.gov.uk). NOT TO BE USED FOR NAVIGATION. Licence number 042006.001 Ornance Survey, © crown copyright 2011. All rights reserved licence number 100049172
Map copyright ISCZ 2011


rRA G – Slieve Na Griddle – FOCI
Irish Sea Conservation Zones
N
rRA G
0 1.25 2.5 5 Km
5°18'0"W
5°16'30"W
5°15'0"W
5°13'30"W
5°12'0"W
5°10'30"W
5°9'0"W
5°7'30"W
5°6'0"W
5°4'30"W
5°3'0"W
5°1'30"W
5°0'0"W
This rRA is designated for the following FOCI:
- Mud habitats in deep water
Area: 4.46 km²
Minimum dimension: 0.69 km
Key
rMCZ
rRA
Project Boundary
FOCI
Mud habitats in deep water
Location of map in relation to UK
Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)
This product has been derived in part from material obtained from the UK Hydrographic Office with permission of the Controller of Her Majesty's Stationery Office and UK Hydrographic Office (www.ukho.gov.uk). NOT TO BE USED FOR NAVIGATION. Licence number 042006.001 Ornance Survey, © crown copyright 2011. All rights reserved licence number 100049172
Map copyright ISCZ 2011

8. Site summary

rRA G is located in rMCZ 7 in the western Irish Sea. This offshore site is sandwiched between the northern Irish territorial waters to the west and the Isle of Man territorial waters to the east. Mud habitat and bedrock makes up the seabed in the site and the depth ranges from100 to 200 m. The Pisces reef complex is situated within the boundaries of rRA G. The Pisces reef qualifies as Annex 1 Reef habitat according to the EU Habitats and Species Directive and has been formally recommended by Defra as a special area of conservation (SAC) (JNCC 2011). The Pisces Reef is comprised of three bedrock pinnacles which rise 15-35 m up from the seafloor. The mud habitat present in rMCZ6 is part of the wider but geographically isolated mud patch in the western Irish Sea. Low energy conditions that have been recorded in this area (Horsburgh et al. 2000) provide a stable environment, characteristic of mud habitats in deep water. The mud habitat in the wider region of rMCZ 7 supports a thriving and commercially important *Neprhops norvegicus* or Dublin Bay Prawn fishery. Close to the reef, the soft sediment in which nephrops burrows are inaccessible to traditional fishing methods, and as such the reef provides a natural refuge from fishing pressure. Placing a RA in this region could provide an additional buffer of reduced fishing activity in the mud habitat. This could have a potential positive impact for larval export outside of the site boundaries and also for the potential recovery of seapen which have been recorded within the vicinity of the site.

9. Detailed site description

The boundary of rRA G encompasses areas of bedrock, which comprises part of the Pisces reef complex (a proposed SAC) amidst deep water mud habitat.

The habitat data for this site stems from the MESH project (Mapping European Seabed Habitats) which includes a JNCC commissioned survey, undertaken by the AFBI (Agri-Food and Biosciences), to ground truth habitat maps with grab and towed video surveys to sample the biological community (JNCC 2007).

The area is a depositional environment for sediments with localised scouring around the bedrock and boulders that make up the reef (Callaway et al. 2009). Geophysical, video and biological grab samples have verified the presence of low energy circalittoral rock, or bedrock under a veneer of mud which was classified as fine mud dominated by burrowing megafauna and scoured mud dominated by polychaetes (Callaway et al. 2009). Callaway et al. (2009) noted that had video and acoustic data had been used alone, the area would have been misclassified as a purely rocky reef area, without accounting for the soft mud habitat covering the reef.

The Pisces reef qualifies as Annex 1 Reef habitat according to the EU Habitats and Species Directive and has been formally recommended by Defra as a special area of conservation (SAC) (JNCC 2011). The Pisces reef qualifies as Annex 1 Reef habitat according to the EU Habitats and Species Directive and has been formally recommended by Defra as a special area of conservation (SAC) (JNCC 2011). The Pisces Reef is comprised of three bedrock pinnacles which rise 15-35 m up from the seafloor. The reefs support a diverse animal community, including hydroids (e.g *Diphasia nugra*), a range of sponges, including the cup sponge *Axinella infundibuliformi*, echinoderms, for example the cushion star fish *Porania pulvillus* and various crustaceans, for example the edible crab *Cancer pagurus* and squat lobster *Munida rugosa*. Additionally, the reef may provide shelter for juvenile fish, including blue whiting, bib, red gurnard and wrasse (Judd 2004, cited in JNCC 2011).

The mud habitat present in rMCZ6 is part of the wider but geographically isolated mud patch in the western Irish Sea. The most well known burrowing marine invertebrate found in deep water mud is the

Dublin Bay prawn *Nephrops norvegicus*, for which there are valuable fishing grounds within this part of the project area. The western Irish Sea nephrops population is larger than the eastern, which occurs on a geographically distinct mud patch, and the two populations are not thought to be connected (Clements 2010). The nephrops fishery is particularly important since the collapse and decline of cod and whiting fisheries in the region and, based on fishery independent video survey data (between 2003-2007), it appears that nephrops burrows are decreasing in density (Clements 2010). There are, however, a whole host of other animals which inhabit deep water mud including the brittlestar *Amphiura chiajei* and the burrowing sea urchin *Brissopsis lyrifera* (Maddock 2010).

During submersible trials in the 1970s, scattered seapens were recorded in the soft sediments between rocky outcrops of the Pisces reef, however they are no longer present in the same abundance (JNCC 2011). More recently, incidental records of seapens have been noted during the ICES nephrops stock assessment in an area close to the southern boundary of the site (Marine Institute / AFBI unpublished data). More recent records to confirm the presence of seapens and burrowing megafauna are required for this habitat feature to be designated in this MCZ, however it seems quite probable that given time and a decrease in trawl activity, seapens may recover in this area.

10. Stakeholder and boundary considerations

In order to meet the ENG target, most stakeholders on the RSG accepted the inclusion of rRA G in the final suite of Reference Areas. For a fuller context on the RSG discussions associated with the selection of Reference Areas, readers of this report are encouraged to consult meeting reports from the ISCZ RSG workshops held in May, June and July 2011 (ISCZ, 2011b,c,d).

11. Conservation objectives

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Low Energy Circalittoral Rock** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Low Energy Circalittoral Rock** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Mud** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Subtidal Mud** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Mud Habitats in Deep Water** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Mud Habitats in Deep Water** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

12. Sites to which this site is related

rRA G lies within the south-western corner of rMCZ 7. rMCZ 7 is approximately 26 km away from rMCZ 6 which is another site that has been recommended for designation for the same EUNIS level 2 habitat types, sublittoral sediment and rock. The site itself overlaps with the Pisces reef complex which has been recommended to Defra as a special area of conservation (SAC). There are a number of existing protected areas with marine components which fall within the vicinity of rMCZ7. Within 40km on the northern Ireland side of rMCZ7are the conservation areas with marine feature designations: Murlough (sea inlets), Strangford Lough (reefs and intertidal mud), Killough (SPA), Outer Ards (SPA, intertidal mud), Copeland Islands (SPA). With 40 km of the Scottish side is the Mull of Galloway (SSSI including maritime cliffs), Within 80 km of the site is Luce Bay and sands (a Scottish SAC with marine designations) and Loch Ken.

13. Supporting documentation

This section should include the sources of the best available scientific and stakeholder information used to identify sites and conservation objectives presented in a table format:

Information	Type of information	Source
Location of low energy circalittoral rock	Surveys (seabed imagery, acoustic, multibeam sonar, grab samples, video surveys)	Judd 2007 and AFBI 2007, referenced in JNCC 2011, Callaway et al. 2009.
Location of subtidal mud	Surveys (seabed imagery, acoustic, multibeam sonar, grab samples, video surveys)	Judd 2007 and AFBI 2007, referenced in JNCC 2011, Callaway et al. 2009.
Location of mud habitats in deep water	Surveys (seabed imagery, acoustic, multibeam sonar, grab samples, video surveys)	Judd 2007 and AFBI 2007, referenced in JNCC 2011, Callaway et al. 2009.

References

CLEMENTS, A.J. 2010. *Broad-scale ecological investigation of Nephrops norvegicus (L.) Burrow distribution in the Western Irish Sea*. Ph.D. Thesis, Queen's University Belfast.

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ISCZ. 2011c. *Meeting report from the 7th Irish Sea Conservation Zones Stakeholder Group meeting*. RK Partnership Ltd.

ISCZ. 2011d. *Meeting report from the 8th Irish Sea Conservation Zones Stakeholder Group meeting.* RK Partnership Ltd.

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http://www.ukbap.org.uk/library/UKBAPPriorityHabitatDescriptionsRevised20100730.pdf

MARINE CONSERVATION ZONE: SELECTION ASSESSMENT DOCUMENT
RRA H ALLONBY BAY

Version and issue date	Amendments made
v1.0 August 2011	

1. Site name

rRA H - Allonby Bay

2. Site centre location

54° 47' 22.760" N, 3° 28' 39.575" W
54.789655 Lat, -3.477659Long. Lambert Azimuthal Equal Area projection, ETRS89 datum

3. Site surface area

4.91 Km^2 (490.69 Ha)

4. Biogeographic region

JNCC regional sea: Irish Sea.
OSPAR region III: Celtic Seas.

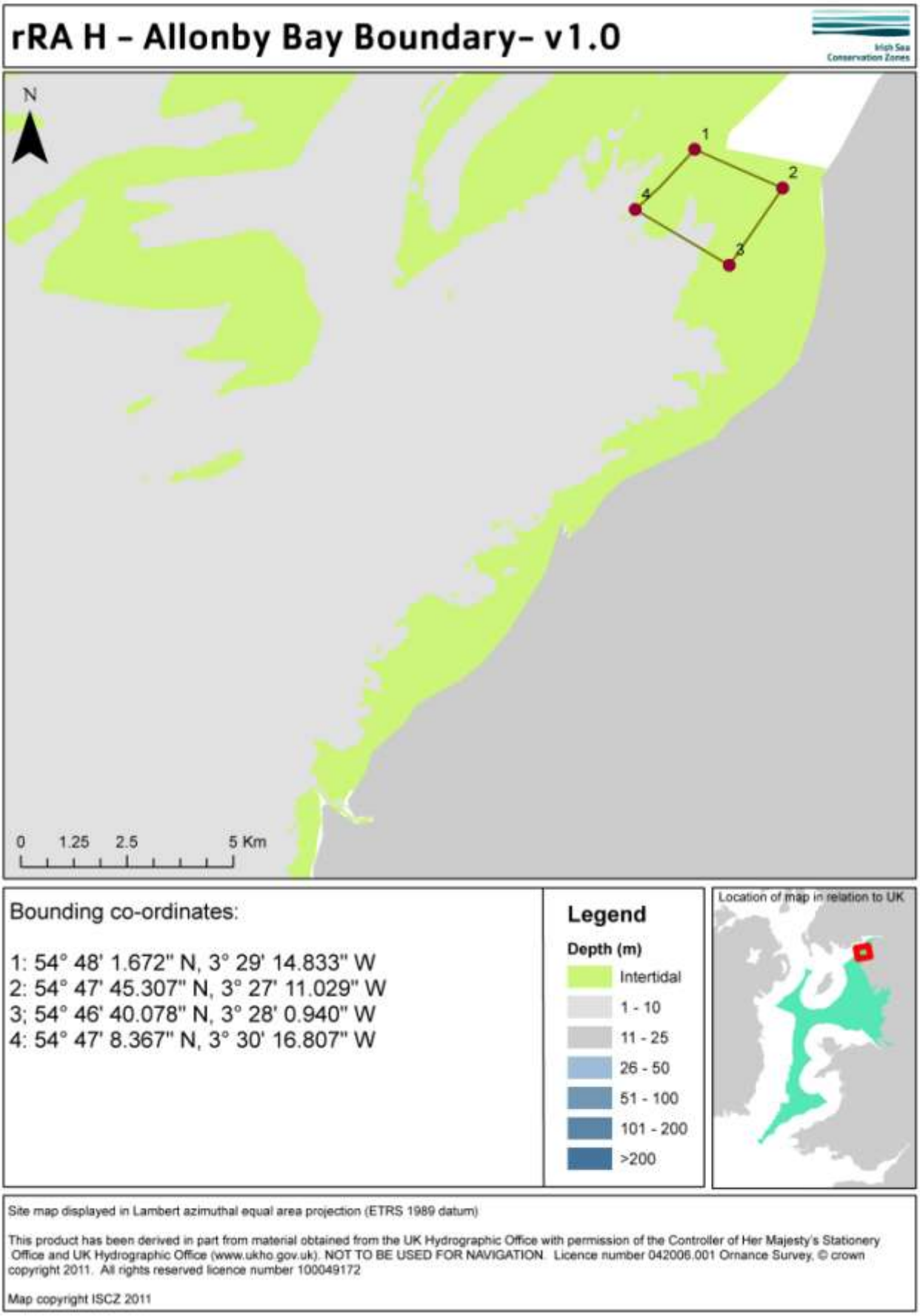
5. Features proposed for designation within rRA H

Feature type	**Feature name**	**Area covered within site (for broad scale habitats and habitats of conservation importance)**
Broad scale habitat	A3.2 Moderate energy infralittoral rock A5.1 Subtidal coarse sediment A5.2 Subtidal sand	0.04 Km^2 (3.69 Ha) 4.81 Km^2 (480.85 Ha) 0.06Km^2 (6.17 Ha)
Habitat of conservation importance	Subtidal sands and gravels	4.91 Km^2 (490.69 Ha)
Species of conservation importance	n/a	
Geological feature	n/a	
Other feature	n/a	

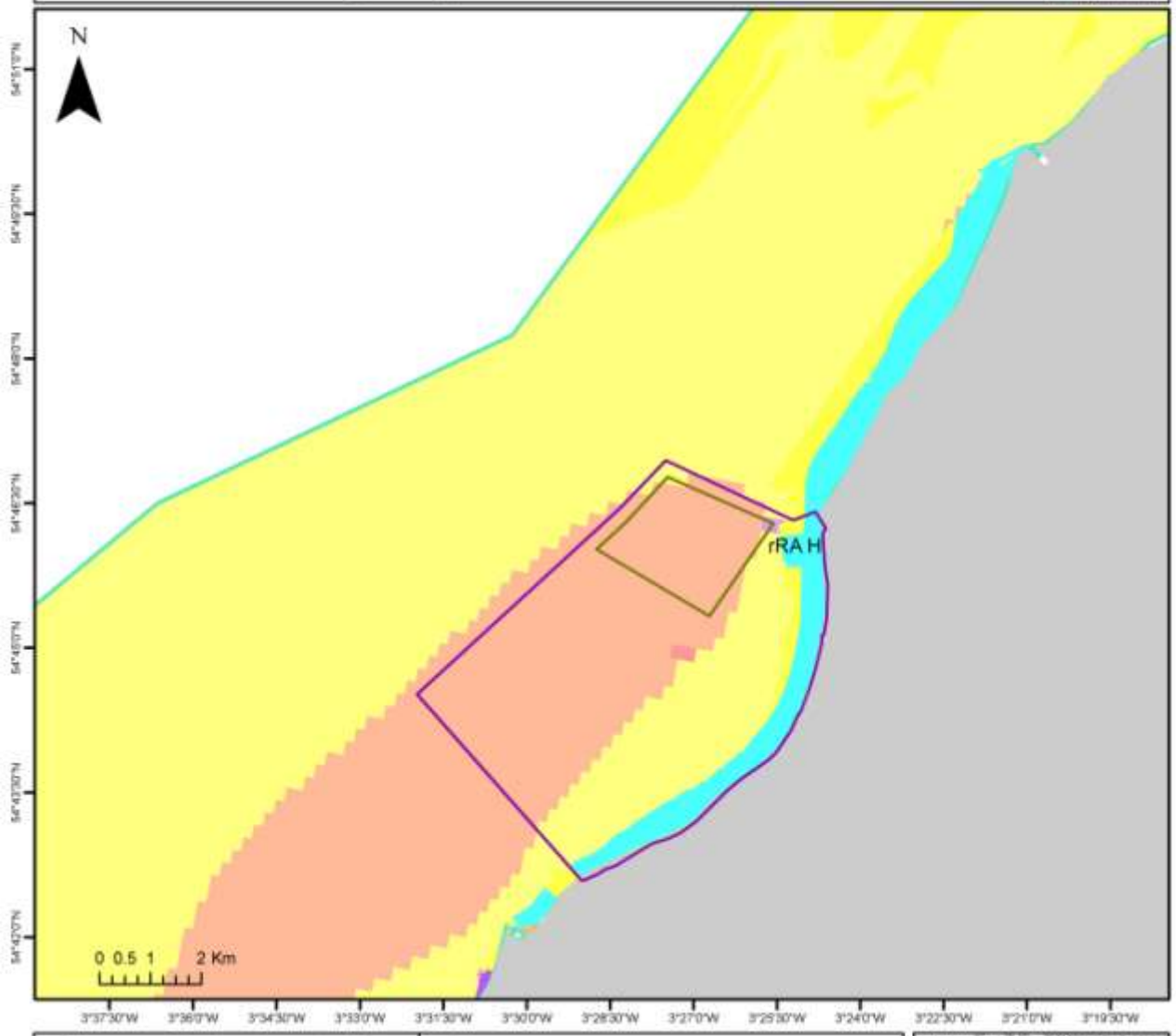
6. Features within rRA H not proposed for designation

Feature type	Feature name	Reason that feature has not been proposed for designation
Broad scale habitat	n/a	
Habitat of conservation importance	n/a	
Species of conservation importance	n/a	

7. Map of site


rRA H – Allonby Bay Boundary– v1.0
Irish Sea Conservation Zones
N
1
2
3
4
0 1.25 2.5 5 Km
Bounding co-ordinates:
1: 54° 48' 1.672" N, 3° 29' 14.833" W
2: 54° 47' 45.307" N, 3° 27' 11.029" W
3; 54° 46' 40.078" N, 3° 28' 0.940" W
4: 54° 47' 8.367" N, 3° 30' 16.807" W
Legend
Depth (m)
Intertidal
1 - 10
11 - 25
26 - 50
51 - 100
101 - 200
>200
Location of map in relation to UK
Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)
This product has been derived in part from material obtained from the UK Hydrographic Office with permission of the Controller of Her Majesty's Stationery Office and UK Hydrographic Office (www.ukho.gov.uk). NOT TO BE USED FOR NAVIGATION. Licence number 042006.001 Ornance Survey, © crown copyright 2011. All rights reserved licence number 100049172
Map copyright ISCZ 2011

rRA H – Allonby Bay – Broad-scale Habitats



This area is designated for the following BSHT:

- A3.2, Moderate energy infralittoral rock
- A5.1, Subtidal coarse sediment
- A5.2, Subtidal sand

Area: 4.91 km^2

Minimum dimension: 2.02 km

Key

rMCZ Project Boundary

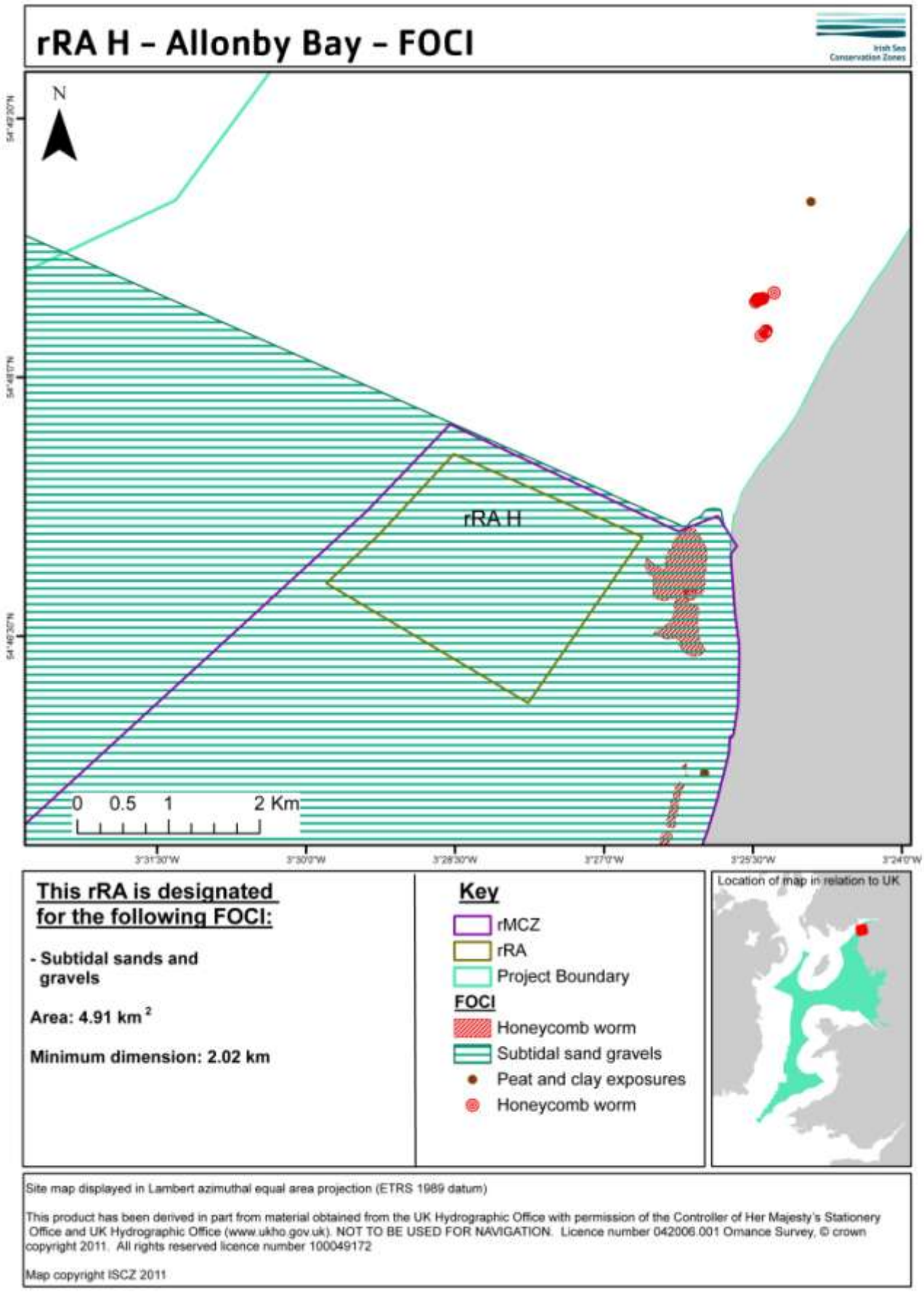
rRA

Broad-scale Habitats

- A1.1, High energy intertidal rock
- A1.2, Moderate energy intertidal rock
- A2.2, Intertidal sand and muddy sand
- A2.3, Intertidal mud
- A2.4, Intertidal mixed sediments
- A2.7, Intertidal biogenic reefs
- A3.1, High energy infralittoral rock
- A3.2, Moderate energy infralittoral rock
- A5.1, Subtidal coarse sediment
- A5.2, Subtidal sand

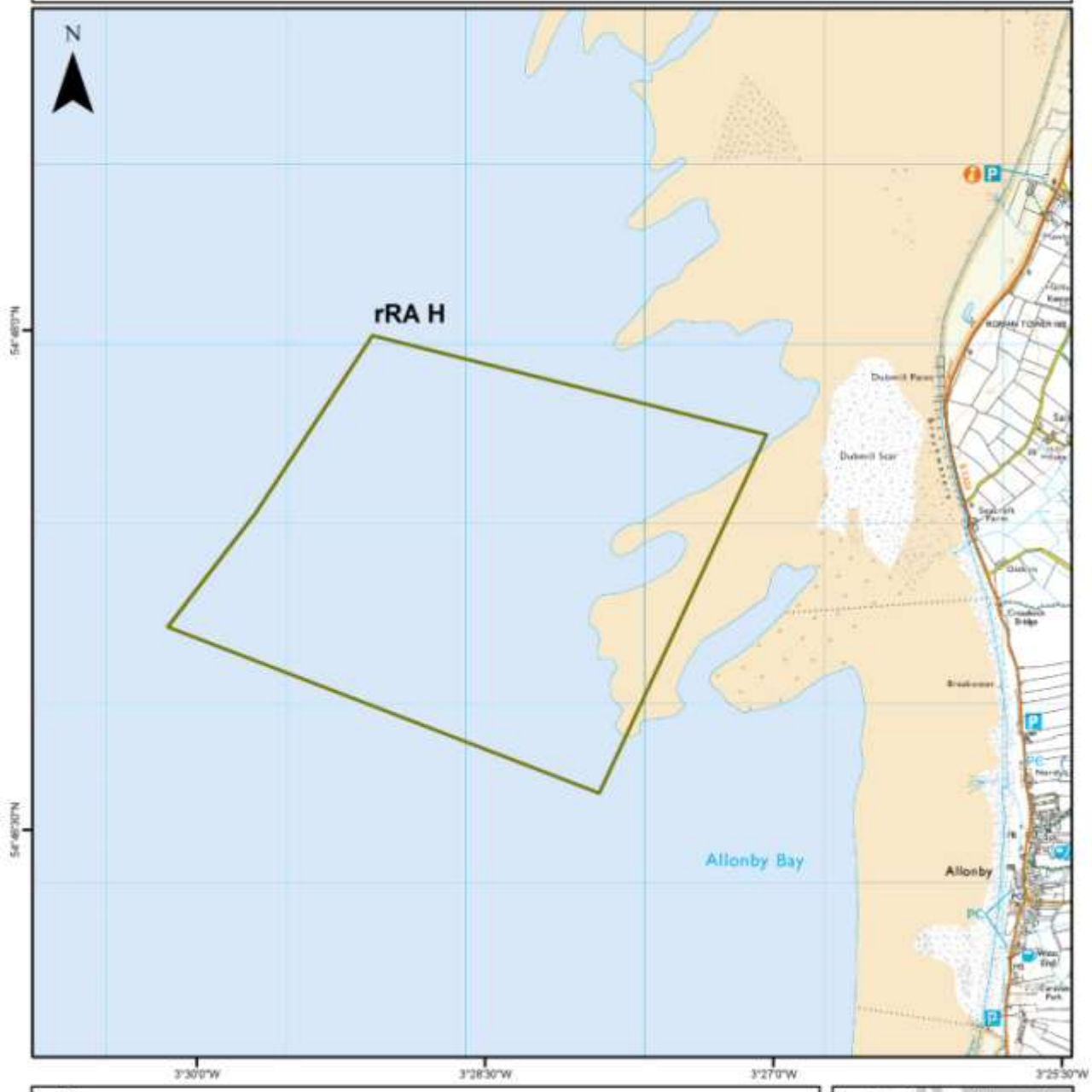
Location of map in relation to UK

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)



Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

rRA H – Allonby Bay – Location



Key

Project Boundary

rRA

0 0.3 0.6 1.2 Km

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

Location of map in relation to UK

8. Site summary

rRA H is situated in north western corner of rMCZ 10 in Allonby Bay on the north Cumbrian coast. It is the most northern reference area in the ISCZ project area. This offshore site is known locally as Maryport Roads and is known to be extremely biologically diverse (Perkins, 1973). Maryport Roads, an area of subtidal coarse sediment and cobbles originally identified by Perkins and was surveyed extensively between the late 1960s and 1980s. The site lies 0.9km offshore and has a depth range of $\leq$ 10 m. The location of rRA H helps to link inshore and offshore sand and coarse sediment habitats.

9. Detailed site description

Maryport Roads was initially identified by Perkins (1973) as an extremely diverse, shallow and cobbley area with associated subtidal mixed sediments. It was thought by the RSG that this area would benefit from MCZ protection. Within this area the substrate is generally thought to be incompatible with benthic fishing and was, therefore, deemed an excellent site for a reference area as it would have relatively little socio-economic impact. Maryport Roads is an important offshore boulder and cobble scar ground. The environment is extremely productive and diverse with sponges, soft corals such as dead man's fingers *Alyconium digitatum*, bryozoans including hornwrack *Flustra folacea*, the red sea squirt *Dendrodoa grossularia*, anemones, hydroids and the reef building honeycomb worm *Sabellaria alveolata* (EN 1997).

Subtidal sand sediments at Maryport Roads are characterised by the bivalves *Mactra stultorum* and banded wedge shell *Donax vittatus*, medium sands by the bivalve surf clam *Spisula solida*, and muddy sands by the polychaete *Nephtys* spp. and the bivalves *Nucula sulcata*, *Abra albida* and *Angulus tenuis* (Perkins 1973, cited in Mills 1998).

The communities recorded from sublittoral scar grounds exhibit rich and well developed epifaunal communities (living on the benthic substrate) similar to rocky underboulder communities characterised by the sponge breadcrumb sponge *Halichondria panicea*, the hydroid *Abietinaria abietina*, the polychaete ross worm *Sabellaria alveolata*, the common whelk *Buccinum undatum*, the horse mussel *Modiolus modiolus*, the bryozoan hornwrack *Flustra foliacea* and the sea squirt *Dendrodoa grossularia.* Sublittoral scar grounds were also considered to be important for the presence of commercially important species such as the edible crab *Cancer pagurus* and lobster *Homarus gammarus*, and for the fish that use them as feeding grounds (Mills 1998).

rRA H has also been identified by the RSG as an important spawning ground for commercial species including skate - thornback ray *Raja clavata* and bass. The shallow waters and rugosity (complexity of the habitat) provide a natural refuge area from predators. It is also thought to be an important pupping ground for harbour porpoise *Phocoena phocoena*.

There is much anecdotal evidence (local ecological knowledge) to inform and support the high biodiversity of this area, but there is a distinct paucity of recent, scientific peer reviewed literature. Designating rRA H as a reference area helps to link inshore and offshore sand and coarse sediment habitats. It also has the potential to inform, if closely monitored, local fisheries science in terms of a greater understanding of spawning and nursery grounds of commercially important species, as well as having wider research potential.

10. Stakeholder and boundary considerations

In order to meet the ENG target, most stakeholders on the RSG accepted the inclusion of rRA H in the final suite of Reference Areas. For a fuller context on the RSG discussions associated with the selection of Reference Areas, readers of this report are encouraged to consult meeting reports from the ISCZ RSG workshops held in May, June and July 2011 (ISCZ, 2011b,c,d).

11. Conservation Objectives

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Coarse Sediment** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality*, and natural environmental processes* Representative of the **Subtidal Coarse Sediment** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Sand** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality*, and natural environmental processes* Representative of the **Subtidal Sand** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Moderate Energy Infralittoral Rock** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality*, and natural environmental processes* Representative of the **Moderate Energy Infralittoral Rock** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Sands and Gravels** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality*, and natural environmental processes* Representative of the **Subtidal Sands and Gravels** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

12. Sites to which this site is related

rRA H lies within the northwest corner of rMCZ10. rMCZ 10 is located in between two recommended MCZs. The Solway is 23 km (12 nm) to the north, a site that is being recommended for designation for two highly mobile species, smelt *Osmerus eperlanus* and eel *Anguilla Anguilla.* The Solway MCZ also contains the same EUNIS level 2 habitat types, sublittoral sediment, littoral rock and littoral sediment. Located 38 km (20 nm) to the south of rMCZ 10 is rMCZ 11, which shares the same EUNIS level 2 habitats, sublittoral sediment, littoral rock, littoral sediment and infra-littoral rock.

rMCZ 10 is in the vicinity (defined here as within 80 km (43 nm) of the following existing or proposed sites that have marine features designated for protection: Morecambe Bay (SPA, SSSI) and Duddon estuary (SPA / SSSI). A further three sites are within 40 km of the rMCZ10, Solway Firth (SAC), Drigg coast (SAC), Upper Solway flats and marshes (SPA).

13. Supporting documentation

Information	Type of information	Source
Ecological Diversity	Local stakeholder knowledge	RSG
Intertidal surveys	Ecological surveys	JNCC MNCR

References

ENGLISH NATURE. 1997. *Cumbrian Coast Natural Area Profile.* Available from: http://www.sssi.naturalengland.org.uk/science/natural/profiles%5CnaProfile119.pdf. Last accessed 25th August 2011.

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ISCZ. 2011c. *Meeting report from the 7th Irish Sea Conservation Zones Stakeholder Group meeting*. RK Partnership Ltd.

ISCZ. 2011d. *Meeting report from the 8th Irish Sea Conservation Zones Stakeholder Group meeting.* RK Partnership Ltd.

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MILLS, D.J.L. 1998. Liverpool Bay to the Solway (Rhos-on-Sea to the Mull of Galloway) (MNCR Sector 11). In: Marine Nature Conservation Review. Benthic marine ecosystems of Great Britain and the north-east Atlantic ed. p. 315–338. Peterborough, Joint Nature Conservation Committee. (Coasts and seas of the United Kingdom. MNCR series).

PERKINS, E.J. 1973. *The Marine Fauna and Flora of the Solway Firth*. The Dumfriesshire and Galloway Antiquarian Society; First edition

Perkins, E.J. 1988. Fourteenth report to the Cumbria Sea-Fisheries Committee. Solway Firth survey - 1st July 1987 to 30th June 1988. Solway Marine Investigations, Maryport, Cumbria.

MARINE CONSERVATION ZONE: SELECTION ASSESSMENT DOCUMENT RRA I CUMBRIAN COAST (1)

Version and issue date	Amendments made
v1.0 August 2011	

1. Site name

rRA I - Cumbrian Coast (1)

2. Site centre location

54° 29' 37.440" N, 3° 37' 18.975" W
54.493733 Lat, -3.621937 Long. Lambert Azimuthal Equal Area projection, ETRS89 datum

3. Site surface area

0.12 Km^2 (11.86 Ha)

4. Biogeographic region

JNCC regional sea: Irish Sea.
OSPAR region III: Celtic Seas.

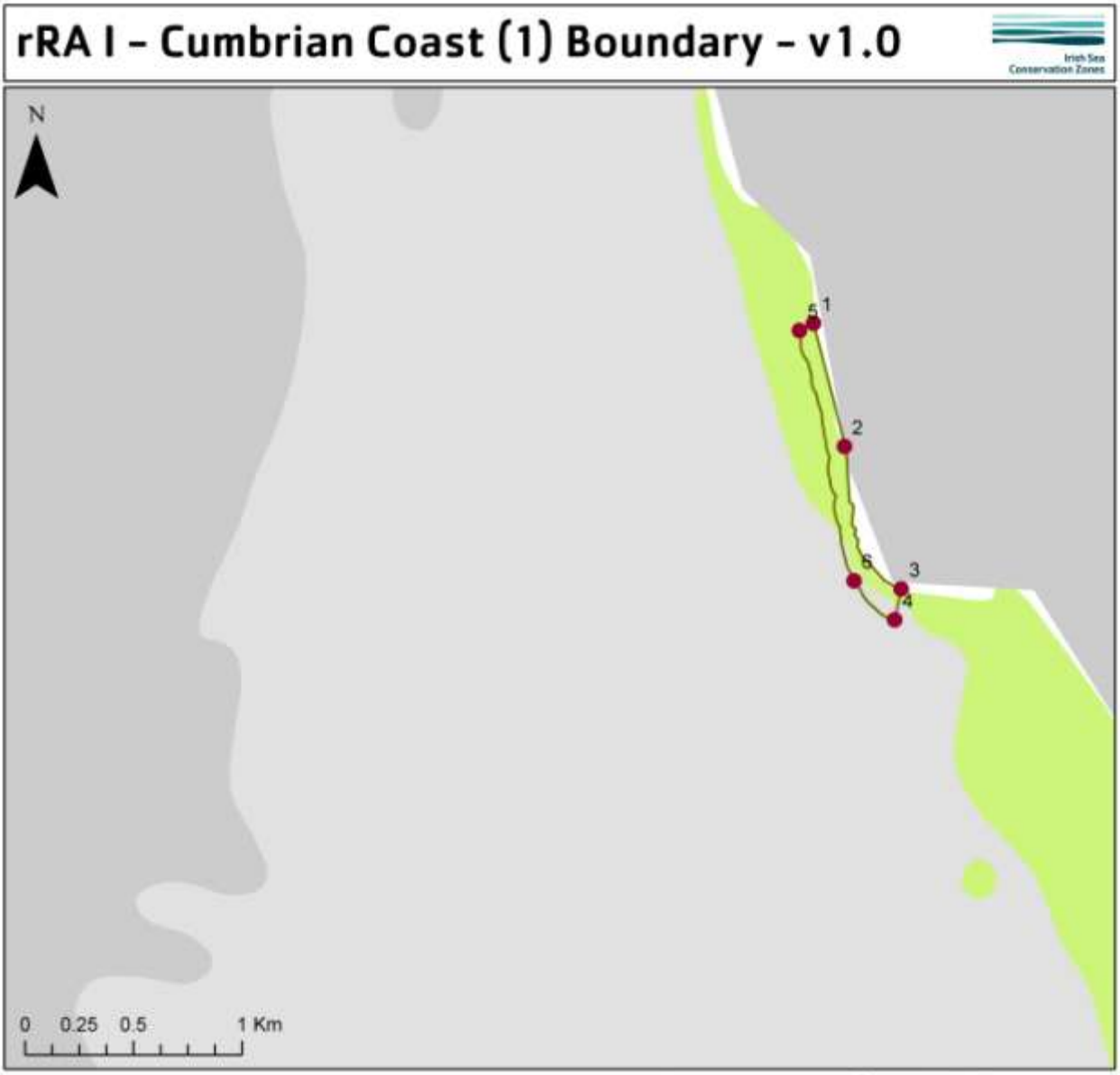
5. Features proposed for designation within rRA I

Feature type	**Feature name**	**Area covered within site (for broad scale habitats and habitats of conservation importance)**
Broad scale habitat	A1.1 High energy infralittoral rock A5.2 Subtidal sand A5.3 Subtidal mud	0.02 Km^2 (1.98 Ha) 0.05 Km^2 (5.33 Ha) 0.05 Km^2 (4.53 Ha)
Habitat of conservation importance	Subtidal sands and gravels Intertidal underbouler communities	0.03 Km^2 (3.08 Ha) NA
Species of conservation importance		
Geological feature		
Other feature		

6. Features within rRA I not proposed for designation

Feature type	Feature name	Reason that feature has not been proposed for designation
Broad scale habitat		
Habitat of conservation importance		
Species of conservation importance		

7. Map of site



Bounding co-ordinates:

1: 54° 30' 0.230" N, 3° 37' 34.721" W
2: 54° 29' 43.093" N, 3° 37' 20.913" W
3: 54° 29' 23.867" N, 3° 36' 59.583" W
4: 54° 29' 19.172" N, 3° 36' 59.748" W
5: 54° 29' 58.810" N, 3° 37' 37.925" W
6: 54° 29' 23.743" N, 3° 37' 11.903" W

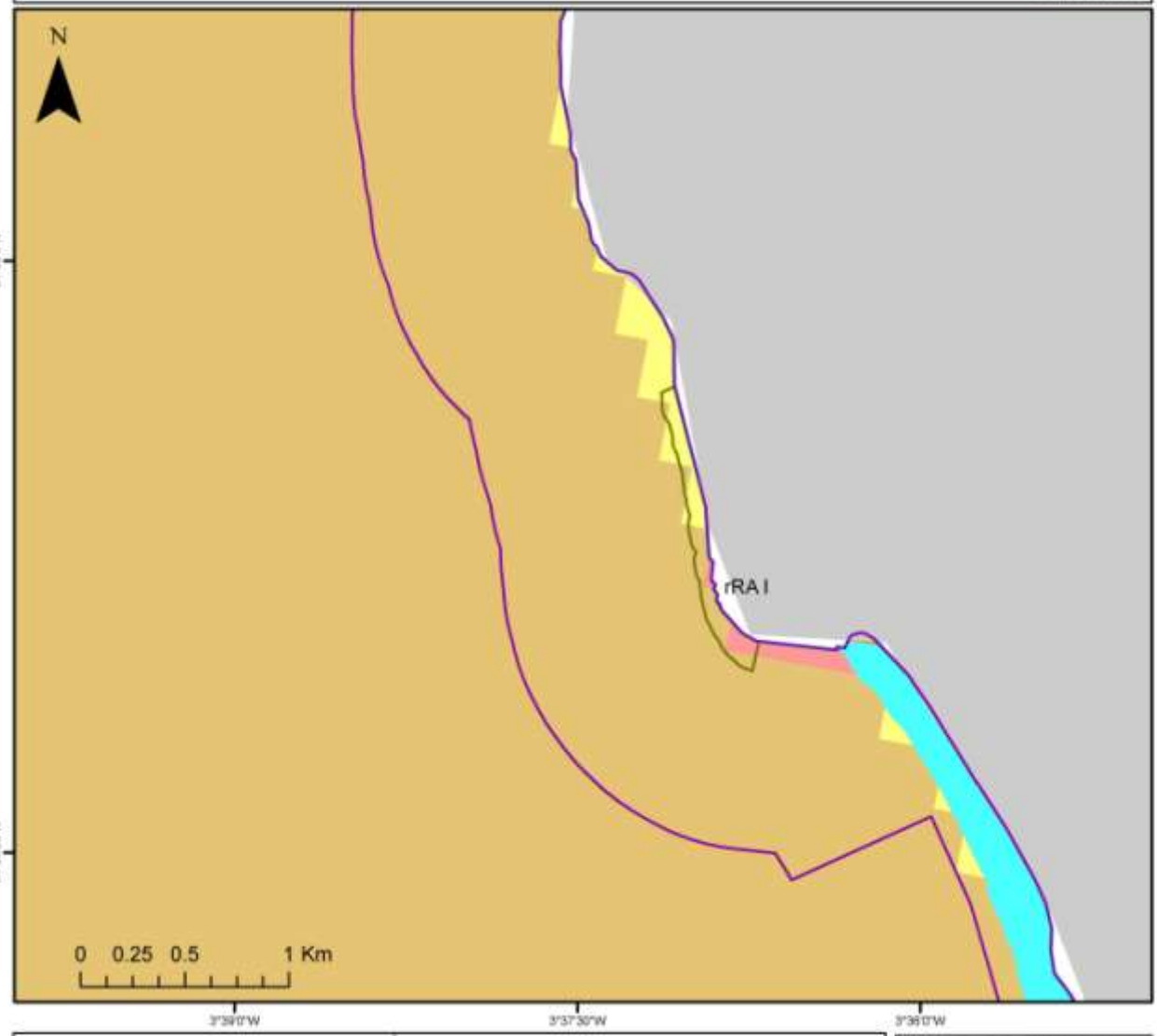
Legend

Depth (m)

- Intertidal
- 1 - 10
- 11 - 25
- 26 - 50
- 51 - 100
- 101 - 200
- >200

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

rRA I – Cumbrian Coast (1) – Broad-scale Habitats



This area is designated for the following BSHT:

- A3.1, High energy infralittoral rock
- A5.2, Subtidal sand
- A5.3, Subtidal mud

Area: 0.12 km^2

Minimum dimension: 0.07 km

Key

rMCZ
Project Boundary
rRA

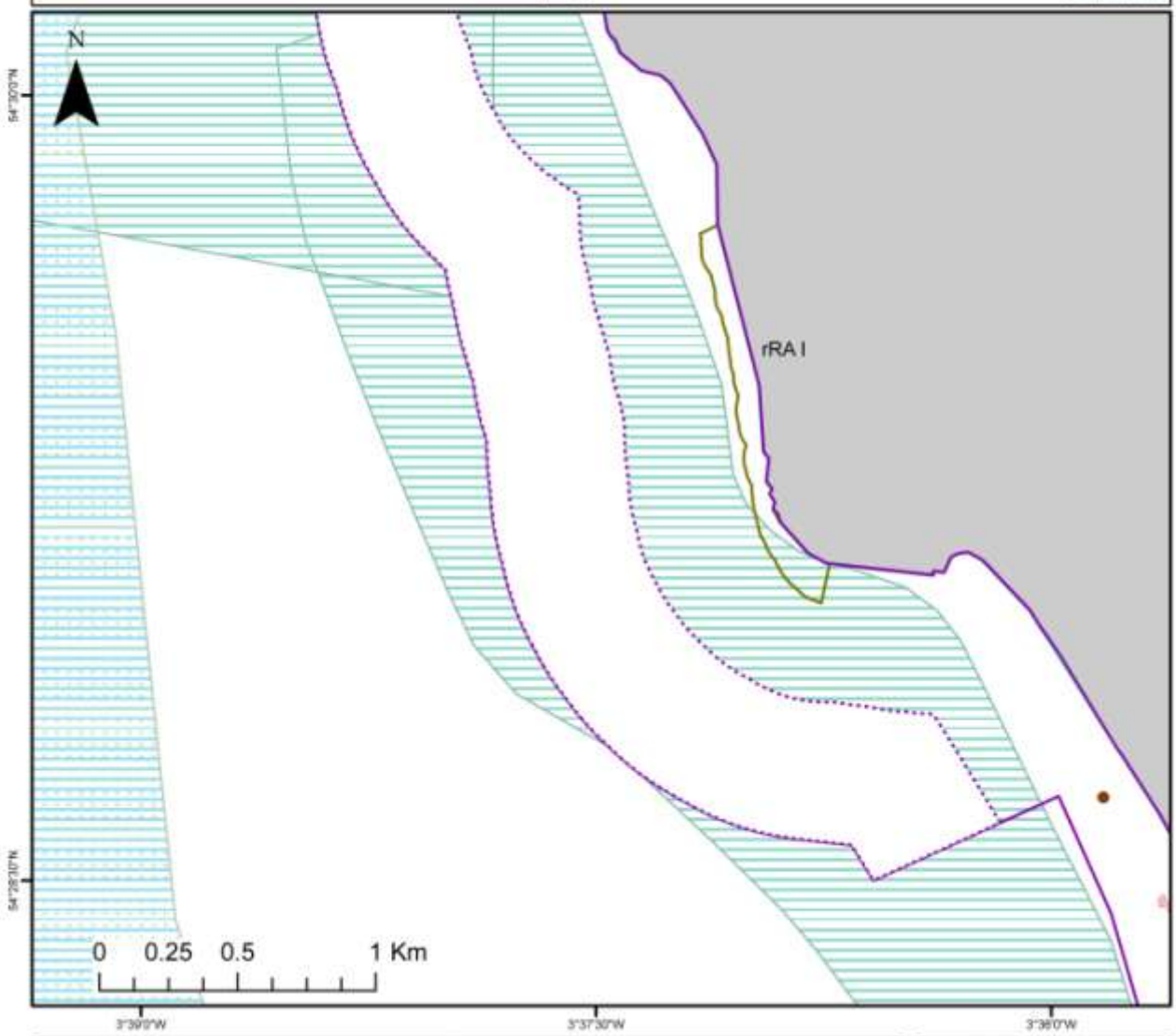
Broad-scale Habitats

- A2.1, Intertidal coarse sediments
- A2.7, Intertidal biogenic reefs
- A3.1, High energy infralittoral rock
- A5.2, Subtidal sand
- A5.3, Subtidal mud

Location of map in relation to UK

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

rRA I – Cumbria Coast (1) – FOCI



This rRA is designated for the following FOCI:

- **Intertidal underboulder communities**
- **Honeycomb worm *Sabellaria alveolata* reefs**

Area: 0.12 km²

Minimum dimension: 0.072 km

Key

- Multipart MCZ
- rMCZ
- rRA
- Project Boundary

FOCI

- Mud habitats in deep water
- Honeycomb worm reef
- Sea pens and burrowing megafauna communties
- Subtidal sands and gravels

Location of map in relation to UK

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

rRA I – Cumbria Coast (1)– Location

Key

Project Boundary

rRA

0 0.15 0.3 0.6 Km

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

8. Site summary rRA I

rRA I is recommended for designation for high energy infralittoral rock, and is one of the only examples of such a habitat within the ISCZ project area. It is comprised of typically diverse intertidal boulder communities with a distinct zoning pattern of species common to rocky shores.

9. Detailed site description

rRA I lies within the multipart rMCZ 11 (Cumbria coast) from Fleswick Bay to South Head, St. Bees Head. The recommended site contains some of the best and only examples of high energy infralittoral and shallow infralittoral rock habitats within the ISCZ project area.

Vertical sandstone cliffs back the shore within the site. To the north of the site the foreshore consists of extensive fine shingle and pebbles, above heavily abraded and wave cut sculptured rock platforms, giving way to boulders on the lower shore. At the northern boundary of the site, the shore narrows into a more steeply sloping shore comprised of large boulders (Lumb pers. comm. 2011).

The upper surface of the large boulders and bedrock, in the splash zone of the littoral fringe at the base of the cliffs, are dominated by lichen species such as *Xanatharia spp*. and *Caloplaca spp*. Fresh water runoff influences the presence of large quantities of green algae *Enteromorpha*. Rough periwinkles *Littorina saxatilis* are also present along with sparse brown algae (JNCC Marine recorder data, 2011).

The upper shore has a community of spiral wrack *Fucus spiralis*, knotted wrack *Ascophyllum nodosum,* common barnacles *Chthamalus spp.,* common limpet *Patella vulgata,* and rough periwinkles *Littorina saxatilis* (JNCC Marine recorder data, 2011).

The mid shore is dominated by barnacles *Chthamalus spp.* at the upper limit of the zone then exclusively *Balanus balanoides*. Common limpets *Patella vulgata* and dog whelks *Nucella lapillus* are common. Seaweeds, bladder wrack *Fucus vesiculosus* and red seaweed *Corallina officinalis* are abundant in rock pools. Tops of boulders exhibit dense aggregations of common mussel *Mytilus edulis* (JNCC Marine recorder data, 2011).

The lower shore presents a mixture of boulders, cobbles and pebbles. Underboulder fauna are noted and small oarweed *Laminaria digitata*, coralline and red crusting algae are also noted. Sand scoured boulders are seen with barnacles *Balanus crenatus* and crustose communites. Common starfish *Asterias rubens* and hermit crab (*Pagarus bernhardus*) are present on the sand bed (JNCC Marine recorder data, 2011).

10. Stakeholder and boundary considerations

In order to meet the ENG target, most stakeholders on the RSG accepted the inclusion of rRA I in the final suite of Reference Areas. For a fuller context on the RSG discussions associated with the selection of Reference Areas, readers of this report are encouraged to consult meeting reports from the ISCZ RSG workshops held in May, June and July 2011 (ISCZ, 2011b,c,d).

11. Conservation objectives

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Mud** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Subtidal Mud** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Sand** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Subtidal Sand** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Intertidal Under Boulder Communities** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Intertidal Under Boulder Communities** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition o

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Sands and Gravels** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Subtidal Sands and Gravels** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **High Energy Infralittoral Rock** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **High Energy Infralittoral Rock** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

12. Sites to which this site is related

rRA I lies within rMCZ 11. rMCZ 11 lies approximately 24 km to the east of rMCZ 1. Within zone 11 lies the already designated St. Bee's Head Natura site. The boundaries of rMCZ11 also overlap with another designated Natura site in Drigg coast. RMCZ 2 lies 40km to the south and encompasses the Duddon estuary Natura site.

13. Supporting documentation

Information	Type of information	Source
Location of high energy intertidal rock / intertidal underboulder communities	Shore transect surveys	MESH
Intertidal sand and muddy sand	Shore transect surveys	MESH
High energy infralittoral rock	Shore transect surveys	MESH
Intertidal zone	Shore transect surveys	JNCC marine recorder data, 2011

References

ISCZ. 2011b. *Meeting report from the 6th Irish Sea Conservation Zones Stakeholder Group meeting.* RK Partnership Ltd.

ISCZ. 2011c. *Meeting report from the 7th Irish Sea Conservation Zones Stakeholder Group meeting*. RK Partnership Ltd.

ISCZ. 2011d. *Meeting report from the 8th Irish Sea Conservation Zones Stakeholder Group meeting.* RK Partnership Ltd.

JNCC *Marine recorder data* 2011

MARINE CONSERVATION ZONE: SELECTION ASSESSMENT DOCUMENT
RRA J CUMBRIAN COAST (2)

Version and issue date	Amendments made
v1.0 August 2011	

1. Site name

rRA J - Cumbrian Coast (2)

2. Site centre location

54° 31' 35.541" N, 3° 37' 12.005" W
54.526539 Lat, -3.620001 Long. Lambert Azimuthal Equal Area projection, ETRS89 datum

3. Site surface area

1.06 Km^2 (105.52 Ha)

4. Biogeographic region

JNCC regional sea: Irish Sea.
OSPAR region III: Celtic Seas.

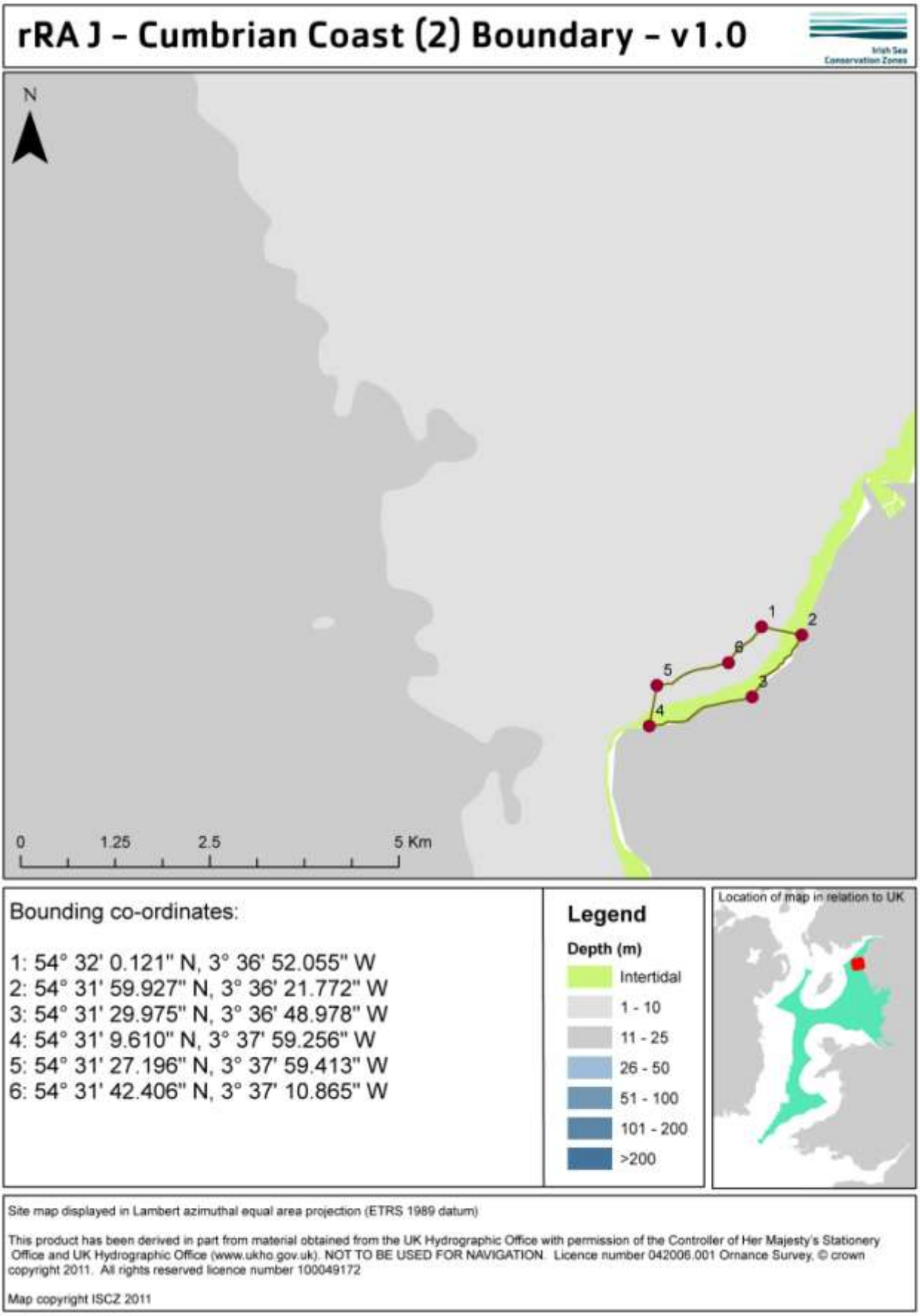
5. Features proposed for designation within rRA J

Feature type	**Feature name**	**Area covered within site (for broad scale habitats and habitats of conservation importance)**
Broad scale habitat	A1.1 High energy intertidal rock A2.4 Intertidal mixed sediments A5.2 Subtidal sand	0.03 Km^2 (2.89 Ha) 0.03 Km^2 (3.35 Ha) 0.94 Km^2 (94.15 Ha)
Habitat of conservation importance	Intertidal underboulder communities Subtidal sands and gravels	0.17 Km^2 (17.42 Ha) N/A
Species of conservation importance		
Geological feature		
Other feature		

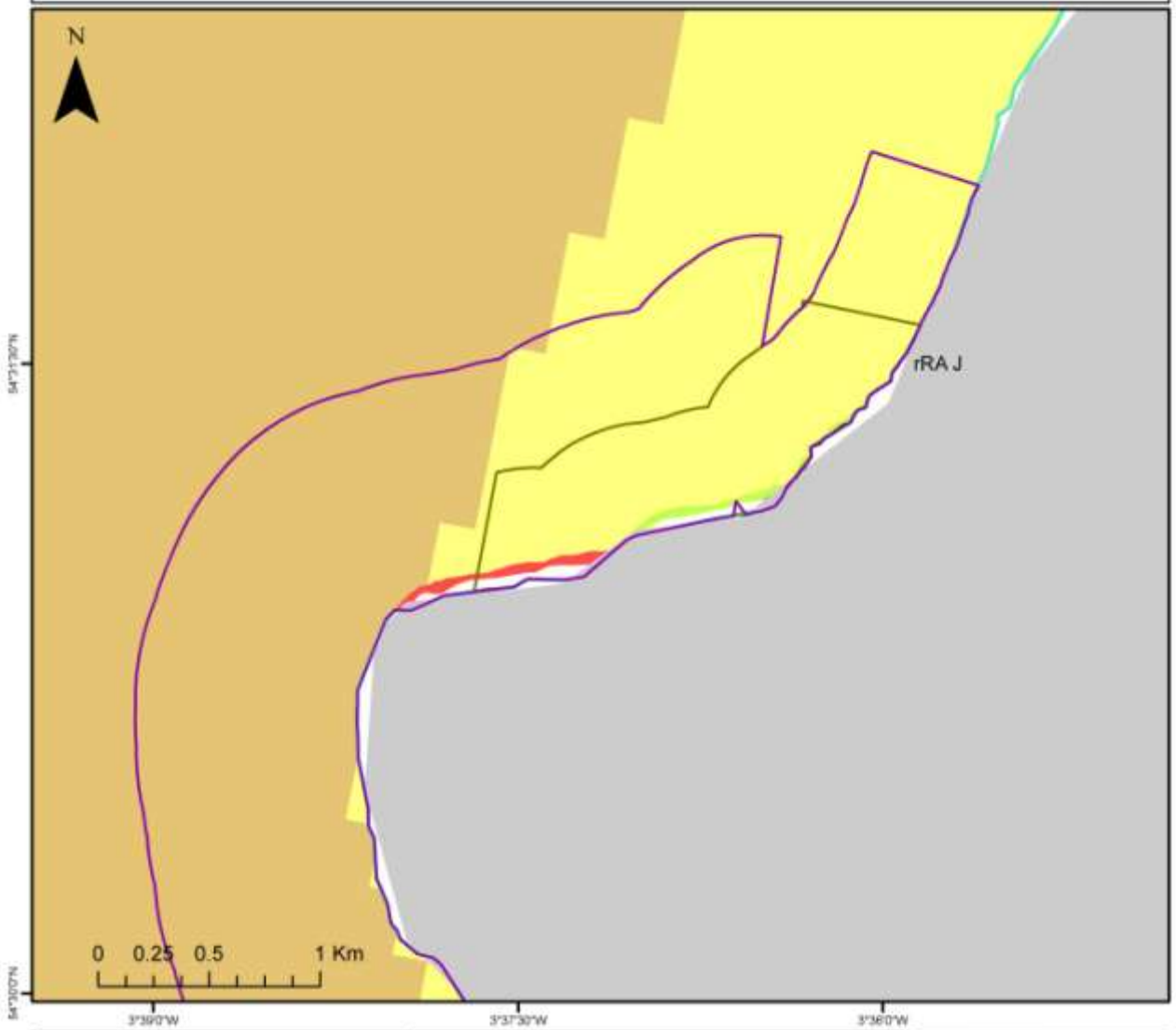
6. Features within rRA J not proposed for designation

Feature type	Feature name	Reason that feature has not been proposed for designation
Broad scale habitat		
Habitat of conservation importance		
Species of conservation importance		

7. Map of site


rRA J – Cumbrian Coast (2) Boundary – v1.0
Irish Sea Conservation Zones
N
1
2
3
4
5
6
0
1.25
2.5
5 Km
Bounding co-ordinates:
1: 54° 32' 0.121" N, 3° 36' 52.055" W
2: 54° 31' 59.927" N, 3° 36' 21.772" W
3: 54° 31' 29.975" N, 3° 36' 48.978" W
4: 54° 31' 9.610" N, 3° 37' 59.256" W
5: 54° 31' 27.196" N, 3° 37' 59.413" W
6: 54° 31' 42.406" N, 3° 37' 10.865" W
Legend
Depth (m)
Intertidal
1 - 10
11 - 25
26 - 50
51 - 100
101 - 200
>200
Location of map in relation to UK
Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)
This product has been derived in part from material obtained from the UK Hydrographic Office with permission of the Controller of Her Majesty's Stationery Office and UK Hydrographic Office (www.ukho.gov.uk). NOT TO BE USED FOR NAVIGATION. Licence number 042006.001 Ornance Survey, © crown copyright 2011. All rights reserved licence number 100049172
Map copyright ISCZ 2011

rRA J – Cumbrian Coast (2) – Broad-scale Habitats



This area is designated for the following BSHT:

- A1.1, High energy intertidal rock
- A2.4, Intertidal mixed sediments
- A5.2, Subtidal sand

Area: 1.06 km ^{2}

Minimum dimension: 0.53 km

Key

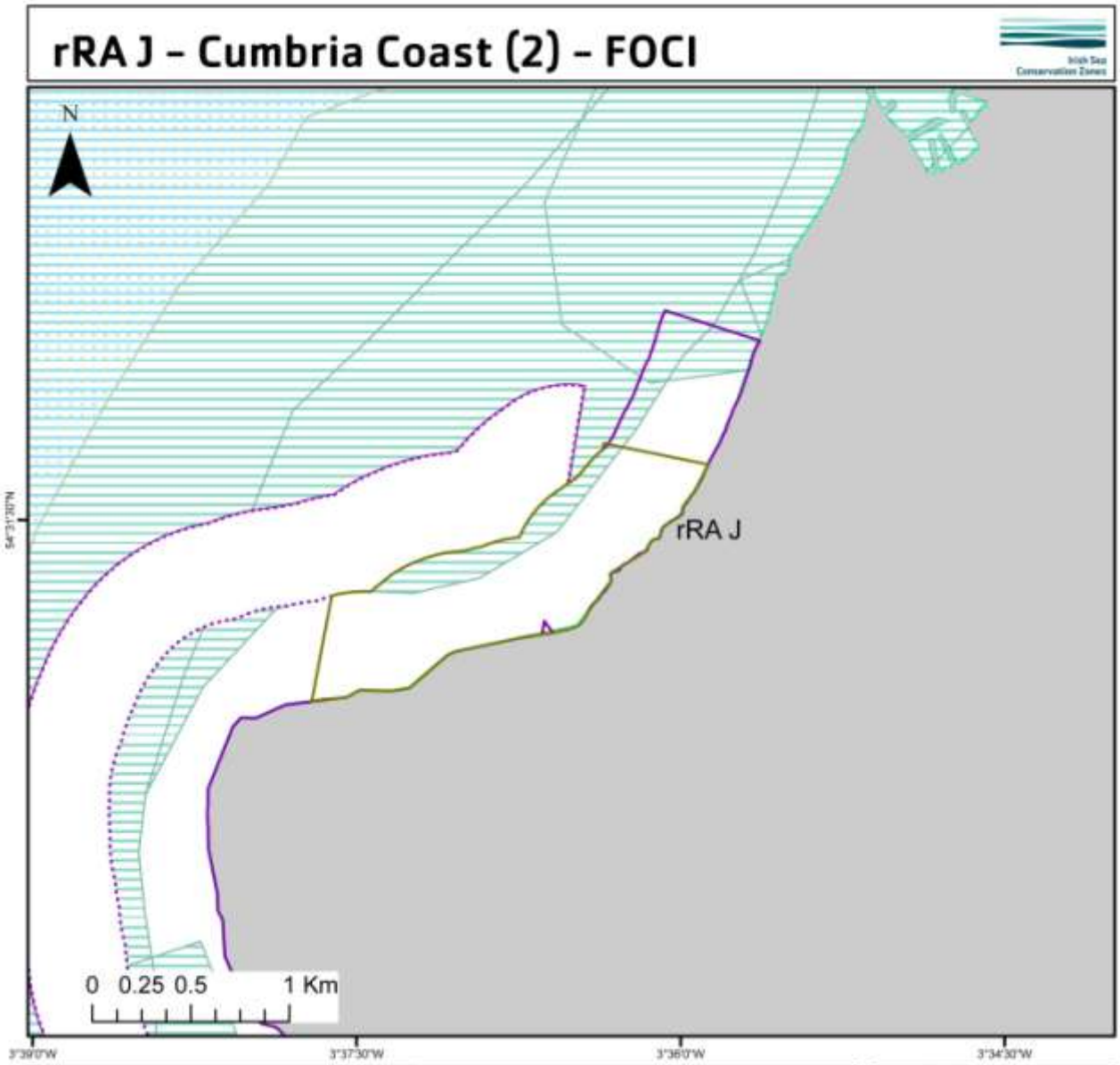
rMCZ
Project Boundary
rRA

Broad-scale Habitats

- A1.1, High energy intertidal rock
- A2.4, Intertidal mixed sediments
- A5.2, Subtidal sand
- A5.3, Subtidal mud

Location of map in relation to UK

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)



This rRA is designated for the following FOCI:

- **Intertidal underboulder communities**
- **Subtidal sands and gravels**

Area: 1.06 km²

Minimum dimension: 0.525 km

Key

- Multipart MCZ
- rMCZ
- rRA
- Project Boundary

FOCI

- Mud habitats in deep water
- Sea pens and burrowing megafauna communties
- Subtidal sands and gravels

Location of map in relation to UK

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

rRA J – Saltom Bay – Location

Key

Project Boundary

rRA

0 0.15 0.3 0.6 Km

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

8. Site summary

rRA J lies within the boundary of the multipart rMCZ11 (Cumbria Coast rMCZ). It is situated in Saltom Bay on the Cumbrian coast and lies north of St Bee's Head. rRA J captures Byerstead fault, a recovering intertidal zone that is showing a return of species diversity following the closure of the Marchon chemical plant and its associated outfall. With time, this area could re-colonise and exhibit similar species richness as the nationally important rocky and boulder shores of St. Bee's Head and Cunning Point rRA T.

9. Detailed site description

The Cumbrian coast, including rRA J, is relatively unusual in that detailed information on the ecology of the inshore areas is available for a series of rocky shore sites that have been surveyed annually since 1993 by the Cumbria Sea Fisheries Committee (Lancaster 2010). These survey data, in combination with the JNCC Marine Nature Conservation Review which surveyed intertidal sites from Liverpool Bay up to the Solway Firth, (Covey et al. 1998), make this a well understood area with a sound evidence base to propose designation of key intertidal features.

rRA J has been recommended for designation for both intertidal and subtidal features. It incorporates areas of high energy intertidal rock and intertidal boulder communities with mixed sediments. The intertidal extent of rRA J has been surveyed annually as part of the Cumbria Sea Fisheries Committee survey (Lancaster, 2010) and captures the area of Byerstead Fault. This area is of particular research interest as it was originally surveyed to monitor the impact of pollutants from the now decomissioned (and demolished) Marchon chemical factory. A marked improvement has been noted in terms of species diversity and their associated re-colonisation of an otherwise algal dominated shore. The continuing improvement has been suggested to be strongly linked to the reduction of pollutants (Lancaster pers. comm., 2011).

Boulders within the shallow sublittoral zone exhibit crusts of honeycomb worm (*Sabellaria alveolata)* tubes, barnacles (*Balanus Cretanus*), red furry encrusting algae (*Rhodothamniella floridula*), red pool algae (*Cerarium nodosum*) and green enteromorpha seaweed (*Ulva linza*). Within this community it is important to note that in 2010, mussel sprat (*Mytilus edulis*), which refers to newly settled bivalve larvae which has begun to develop a shell, was encountered for the first time in seventeen years of surveying, and is wholly indicative of vastly improved water quality. In the low water mark there was also a varied under-boulder community including tube worms, crabs, anemones, sea squirts (another new addition in 2010) and bryozoans (Lancaster, 2010).

The mid shore zone introduces more new species including toothed wrack (*Fucus serratus*) bladder wrack (*Fucus vesiculosus*), limpets (Patella vulgata), barnacles (*Semibalanus balanoides*) periwinkles (*Littorina* spp.) and dog whelks (*Nucella lapillus*). This area was previously dominated by seaweeds, which is unusual for the rocky Cumbrian coast and may be linked to the relatively poor water quality at the site. However, recent surveys indicate a re-establishment of a population of grazers, which may bring about a mid to low shore barnacle-limpet zone as seen on other true rocky shores such Cunning Point and St. Bee's Head. The upper shore is dominated by spiral wrack (*Fucus spiralis*), green enteromorpha algae (*Ulva linza)* and green algae (*Blindingia minima*)(Lancaster, 2011).

As a reference area it will be interesting to monitor the continued recovery of the site, alongside Lancaster's continuing survey work.

10. Stakeholder and boundary considerations

In order to meet the ENG target, most stakeholders on the RSG accepted the inclusion of rRA J in the final suite of Reference Areas. For a fuller context on the RSG discussions associated with the selection of Reference Areas, readers of this report are encouraged to consult meeting reports from the ISCZ RSG workshops held in May, June and July 2011 (ISCZ, 2011b,c,d).

11. Conservation objectives

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Intertidal Mixed Sediments** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Intertidal Mixed Sediments** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Sand** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Subtidal Sand** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Intertidal Under Boulder Communities** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Intertidal Under Boulder Communities** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Sands and Gravels** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Subtidal Sands and Gravels** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **High Energy Intertidal Rock** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **High Energy Infralittoral Rock** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

12. Sites to which this site is related

rRA J lies within rMCZ 11. rMCZ 11 lies approximately 24 km to the east of rMCZ 1. Within zone 11 lies the already designated St. Bee's Head Natura site. The boundaries of rMCZ11 also overlap with another designated Natura site in Drigg coast. RMCZ 2 lies 40km to the south and encompasses the Duddon estuary Natura site.

13. Supporting documentation

Information	Type of information	Source
Location of high energy intertidal rock / intertidal underboulder communities	Shore transect surveys	MESH, Covey et al. 1998, Lancaster 2010
Intertidal sand and muddy sand	Shore transect surveys	MESH, Covey et al. 1998, Lancaster 2010
Intertidal biogenic reefs (blue mussel beds and honeycomb worm *Sabellaria alveolata* reefs)	Shore transect surveys	MESH, Covey et al. 1998, Lancaster 2010
High energy infralittoral rock	Shore transect surveys	MESH, Covey et al. 1998, Lancaster 2010

References

COVEY, R., FORTUNE, F., NICHOLS, D.M. & THORPE, K.1998. *Marine Nature Conservation Review. Sector 11. Liverpool Bay and the Solway Firth: area summaries*. Peterborough, Joint Nature Conservation Committee. (Coasts and seas of the United Kingdom. MNCR series

ISCZ. 2011b. *Meeting report from the 6th Irish Sea Conservation Zones Stakeholder Group meeting.* RK Partnership Ltd.

ISCZ. 2011c. *Meeting report from the 7th Irish Sea Conservation Zones Stakeholder Group meeting*. RK Partnership Ltd.

ISCZ. 2011d. *Meeting report from the 8th Irish Sea Conservation Zones Stakeholder Group meeting.* RK Partnership Ltd.

LANCASTER, J. 2010. *Cumbrian Sea Fisheries Committee shore survey*. Solenvo Marine Environmental Consultants.

MARINE CONSERVATION ZONE: SELECTION ASSESSMENT DOCUMENT
RRA K TARN POINT

Version and issue date	Amendments made
v1.0 August 2011	

1. Site name

rRA K - Tarn Point

2. Site centre location

54° 17' 35.313" N , 3° 25' 27.348" W
54.293143 Lat, -3.424263 Long. Lambert Azimuthal Equal Area projection, ETRS89 datum

3. Site surface area

1.07 Km^2 (107.34 Ha)

4. Biogeographic region

JNCC regional sea: Irish Sea.
OSPAR region III: Celtic Seas.

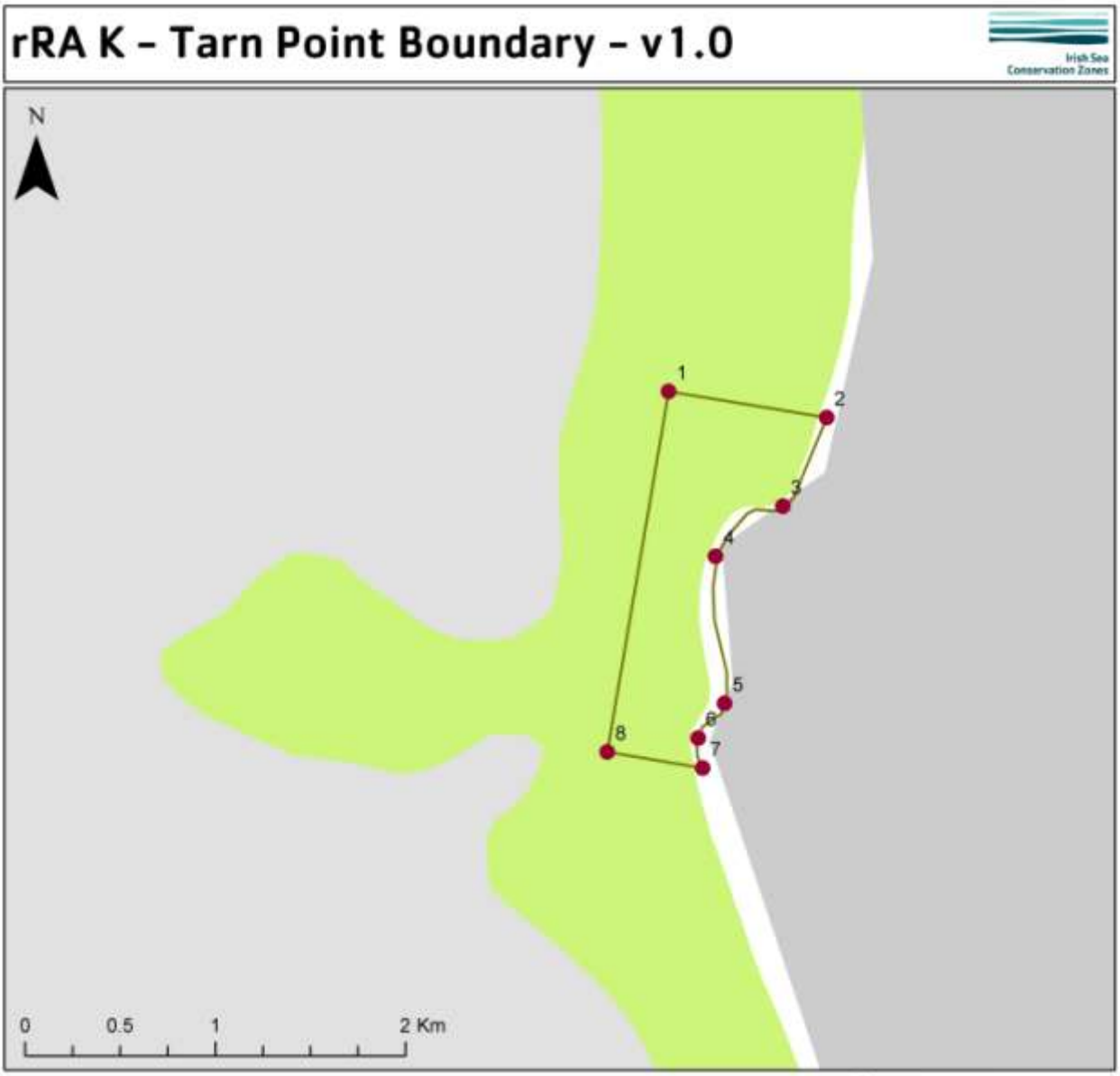
5. Features proposed for designation within rRA K

Feature type	**Feature name**	**Area covered within site (for broad scale habitats and habitats of conservation importance)**
Broad scale habitat	A2.7 Intertidal biogenic reefs A3.1 High energy infralittoral rocks	0.23 Km^2 (23.35 Ha) 0.002 Km^2 (0.21 Ha)
Habitat of conservation importance	Blue mussel *(Mytilus edulis)* beds Honeycomb worm (*Sabellaria alveolata)* reefs	- 0.34 Km^2 (33.77 Ha)
Species of conservation importance		
Geological feature		
Other feature		

6. Features within rRA K not proposed for designation

Feature type	Feature name	Reason that feature has not been proposed for designation
Broad scale habitat	Intertidal sand and Muddy sand Subtidal sand	Covered by gap analysis
Habitat of conservation importance	Subtidal sands and gravels	Based on the project team's rule of thumb for designating features
Species of conservation importance		

7. Map of site



Bounding co-ordinates:

1: 54° 18' 3.072" N, 3° 25' 44.835" W
2: 54° 18' 3.673" N, 3° 24' 58.130" W
3: 54° 17' 47.538" N, 3° 25' 5.849" W
4: 54° 17' 37.080" N, 3° 25' 22.407" W
5: 54° 17' 12.860" N, 3° 25' 11.744" W
6: 54° 17' 6.239" N, 3° 25' 17.446" W
7: 54° 17' 1.401" N, 3° 25' 14.522" W
8: 54° 17' 1.066" N, 3° 25' 42.688" W

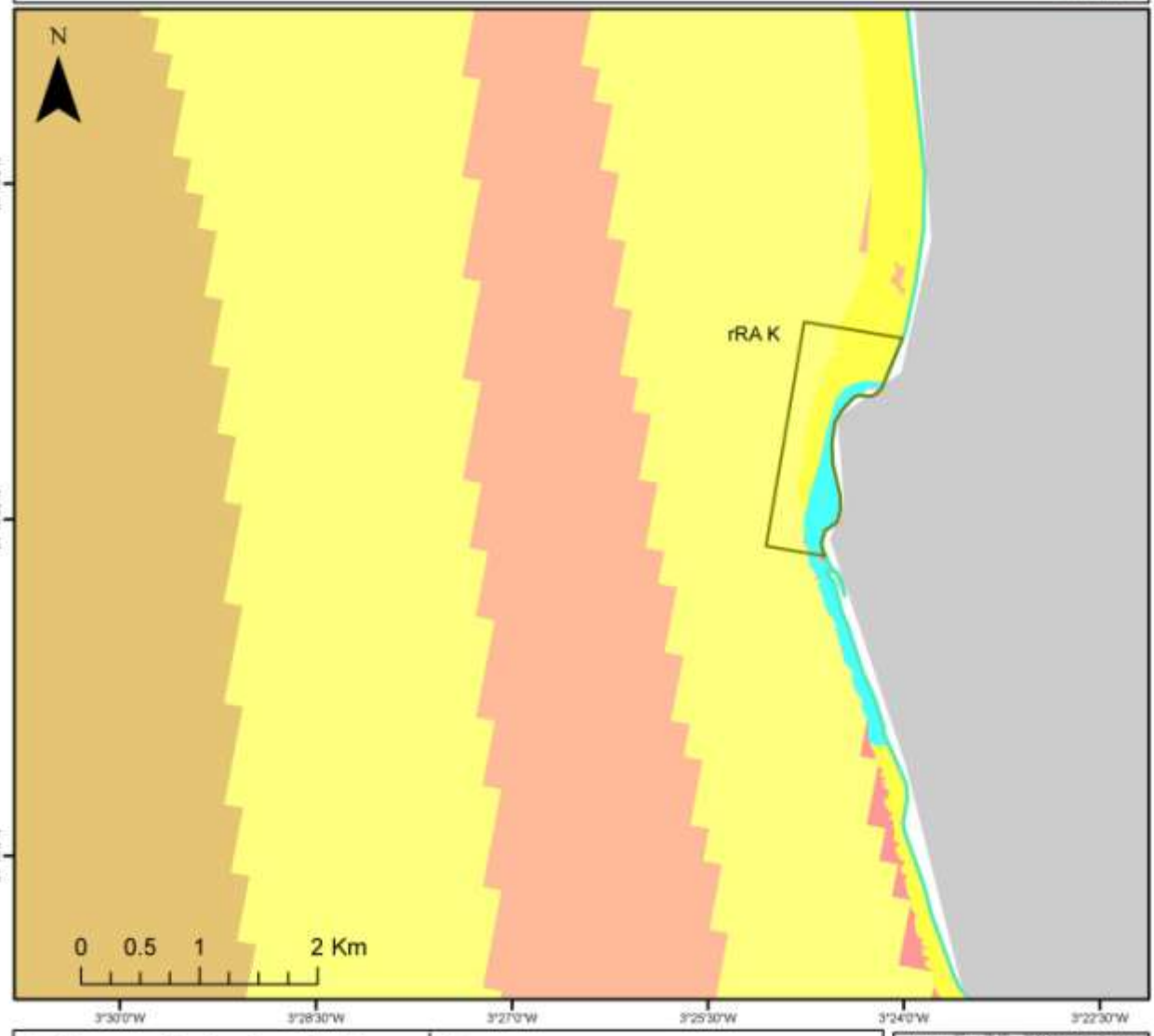
Legend

Depth (m)

- Intertidal
- 1 - 10
- 11 - 25
- 26 - 50
- 51 - 100
- 101 - 200
- >200

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

rRA K – Tarn Point – Broad-scale Habitats



This area is designated for the following BSHT:

- A2.2, Intertidal sand and muddy sand
- A2.7, Intertidal biogenic reefs
- A3.1, High energy infralittoral rock
- A5.2, Subtidal sand

Area: 1.07 km^2

Minimum dimension: 0.51 km

Key

rRA Project Boundary

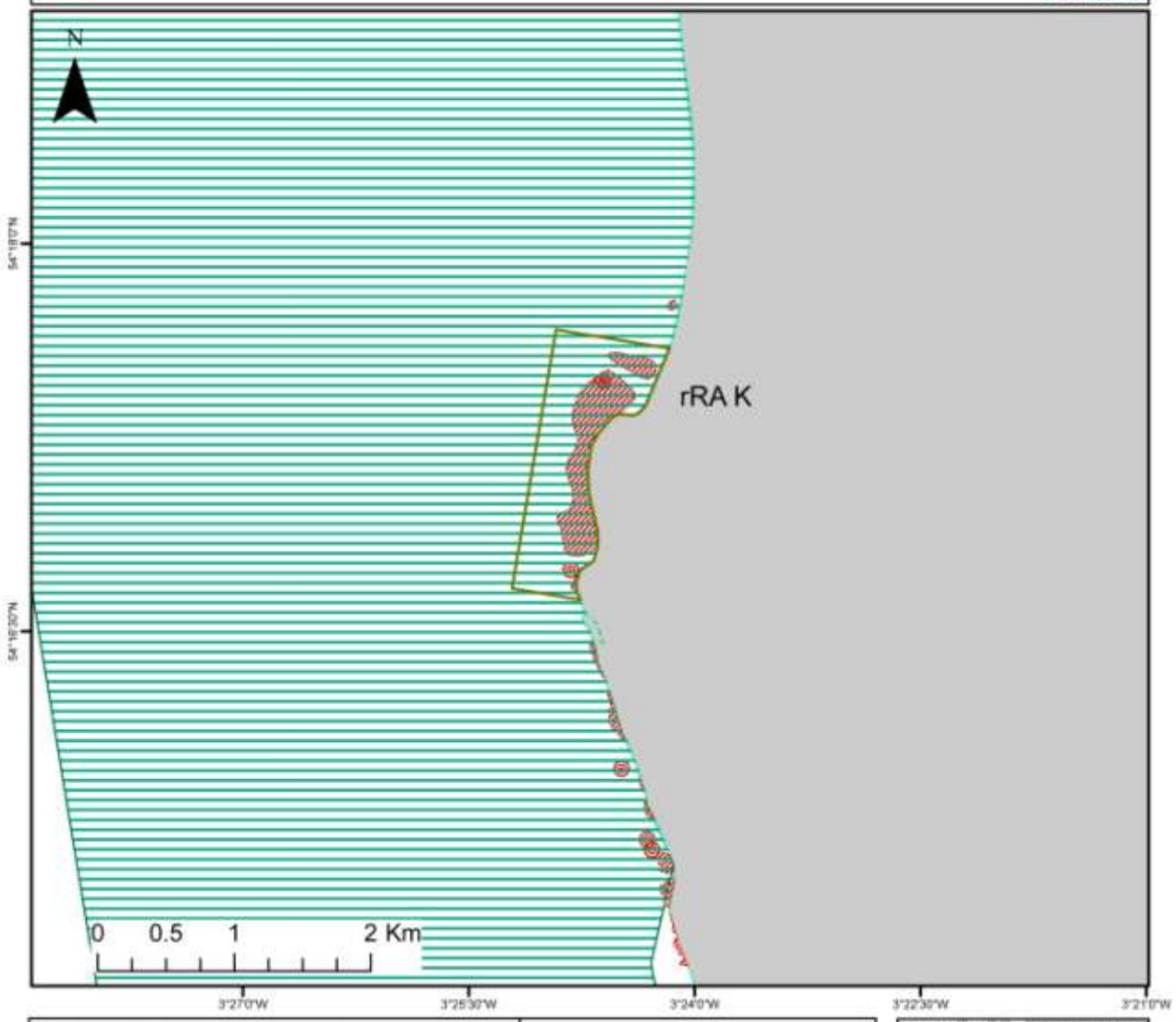
Broad-scale Habitats

- A2.2, Intertidal sand and muddy sand
- A2.7, Intertidal biogenic reefs
- A3.1, High energy infralittoral rock
- A5.1, Subtidal coarse sediment
- A5.2, Subtidal sand
- A5.3, Subtidal mud

Location of map in relation to UK

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

rRA K – Tarn Point – FOCI



This rRA is designated for the following FOCI:

Area: 1.07 km²

Minimum dimension: 0.51 km

- **Blue mussel *Mytilus edulis* beds**
- **Honeycomb worm *Sabellaria alveolata* reefs**

Key

- rRA
- Project Boundary

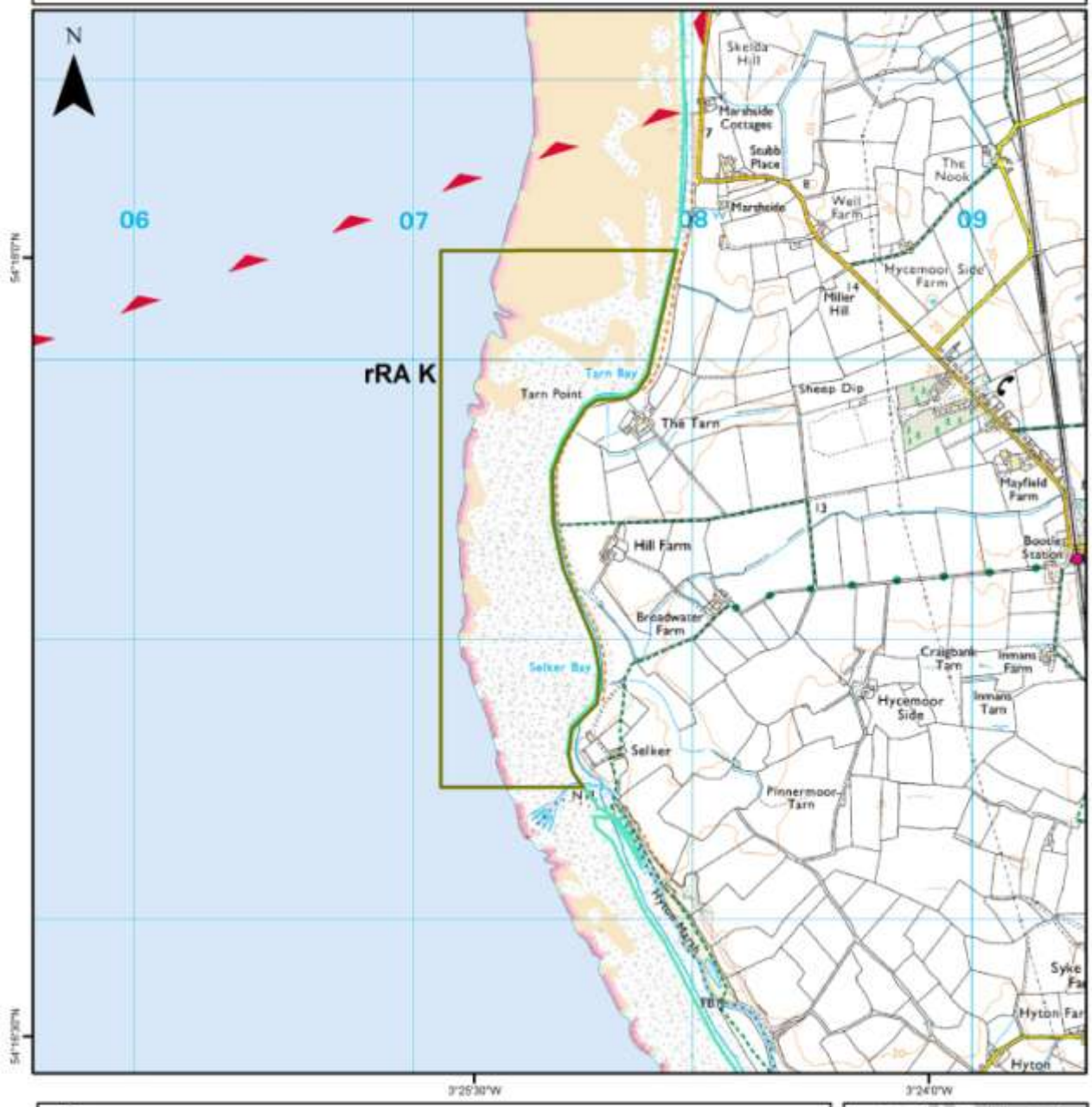
FOCI

- Sabellaria alveolata reefs
- Subtidal sand gravels
- Peat and clay exposures
- Honeycomb worm

Location of map in relation to UK

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

rRA K – Tarn Point – Location



Key

Project Boundary

rRA

0 0.2 0.4 0.8 Km

Location of map in relation to UK

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

8. Site summary

RA K is a small intertidal site situated in Tarn Point on the Cumbrian coast. Tarn Point has been subject to annual ecological surveys by the Cumbrian Sea Fisheries Committee since 1993. The benthic habitat is composed of two broadscale habitat feature types (BSHT), intertidal biogenic reefs and high energy infralittoral rocks. The biogenic reefs feature two distinct habitats of conservation importance (FOCI): Blue Mussel beds (*Mytilus edulis)* and Honeycomb worm reefs (*Sabellaria alveolata).* A third FOCI is also present within the boundaries of RA: K: subtidal sands and gravels however this habitat has not been designated based on the projects rule of thumb.

9. Detailed site description

It is important to distinguish between blue mussels commonly found around all UK coasts and blue mussel (*Mytilus edulis)* beds. As a habitat FOCI, blue mussel beds only refers to natural beds found over a variety of sediments, this excludes artificially created mussel beds and mussel beds that occur over rocks and boulders (Ecological Network Guidance, 2010). Beds of blue mussels are found on the mid to lower shore on a mixture of substrates, but primarily cobbles and pebbles on muddy sediments, sand and mud. At high densities (over 30%) mussels bind to the soft substrate providing a natural habitat for other flora and fauna (OSPAR Commission 2008). In RA: K it is important to note that the ephemeral blue mussel beds have been designated as a habitat FOCI based on historical ecological survey data of Tarn Point carried out by the Cumbrian Sea Fisheries Committee where they are shown to be abundant.

The second habitat FOCI, honeycomb worm (*Sabellaria alveolata)* reefs are formed from dense aggregations of individual honeycomb worms. These reefs typically form over mixed substrates (e.g. sand, gravel, pebble and cobble) and rocky habitats. The honeycomb worm reefs of Tarn point, as identified by Lancaster 2010, have been found to reach up to 60 cm in height.

Figure 1: *Sabillaria alveolata*, individual tubes. (Photo courtesy of Lancaster)

Figure 2: *Sabillaria alveolata* mound -covered in green algae (Photo courtesy of Lancaster)

Both blue mussel beds and honeycomb worm reefs constitute biogenic reefs which are defined as being 'solid massive structures which are created by accumulations of organisms, usually arising from the seabed clearly forming a substantial, discrete community or habitat which is very different from the surrounding seabed' (Holt et al. 1998). Blue mussel beds and honeycomb worms provide a stable, hard substrate in areas of otherwise soft sediments or unstable rocky ground and this underlies their ecological importance; they stabilize the sediment forming hard structures to which other sessile (or immobile) organisms can attach; provide a heterogenous or varied surface structure, for example, crevices which give shelter to other animals; and the accumulated faeces and associated sediments is an important food source for other species (Holt et al. 1998). As a result, both blue mussel beds and honeycomb worm reefs support a varied biological community.

The Cumbrian coast is relatively unusual compared to the rest of Irish Sea Conservation Zone project area, as detailed information on the ecology of the inshore areas is available for a series of rocky shore sites that have been surveyed annually since 1993 by the Cumbria Sea Fisheries Committee (Lancaster 2010). The Solway Firth represents the northerly limit of honeycomb worm reefs, and the Cumbrian coast is noted for having the UKs most extensive and best representative examples of this habitat type (Lancaster J. pers. comm. 2010).

The presence of the BSHT of high energy infralittoral rock, as identified in the MESH survey, despite being a subtidal habitat is being designated but acknowledged as a small area due to the size of the feature and is not well represented across the MCZ's.

Subtidal sands and gravels are also present within the boundaries of rRA: K. However, due to the sites size and intertidal designation status, purely subtidal features are not being included. But it is worthy to note that this habitat type is host to a range of marine invertebrates, including anemones, polychaete worms, bivalves, amphipods (Maddock 2010).

10. Stakeholder and boundary considerations

In order to meet the ENG target, most stakeholders on the RSG accepted the inclusion of rRA K in the final suite of Reference Areas. For a fuller context on the RSG discussions associated with the selection of Reference Areas, readers of this report are encouraged to consult meeting reports from the ISCZ RSG workshops held in May, June and July 2011 (ISCZ, 2011b,c,d).

11. Conservation objectives

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **High Energy Infralittoral Rock** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **High Energy Infralittoral Rock** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Intertidal Biogenic Reefs** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Intertidal Biogenic Reefs** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Coarse Sediment** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Subtidal Coarse Sediment** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Sands** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Subtidal Sands** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Intertidal Sand and Muddy Sand** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Intertidal Sand and Muddy Sand** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the ***Sabellaria alveolata* (Honeycomb Worm) Reefs** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the ***Sabellaria alveolata* (Honeycomb Worm) Reefs** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the ***Mytilus edulis* (Blue Mussel) Beds** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the ***Mytilus edulis* (Blue Mussel) Beds** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

12. Sites to which this site is related

RA: K is a small intertidal site situated in Tarn Point on the Cumbrian coast.
RA: K is in the vicinity of the following existing and draft conservation areas that have marine associated features. Vicinity is in this context been defined as a distance less than 80 km, and therefore includes Drigg coast (SAC) and Duddon estuary (SPA / SSSI) within 12km of RA: K and Morecambe Bay (SPA, SSSI) within 40 km of rMCZ12. Within 80 km of this site are: Solway Firth (SAC), Upper Solway flats and marshes (SPA), Luce Bay and Sands (SAC), Ribble and Alt Estuaries (SPA).

13. Supporting documentation

Information	Type of information	Source
Location of blue mussel (*Mytilus edulis)* beds	Annual ecological surveys	Lancaster J. (2010) Cumbrian Sea Fisheries Committee shore survey. Solenvo Marine Environmental Consultants.
Location of honeycomb worm (*Sabellaria alveolata)* reefs	Annual ecological surveys	Lancaster J. (2010) Cumbrian Sea Fisheries Committee shore survey. Solenvo Marine Environmental Consultants.

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Holt T. et al. 1998. Biogenic Reefs (volume IX). An overview of dynamic and sensitivity characteristics for conservation management of marine SACs. Scottish Association for Marine Science (UK Marine SACs Project).

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ISCZ. 2011c. *Meeting report from the 7th Irish Sea Conservation Zones Stakeholder Group meeting*. RK Partnership Ltd.

ISCZ. 2011d. *Meeting report from the 8th Irish Sea Conservation Zones Stakeholder Group meeting.* RK Partnership Ltd.

Lancaster J. 2010. Cumbrian Sea Fisheries Committee shore survey. Solenvo Marine Environmental Consultants.

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MARINE CONSERVATION ZONE: SELECTION ASSESSMENT DOCUMENT
RRA S NORTH ST. GEORGE'S CHANNEL (2)

Version and issue date	Amendments made
v1.0 August 2011	

1. Site name

rRA S - North St. George's Channel (2)

2. Site centre location

53° 38' 3.929" N, 4° 43' 11.410" W
53.634424 Lat, -4.719836 Long. Lambert Azimuthal Equal Area projection, ETRS89 datum

3. Site surface area

38.08 Km^2 (3808.20 Ha)

4. Biogeographic region

JNCC regional sea: Irish Sea.
OSPAR region III: Celtic Seas.

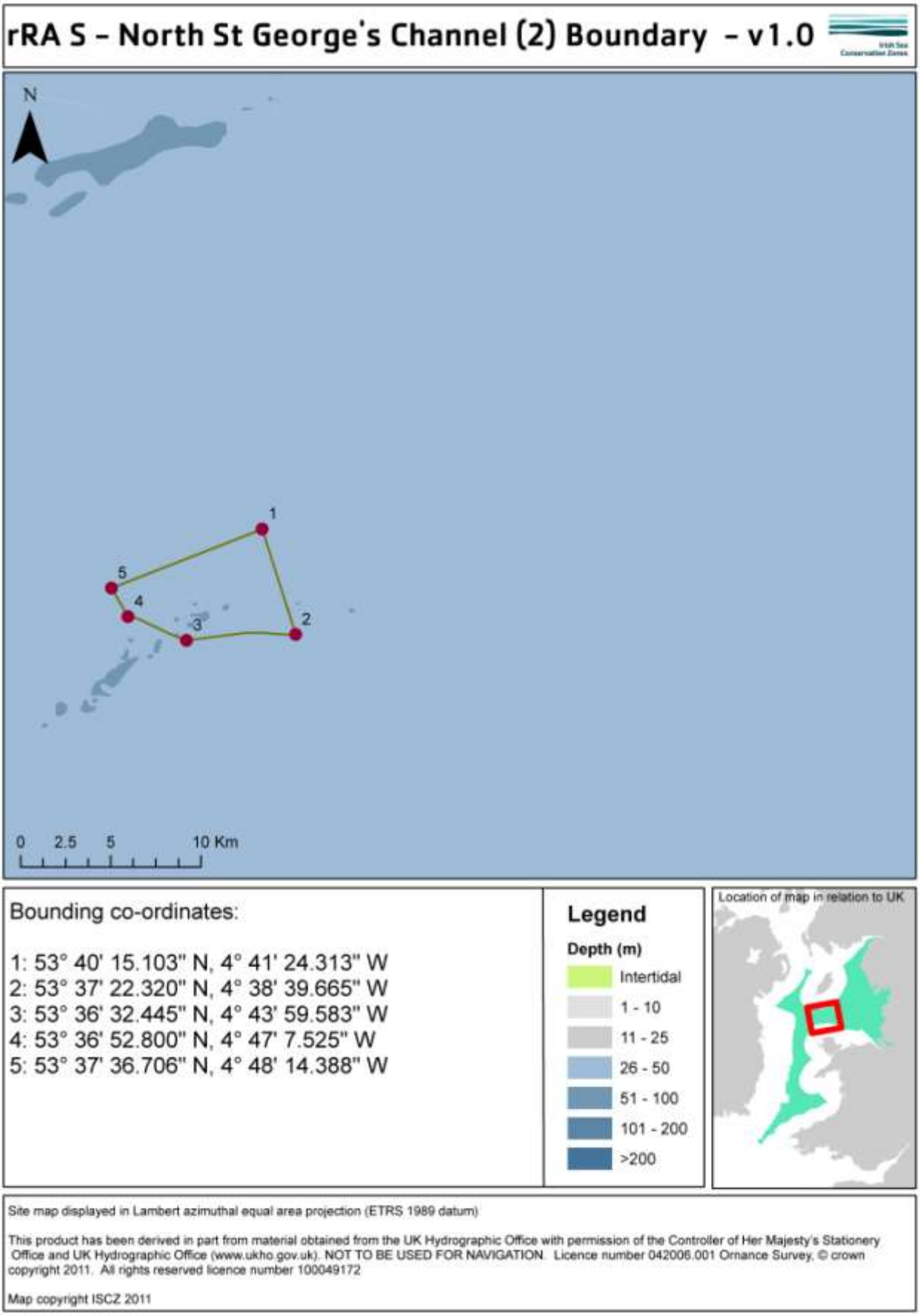
5. Features proposed for designation within rRA S

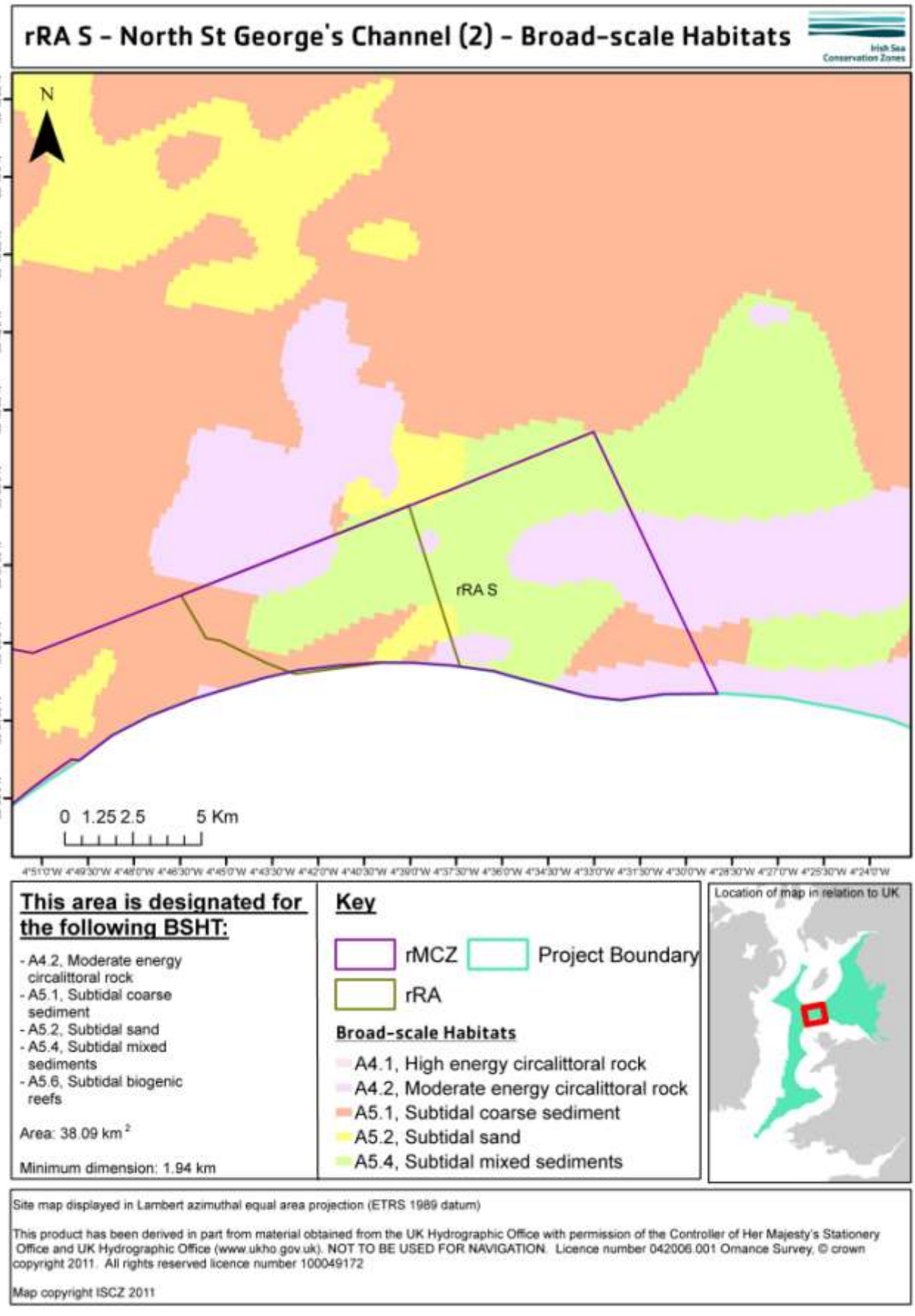
Feature type	**Feature name**	**Area covered within site (for broad scale habitats and habitats of conservation importance)**
Broad scale habitat	A4.2 Moderate energy circalittoral rock	5.60 Km^2 (559.89 Ha)
	A5.1 Subtidal coarse sediment	10.3Km^2 (1030.4Ha)
	A5.2Subtidal sand	3.16 km^2 (315.81Ha)
	A5.4 Subtidal mixed sediment	18.73 Km^2 (1872.69 Ha)
	A5.6 Subtidal biogenic reefs	13.78 Km^2 (1377.8 Ha)
Habitat of conservation importance	Horse mussel (*Modiolus modiolus)* beds	13.78 Km^2 (1377.8 Ha)
Species of conservation importance		
Geological feature		
Other feature	n/a	

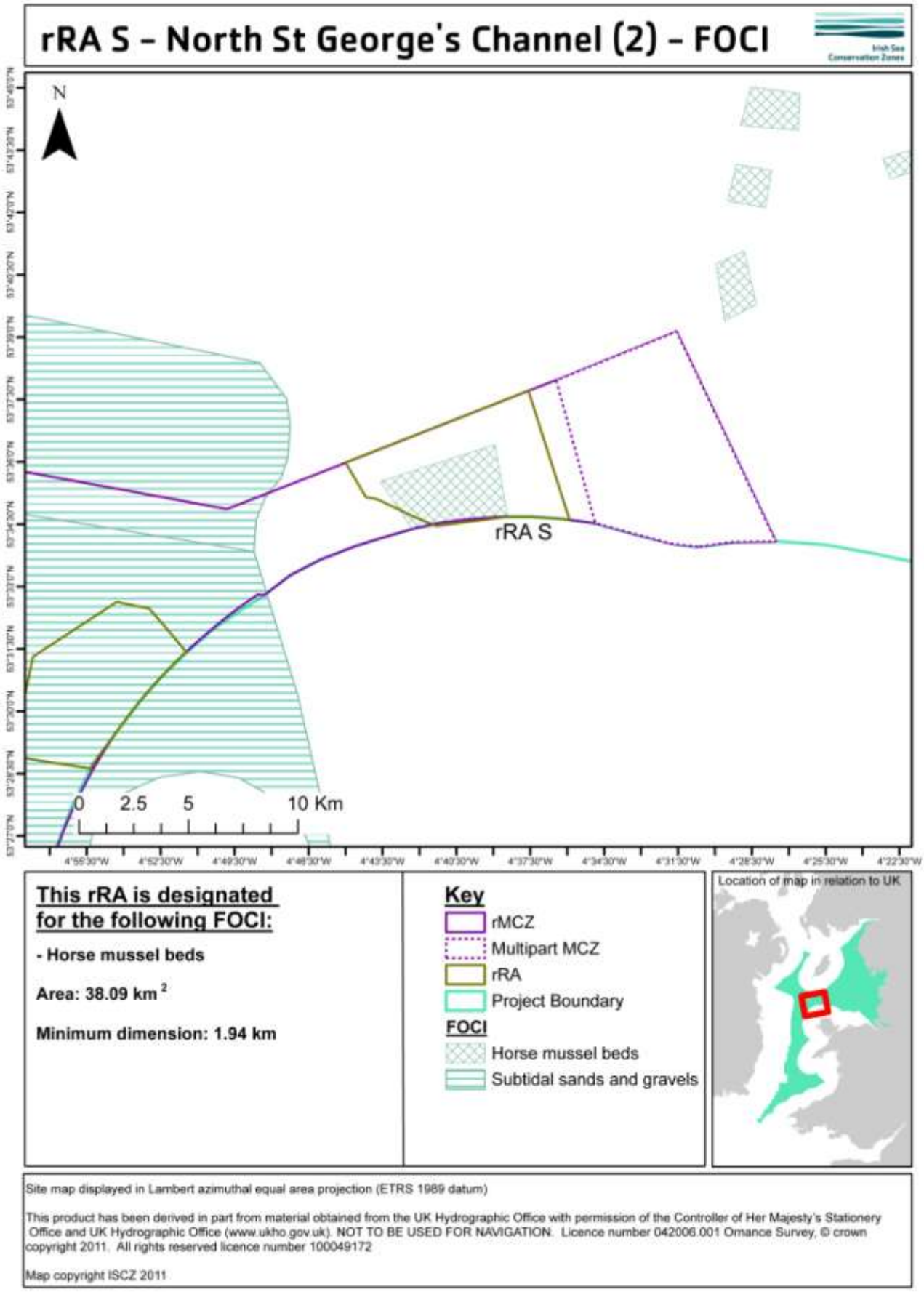
6. Features within rRA S not proposed for designation

Feature type	Feature name	Reason that feature has not been proposed for designation
Broad scale habitat	n/a	
Habitat of conservation importance	n/a	
Species of conservation importance	n/a	

7. Map of site


rRA S – North St George's Channel (2) Boundary – v1.0
N
1
2
3
4
5
0 2.5 5 10 Km
Bounding co-ordinates:
1: 53° 40' 15.103" N, 4° 41' 24.313" W
2: 53° 37' 22.320" N, 4° 38' 39.665" W
3: 53° 36' 32.445" N, 4° 43' 59.583" W
4: 53° 36' 52.800" N, 4° 47' 7.525" W
5: 53° 37' 36.706" N, 4° 48' 14.388" W
Legend
Depth (m)
Intertidal
1 - 10
11 - 25
26 - 50
51 - 100
101 - 200
>200
Location of map in relation to UK
Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)
This product has been derived in part from material obtained from the UK Hydrographic Office with permission of the Controller of Her Majesty's Stationery Office and UK Hydrographic Office (www.ukho.gov.uk). NOT TO BE USED FOR NAVIGATION. Licence number 042006.001 Ornance Survey, © crown copyright 2011. All rights reserved licence number 100049172
Map copyright ISCZ 2011


rRA S – North St George's Channel (2) – Broad-scale Habitats
Irish Sea Conservation Zones
N
rRA S
0 1.25 2.5 5 Km
4°51'0"W 4°49'30"W 4°48'0"W 4°46'30"W 4°45'0"W 4°43'30"W 4°42'0"W 4°40'30"W 4°39'0"W 4°37'30"W 4°36'0"W 4°34'30"W 4°33'0"W 4°31'30"W 4°30'0"W 4°28'30"W 4°27'0"W 4°25'30"W 4°24'0"W
This area is designated for the following BSHT:
- A4.2, Moderate energy circalittoral rock
- A5.1, Subtidal coarse sediment
- A5.2, Subtidal sand
- A5.4, Subtidal mixed sediments
- A5.6, Subtidal biogenic reefs
Area: 38.09 km²
Minimum dimension: 1.94 km
Key
rMCZ
Project Boundary
rRA
Broad-scale Habitats
A4.1, High energy circalittoral rock
A4.2, Moderate energy circalittoral rock
A5.1, Subtidal coarse sediment
A5.2, Subtidal sand
A5.4, Subtidal mixed sediments
Location of map in relation to UK
Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)
This product has been derived in part from material obtained from the UK Hydrographic Office with permission of the Controller of Her Majesty's Stationery Office and UK Hydrographic Office (www.ukho.gov.uk). NOT TO BE USED FOR NAVIGATION. Licence number 042006.001 Omance Survey, © crown copyright 2011. All rights reserved licence number 100049172
Map copyright ISCZ 2011



Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

8. Site summary

rRA S is located within the north eastern point of rMCZ 3, a large zone in the mid-Irish Sea. The depth of the area ranges from 50 to 100 m and it is located approximately 23 km / 12 nm northwest from the coast of Anglesey in north Wales.

Horse mussels *Modiolus modiolus* have been found in dense enough aggregations (≥50% coverage) to constitute beds, an Annex 1 Reef habitat according to the EU Habitats and Species Directive. The horse mussel *Modiolus modiolus* beds in this area support a range of filter feeding animals, for example acorn barnacle *Balanus balanus*, hydroids and soft corals (Rees 2005). One such reef has been captured within rRA S.

The majority of the seabed in this area is composed of a mixture of sediments, categorised as the FOCI habitat subtidal sands and gravels. This is a very common substrate type in the Irish Sea and throughout UK waters. Sands and gravels in the Irish Sea tend to host a range of invertebrates.

9. Detailed site description

The seabed in rRA S has been mapped using a combination of physical and biological data (UK Seamap, the Mapping European Seabed Habitat projects (MESH), and the HABMAP project)). The predominant broad-scale habitat types present in the area are the subtidal coarse sediment, subtidal sand subtidal mixed sediment. In this region, such sediments tend to support an abundance of bivalves and polychaete worms. Bolam et al. (2010) identified molluscs and annelid worms which live within the sediment as the main secondary producers in this part of the Irish Sea. These invertebrates are a key part of the food chain; they recycle organic matter from within the sediment, linking primary production from the plankton to predatory fish (Bolam et al. 2010).

Large parts of the Irish Sea were surveyed as part of the Strategic Environment Assessment (SEA, 2005) for offshore energy licensing. This information, which became publically available in 2005, confirmed the presence of another biogenic reef type in rRA S, horse mussel *Modiolus modiolus* beds (Rees 2005). This is an important addition to the ISCZ network, as this is a habitat FOCI that is not present with any confidence in any other rMCZ.

Horse mussel beds support a range of other suspension feeders, providing a link in the food chain by connecting primary production in the plankton to the benthos (sea bed organisms), termed 'benthic-pelagic coupling' (Tyler-Walts 2007). Bivalves also perform a number of essential roles for optimum ecosystem functioning. They play a key role in unlocking the energy of primary producers, which in the sea are the phytoplankton (microscopic algae), making it available to be used as food by other creatures. As such, primary producers are the very basis of the food chain that provides the fish that humans consume. It is the bivalves and other suspension feeders that make that energy readily available and useable to the next organism in the food chain. They filter suspended particles from the water column (via a siphon which extends up into the water) and discharge nutrient rich particulates onto the seabed (Dame, 1996). Such deposits promote the growth of deposit feeding and herbivorous benthic (seabed) invertebrates, which serve as prey for crabs and demersal fish (those that live on or near the seabed). Horse mussel beds may also be an important feeding and nursery ground for demersal fish (Hinz et al. 2010).

10. Stakeholder and boundary considerations

In order to meet the ENG target, most stakeholders on the RSG accepted the inclusion of rRA S in the final suite of Reference Areas. For a fuller context on the RSG discussions associated with the selection of Reference Areas, readers of this report are encouraged to consult meeting reports from the ISCZ RSG workshops held in May, June and July 2011 (ISCZ, 2011b,c,d).

This site was initially identified in iteration 1 as it contained the only example of High Energy circalittoral rock in the project area. Its boundary has evolved throughout the process, with the most recent additions being a box on the northwest corner of the site to protect subtidal sand that coincides with a persistent thermal front, and a thin extension to the northeast to capture high confidence horse mussel bed data.

11. Conservation objectives

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Moderate Energy Circalittoral Rock** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Moderate Energy Circalittoral Rock** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Mixed Sediment** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Subtidal Mixed Sediment** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Coarse Sediment** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Subtidal Coarse Sediment** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Sands** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Subtidal Sands** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the ***Modiolus modiolus* (Horse Mussel) Beds** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the ***Modiolus modiolus* (Horse Mussel) Beds** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Biogenic Reefs** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Subtidal Biogenic Reefs** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

12. Sites to which this site is related

rRA S is located in the mid-Irish sea, 88 km (47 nm) to the north of another recommended MCZ (rMCZ4), 80 km (43 nm) from the Lleyn Peninsula and the Sarnau (a Welsh inshore Special Area of Conservation (SAC) with marine components, including horse mussel beds) and 35 km (19 nm) from the Menai Strait and Conwy Bay another Welsh inshore SAC with marine components).

13. Supporting documentation

Information	Type of information	Source
Location of moderate energy circalittoral rock	Combined physical and biological surveying with habitat modelling	Robinson et al. (2007), MESH, Blyth-Skyrme et al. 2008
Subtidal coarse sediment	Combined physical and biological surveying with habitat modelling	Robinson et al. (2007), MESH.
Subtidal sand	Combined physical and biological surveying with habitat modelling	Robinson et al. (2007), MESH.
Subtidal mixed sediment	Combined physical and biological surveying with habitat modelling	Robinson et al. (2007), MESH.
Horse mussel *Modiolus modiolus* beds	Biological survey	Rees (2005)

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MARINE CONSERVATION ZONE: SELECTION ASSESSMENT DOCUMENT
RRA T CUNNING POINT

Version and issue date	Amendments made
v1.0 August 2011	

1. Site name

rRA T - Cunning Point

2. Site centre location

54° 35' 21.007" N, 3° 35' 1.636" W
54.589168 Lat, -3.583787 Long. Lambert Azimuthal Equal Area projection, ETRS89 datum

3. Site surface area

0.46 Km^2 (45.94 Ha)

4. Biogeographic region

JNCC regional sea: Irish Sea.
OSPAR region III: Celtic Seas.

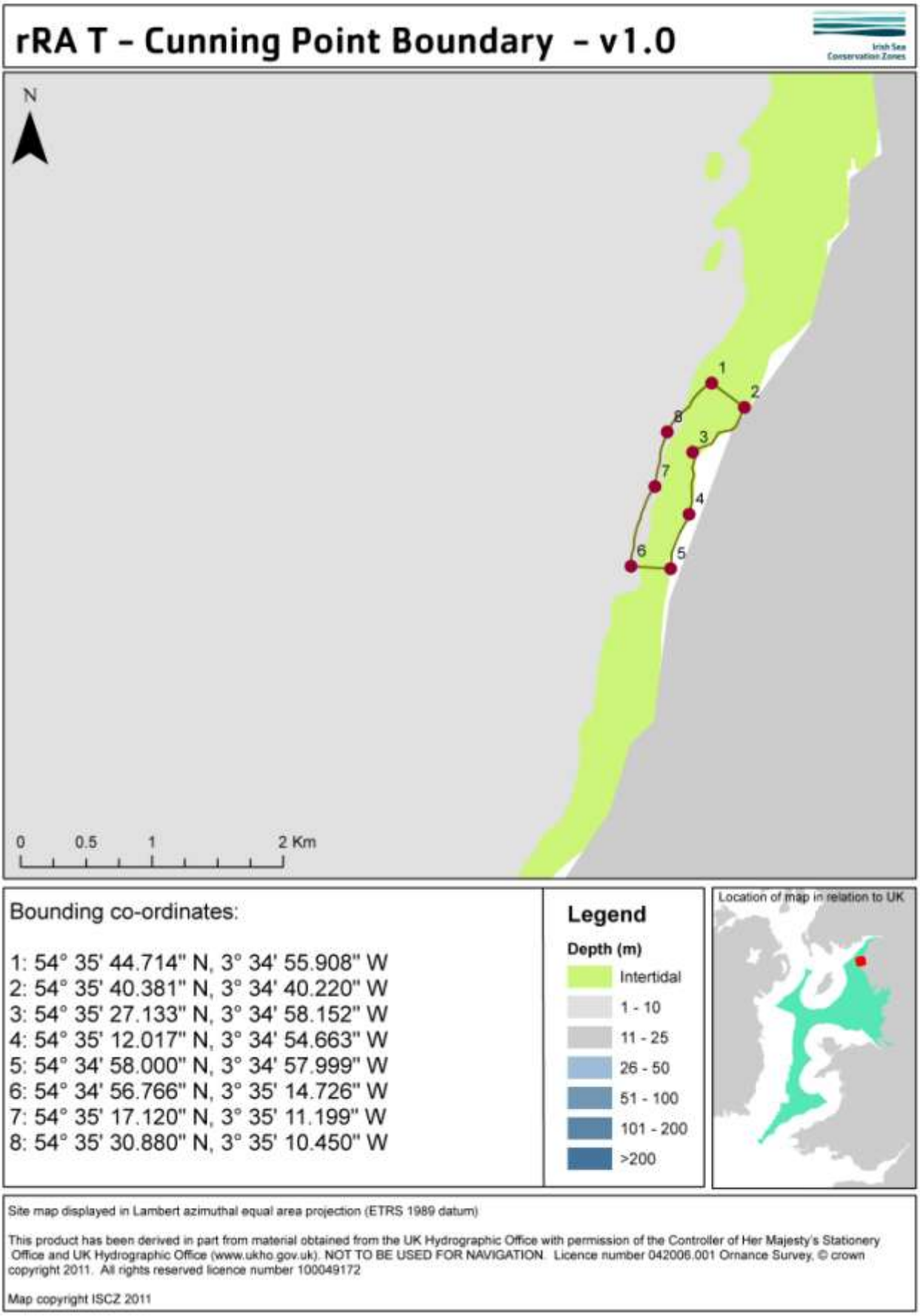
5. Features proposed for designation within r RA T

Feature type	**Feature name**	**Area covered within site (for broad scale habitats and habitats of conservation importance)**
Broad scale habitat	A1.2 Moderate energy intertidal rock A5.3 Subtidal mud	0.08 Km^2 (8.03 Ha) 0.38 Km^2 (37.74 Ha)
Habitat of conservation importance	Subtidal sands and gravels	- 0.46 Km^2 (45.94 Ha)
Species of conservation importance		
Geological feature		
Other feature		

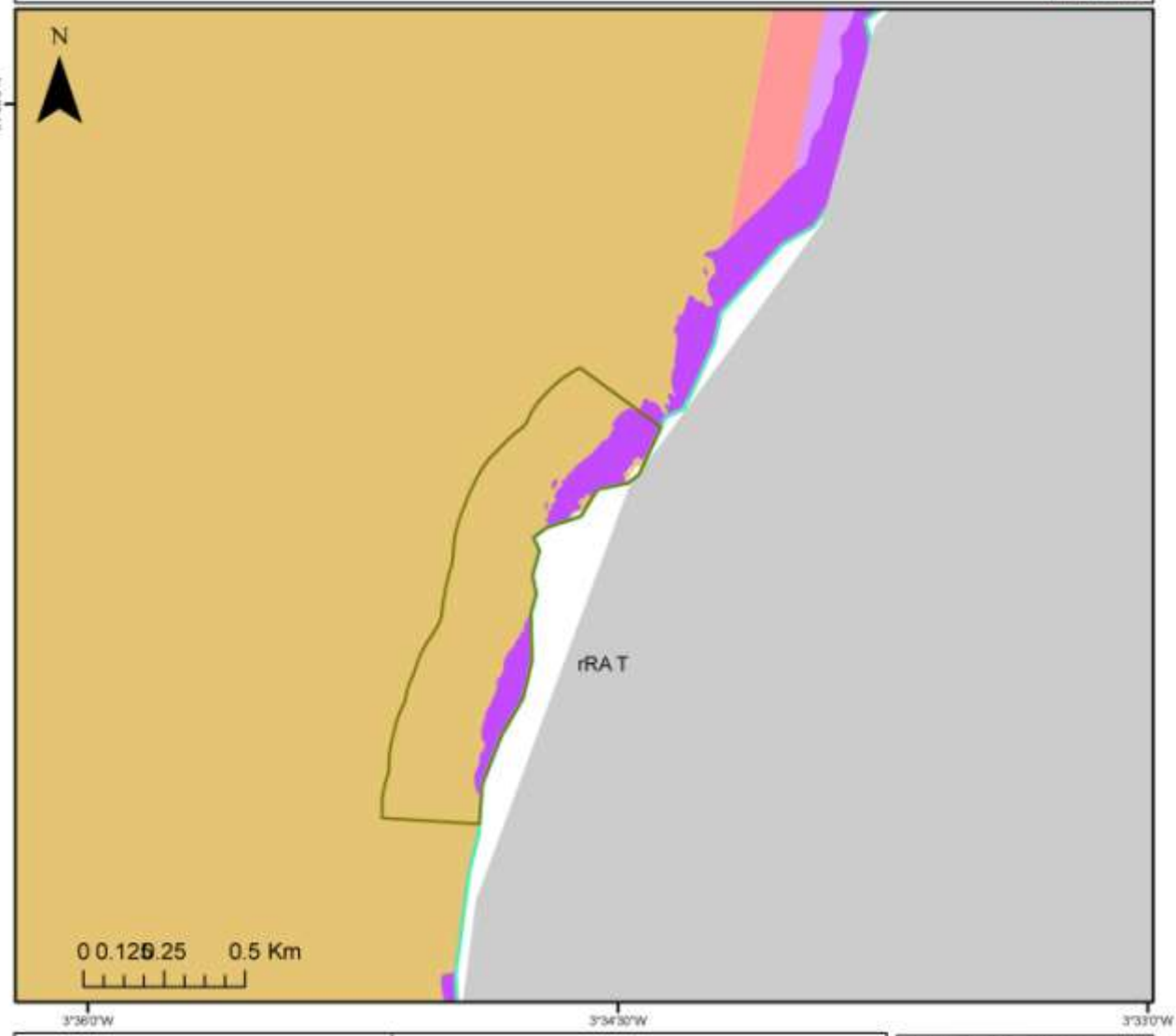
6. Features within r RA T not proposed for designation

Feature type	Feature name	Reason that feature has not been proposed for designation
Broad scale habitat		
Habitat of conservation importance		
Species of conservation importance		

7. Map of site


rRA T – Cunning Point Boundary – v1.0
Irish Sea Conservation Zones
N
1
2
3
4
5
6
7
8
0
0.5
1
2 Km
Bounding co-ordinates:
1: 54° 35' 44.714" N, 3° 34' 55.908" W
2: 54° 35' 40.381" N, 3° 34' 40.220" W
3: 54° 35' 27.133" N, 3° 34' 58.152" W
4: 54° 35' 12.017" N, 3° 34' 54.663" W
5: 54° 34' 58.000" N, 3° 34' 57.999" W
6: 54° 34' 56.766" N, 3° 35' 14.726" W
7: 54° 35' 17.120" N, 3° 35' 11.199" W
8: 54° 35' 30.880" N, 3° 35' 10.450" W
Legend
Depth (m)
Intertidal
1 - 10
11 - 25
26 - 50
51 - 100
101 - 200
>200
Location of map in relation to UK
Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)
This product has been derived in part from material obtained from the UK Hydrographic Office with permission of the Controller of Her Majesty's Stationery Office and UK Hydrographic Office (www.ukho.gov.uk). NOT TO BE USED FOR NAVIGATION. Licence number 042006.001 Ornance Survey, © crown copyright 2011. All rights reserved licence number 100049172
Map copyright ISCZ 2011

rRA T – Cunning Point – Broad-scale Habitats



This area is designated for the following BSHT:

- A1.2, Moderate energy intertidal rock
- A5.3, Subtidal mud

Area: 0.46 km^2

Minimum dimension: 0.31 km

Key

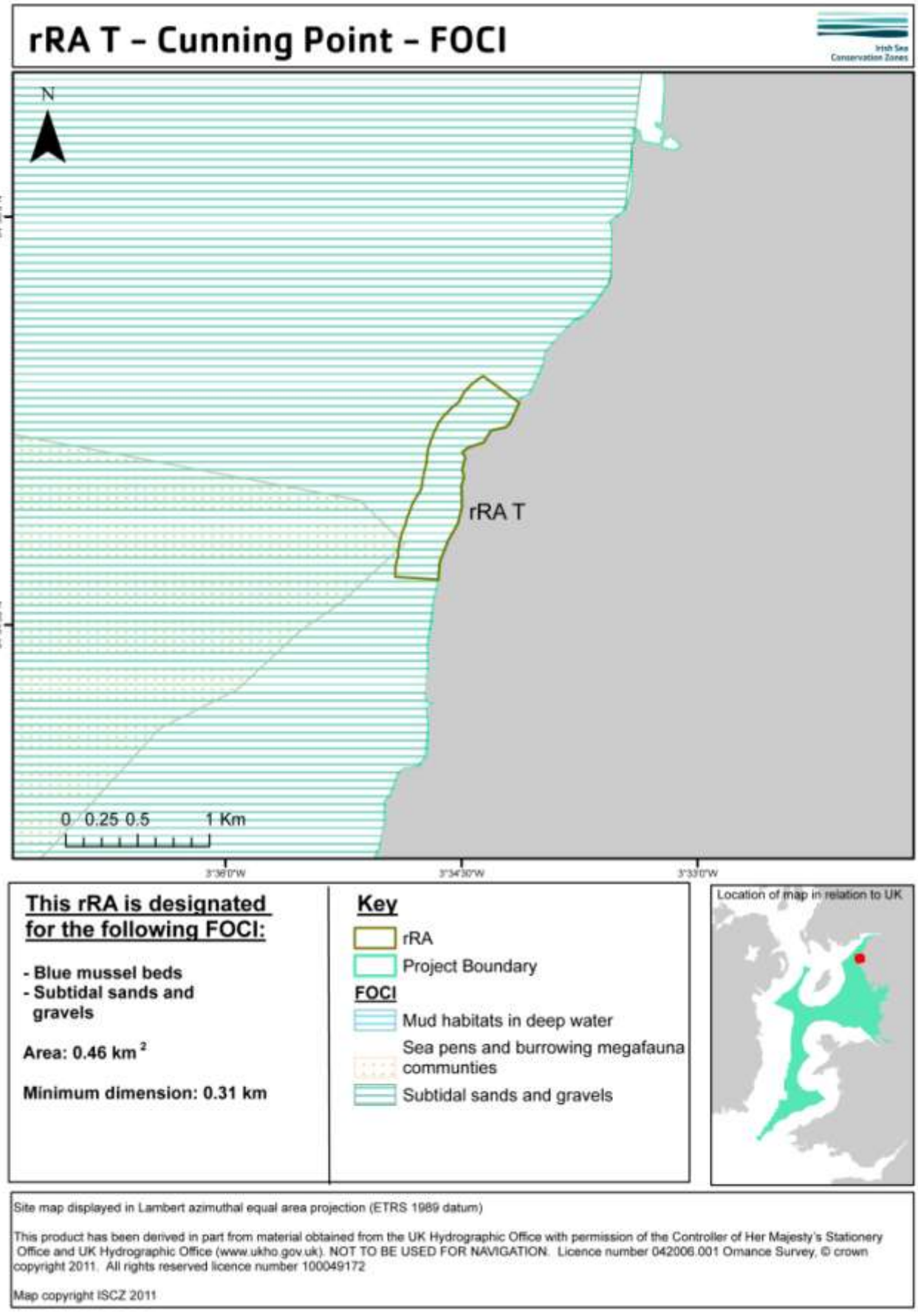
rRA Project Boundary

Broad-scale Habitats

- A1.2, Moderate energy intertidal rock
- A3.1, High energy infralittoral rock
- A3.2, Moderate energy infralittoral rock
- A5.3, Subtidal mud

Location of map in relation to UK

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)


rRA T – Cunning Point – FOCI
Irish Sea Conservation Zones
N
rRA T
0 0.25 0.5 1 Km
3°38'0"W
3°34'30"W
3°33'0"W
This rRA is designated for the following FOCI:
- Blue mussel beds
- Subtidal sands and gravels
Area: 0.46 km 2
Minimum dimension: 0.31 km
Key
rRA
Project Boundary
FOCI
Mud habitats in deep water
Sea pens and burrowing megafauna communties
Subtidal sands and gravels
Location of map in relation to UK
Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)
This product has been derived in part from material obtained from the UK Hydrographic Office with permission of the Controller of Her Majesty's Stationery Office and UK Hydrographic Office (www.ukho.gov.uk). NOT TO BE USED FOR NAVIGATION. Licence number 042006.001 Ornance Survey, © crown copyright 2011. All rights reserved licence number 100049172
Map copyright ISCZ 2011

rRA T – Cunning Point– Location

Key

Project Boundary

rRA

0 0.125 0.25 0.5 Km

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

Location of map in relation to UK

8. Site summary

The rocky shores of the Cumbrian coast provide many ecological niches for organisms to colonise and, for this reason, they tend to be biologically rich. rRA T is located at Cunning Point on the Cumbrian coast. The complex structure of this rocky habitat supports a diverse community of flora and fauna. Within the ISCZ project area there are very few natural rock exposures. Much of the limited hard coastline has been heavily modified by the dumping of waste from iron, steel and coal industries. The proposed site contains some of the best examples of moderate energy intertidal rock habitats. This is confirmed by annual coastal surveys that have been undertaken for the Cumbria Sea Fisheries Committee since 1993.

9. Detailed site description

Cunning Point is an excellent example of a true rocky shore and exhibits an interesting array of habitats from huge wave cut platforms to mini cliffs, arches, surge gullies and large boulders (Lancaster, 2010). Cunning Point is also recognized as a Regionally Important Geological and Geomorphological Site (RIGS) and has some of the best examples of moderate energy intertidal rock habitats within the ISCZ project area.

Cunning Point and the adjacent rock shores within the recommended reference area are comprised of extensive exposures of sandstone bedrock of upper Carboniferous age (circa 300 -320 Ma). This bedrock is present along most of the length of the proposed site from the mid shore to [at least] mean low water. These include extensive horizontal beds to the south and 2-3 m high vertical and overhanging rock faces and gullies at and around Cunning Point. Rock pools are common, with a good mix of sizes and depths. Extensive areas of boulders and cobbles on bedrock are present. Some extensive areas of mobile shingle are present on mid and lower shores, with signs of abrasion to adjacent areas. The rock pools have not been directly sampled but have recently been observed. They looked (Lumb, pers. comm.) to support typical species and there was no evidence was seen of sand smothering or scouring. This supports Lancaster's (2010) findings that the previous trend of sand inundation now appears to be reversing.

The width of shore from mean high water spring to mean low water spring is between 75-100m for much of the site. Cunning Point forms a promontory where the shore is backed by a wider strip of vegetated shingle and coastal habitat extending back to the railway line. Sections of this coastline have been armored to protect the railway. Such coast protection works are currently taking place but do not impact the diverse intertidal zone. The current work is impacting on the upper shore but such impacts are localised and recovery is likely to be rapid (Lumb pers.comm. 2011 & Lancaster pers. comm. 2011). There are no signs that the proposed features are in an unfavourable condition and that, therefore, it merits being designated as a reference area.

At the extreme low water mark there is a kelp zone which is dominated by Oarweed (*Laminaria digitata*) and supports the associated plant and animal community common to the kelp patches. Barnacles, tiny seed mussels and newly established red seaweeds such as Dulse (*Palmaria palmata*), Irish moss (Chondrus *crispus*) and False Irish Moss (*Mastocarpus stallatus*) dominate the lower shore wave cut platforms. Toothed wracks (*Fucus serratus*) were also common but only on the boulders found at the base of the wave cut platforms. Moving higher up the wave cut platform, the vertices were colonised by barnacles, seed mussels and algae tucked into crevices. The top of the platforms are characterised by a variety of seaweeds (Lancaster, 2010).

Mid shore, communities of barnacles (*Balanus & Chthamalus spp*.) and limpets (*Patella vulgata*) were found, changing to seaweeds namely bladder wrack (*Fucus vesiculosus*) and egg wrack (*Ascophyllum nodosum*) beneath which barnacles and limpets can be found, including encrusting red algae. Deep rock pools exhibited toothed wrack (*Fucus serratus*) and sugar kelp (*Laminaria saccharina*). Rock prawns (*Palaemon serratus*) and shannies (*Lipophrys pholis*) also frequent the pools (Lancaster, 2010).

10. Stakeholder and boundary considerations

In order to meet the ENG target, most stakeholders on the RSG accepted the inclusion of rRA T in the final suite of Reference Areas. For a fuller context on the RSG discussions associated with the selection of Reference Areas, readers of this report are encouraged to consult meeting reports from the ISCZ RSG workshops held in May, June and July 2011 (ISCZ, 2011b,c,d).

11. Conservation objectives

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Moderate Energy Intertidal Rock** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Moderate Energy Intertidal Rock** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Mud** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Subtidal Mud** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Sands and Gravels** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Subtidal Sands and Gravels** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

12. Sites to which this site is related

rRA T is not located within an rMCZ or an European Marine Site, the closest site is rMCZ 11 which is 5km to the south, the nearest reference area is rRA J which is 5.6km to the south.

13. Supporting documentation

Information	Type of information	Source
Intertidal sand and muddy sand	Shore transect surveys	MESH, Covey et al. 1998, Lancaster 2010

References

COVEY, R., FORTUNE, F., NICHOLS, D.M. & THORPE, K.1998. *Marine Nature Conservation Review. Sector 11. Liverpool Bay and the Solway Firth: area summaries*. Peterborough, Joint Nature Conservation Committee. (Coasts and seas of the United Kingdom. MNCR series

ISCZ. 2011b. *Meeting report from the 6th Irish Sea Conservation Zones Stakeholder Group meeting.* RK Partnership Ltd.

ISCZ. 2011c. *Meeting report from the 7th Irish Sea Conservation Zones Stakeholder Group meeting*. RK Partnership Ltd.

ISCZ. 2011d. *Meeting report from the 8th Irish Sea Conservation Zones Stakeholder Group meeting.* RK Partnership Ltd.

LANCASTER, J. 2010. *Cumbrian Sea Fisheries Committee shore survey*. Solenvo Marine Environmental Consultants.

MARINE CONSERVATION ZONE: SELECTION ASSESSMENT DOCUMENT
RRA W BARROW SOUTH

Version and issue date	Amendments made
v1.0 August 2011	

1. Site name

rRA W - Barrow South

2. Site centre location

54° 5' 45.253" N, 3° 11' 29.175" W
54.095903 Lat, -3.191437Long. Lambert Azimuthal Equal Area projection, ETRS89 datum

3. Site surface area

0.42 Km^2 (42.11 Ha)

4. Biogeographic region

JNCC regional sea: Irish Sea.
OSPAR region III: Celtic Seas.

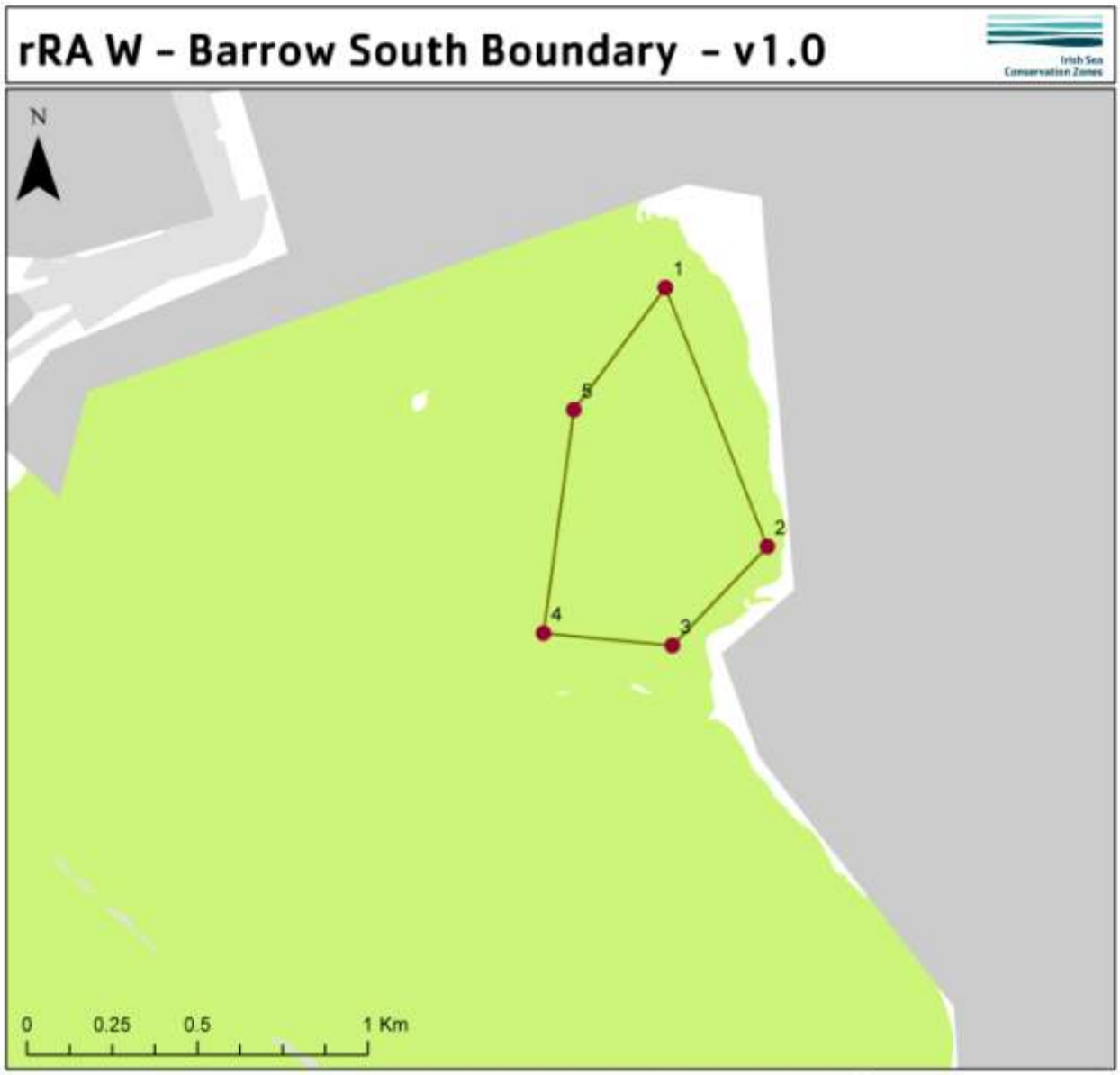
5. Features proposed for designation within RA W2

Feature type	**Feature name**	**Area covered within site (for broad scale habitats and habitats of conservation importance)**
Broad scale habitat	A2.3 Intertidal mud A2.6 Intertidal sediments dominated by aquatic angiosperms	0.07 Km^2 (6.81 Ha) 0.35 Km^2 (35.02 Ha)
Habitat of conservation importance	Seagrass beds	
Species of conservation importance		-
Geological feature	n/a	
Other feature	n/a	

6. Features within RA W2 not proposed for designation

Feature type	Feature name	Reason that feature has not been proposed for designation
Broad scale habitat		
Habitat of conservation importance		
Species of conservation importance		

7. Map of site



Bounding co-ordinates:

1: 54° 6' 5.206" N, 3° 11' 32.695" W
2: 54° 5' 42.811" N, 3° 11' 8.710" W
3: 54° 5' 31.941" N, 3° 11' 20.912" W
4: 54° 5' 30.885" N, 3° 11' 41.817" W
5: 54° 5' 52.226" N, 3° 11' 43.634" W

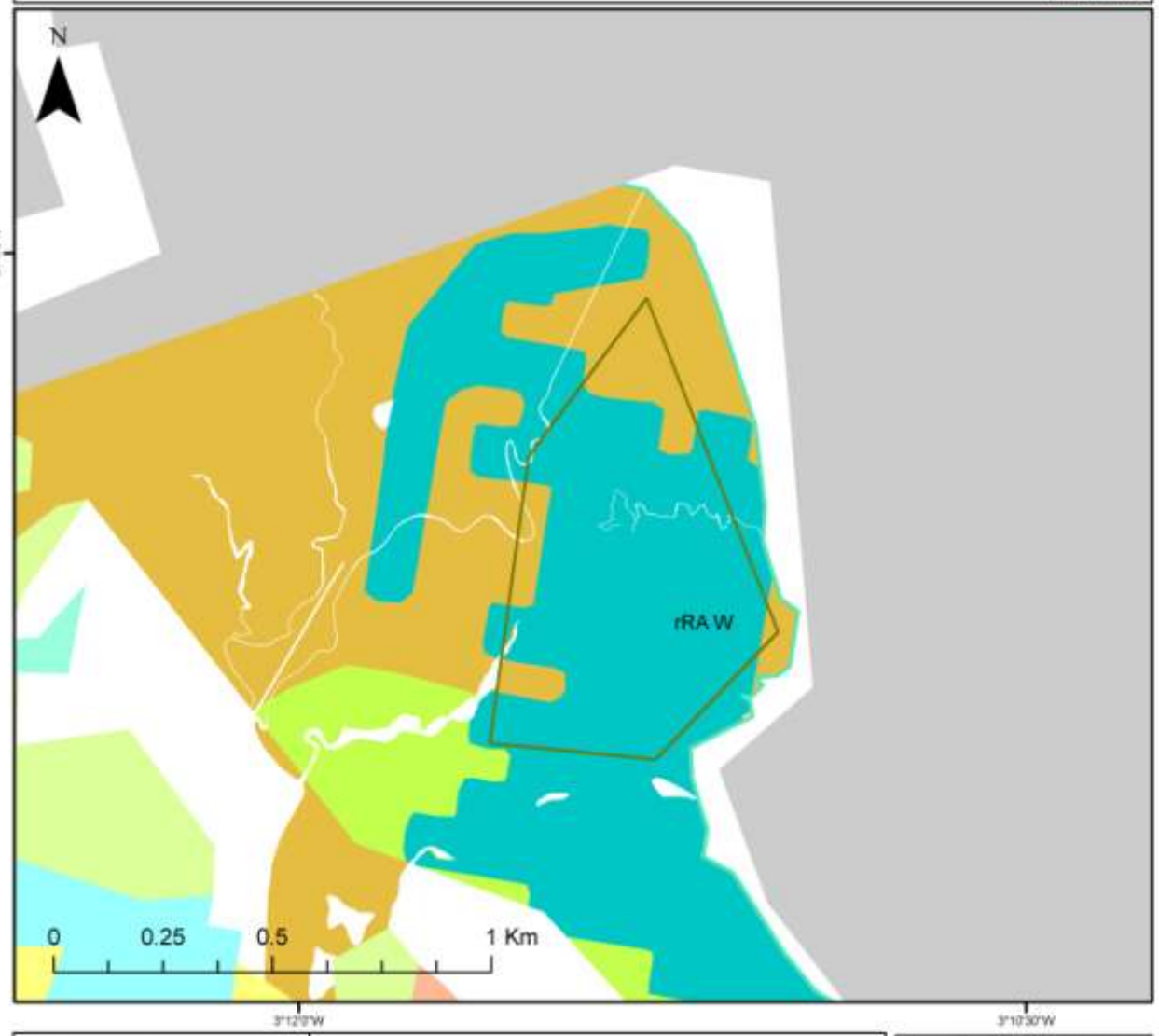
Legend

Depth (m)

- Intertidal
- 1 - 10
- 11 - 25
- 26 - 50
- 51 - 100
- 101 - 200
- >200

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

rRA W – Barrow South – Broad-scale Habitats



This area is designated for the following BSHT:

- A1.2, Moderate energy intertidal rock
- A5.3, Subtidal mud

Area: 0.46 km^2

Minimum dimension: 0.31 km

Key

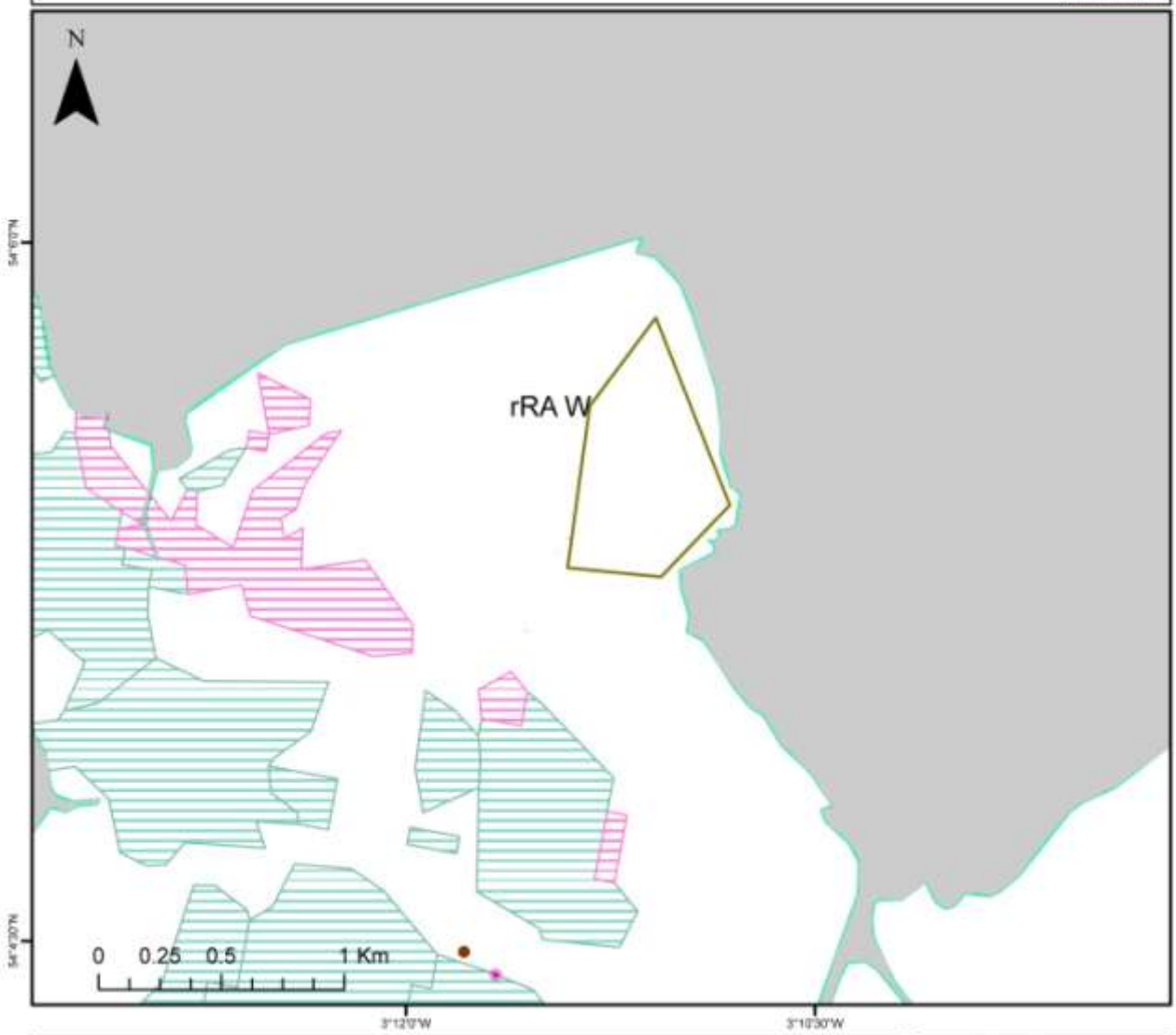
rRA Project Boundary

Broad-scale Habitats

- A2.3, Intertidal mud
- A2.4, Intertidal mixed sediments
- A2.6, Intertidal sediments dominated by aquatic angiosperms
- A5.1, Subtidal coarse sediment
- A5.2, Subtidal sand
- A5.4, Subtidal mixed sediments
- A5.5, Subtidal macrophyte-dominated sediment
- A5.6, Subtidal biogenic reefs

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

rRA W – Barrow South – FOCI



This rRA is designated for the following FOCI:

- Seagrass beds

Area: 0.42 km²

Minimum dimension: 0.39 km

Key

- rRA
- Project Boundary

FOCI

- Seagrass beds
- Sheltered muddy gravels
- Subtidal sands and gravels
- Sheltered muddy gravels

Location of map in relation to UK

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

rRA W – Barrow South – Location

Key

Project Boundary

rRA

0 0.15 0.3 0.6 Km

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

Location of map in relation to UK

8. Site summary

rRA W has been recommended for designation for the habitat FOCI Seagrass beds. Two species of eelgrass (Zostera spp.) are found within the site, namely the dwarf eelgrass *Zostera noltii* and the narrow leaf eelgrass *Zostera angustifolia* (English Nature, 2000). This is a particularly important site as the eelgrass stands found in this region are the only such population within the north west of England (English Nature, 2000). rRA W falls within the Walney Island and Piel Flats SSSI and is also within the Morecambe Bay SAC.

9. Detailed site description

rRA W is situated south of Walney Island and east of Roa Island, in an area known as Westfield. It has been subject to regular ecological surveys in order to monitor the two waste water outfalls within Walney channel, one such outflow is onto Roosecote sands, 406 m from rRA W. The area has been closely monitored (under the E.U. Water Framework Directive) for the discharge impacts on the eelgrass beds, as an increased abundance of opportunistic ephemeral green algae (e.g. Enteromorpha spp) could have a negative impact on the eelgrass community (Hubble *et al*. 2007). Roosecote sands is a heavily used area (by the MOD, United Utilities, and for maintenance dredging) and the position of rRA: W represents the least impacted part of the area by anthropogenic activities. The wastewater outfalls are not deemed to be impacting the site (Hubble et al. 2007, Evans *et al*., 2008). The southern boundary of the site is delineated by a buffer zone of ˜ 500 m to enable access to gas and telecommunication infrastructures. Species diversity greatly increases south of Westfield Point towards Roa Island which demonstrates rich tide swept communities. However, this area was rejected by the RSG as a possible RA as it is on the edge of an active dredging site and would, therefore, be inappropriate as a reference area.

Eelgrass beds are ecologically important habitats and play a number of important roles in shallow water areas. Their extensive horizontal root networks (rhizomes) have a stabilising effect on coastal sediments. They bind and consolidate sediments, reduce susceptibility to erosion and therefore reduce sediment transport by currents. Further to this, the leaves promote settlement of sediment (Davidson and Hughes, 1998). Seagrass beds are known to provide shelter to post-larvae and juveniles of some commercial fish species. They are highly productive habitats and their root systems help to aerate the upper layers of sediment that can promote inhabitation by some burrowing animals including bivalves and annelid worms (Davidson and Hughes, 1998). As a reference area it would be worthy of investigating the extent of such habitat niches, and further quantifying the biodiversity of the site, as the majority of available ecological data relates to the seagrasses themselves. Seagrasses are also an important food source for overwintering migratory wildfowl (Davidson and Hughes, 1998).

Roosecote sands illustrate a discontinuous, patchy eelgrass distribution, with a noted increase in density towards the outer edges of the patches (Hubble *et al*. 2007). *Zostera noltii* was found in dense aggregations to the north and south of the Westfield Point gravel bar, in general no more than ~ 300 m from the shore line. It was frequently found on slightly raised areas, uncovered at low tide. *Z. angustifolia* exhibited considerably less coverage than *Z. noltii* and was observed only on isolated occasions. Its distribution was notably more frequent to the south of the gravel bar, but only in small patches. Z. angustifolia was observed in deeper waters than *Z. noltii* and rarely exposed at low tide and its range extended out a good 50m further than the extent of *Z. noltii*. Within rRA W, *Zostera noltii* is the dominant species. It is interesting to note that within the impact zone of the outfall there is very little seagrass; the area is dominated by the ephemeral green algae *Enteromorpha spp*. (Hubble *et al*. 2007).

Connor et. al. (1997) described the typical infaunal community (creatures living within the sediment) as associated with the broad-scale habitat of intertidal mud as being characterised by polychaetes such as the bristle worm *Pygospio elegans*, lugworm *Arenicola marina*, and mud shrimps *Corophium volutator*. Bivalves such as the common cockle *Cerastoderma edule*, baltic tellin *Macoma balthica* and peppery furrow shell *Scrobicularia plana* are also present. Typically an epifaunal community (creatures that dwell on the sediment) includes the mud snail laver spire shell *Hydrobia ulvae*, shore crabs *Carcinus maenas* and the green alga *Ulva* sp. Such diverse communities have been recorded in the soft sediment invertebrate surveys conducted by the Natural History Museum within the Westfield area and rRA W (Evans et. al., 2008).

10. Stakeholder and boundary considerations

In order to meet the ENG target, most stakeholders on the RSG accepted the inclusion of rRA W in the final suite of Reference Areas. For a fuller context on the RSG discussions associated with the selection of Reference Areas, readers of this report are encouraged to consult meeting reports from the ISCZ RSG workshops held in May, June and July 2011 (ISCZ, 2011b,c,d).

11. CONSERVATION OBJECTIVES

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Seagrass Beds** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Seagrass Beds** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Intertidal Mud** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Intertidal Mud** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Intertidal Sediments dominated by Aquatic Angiosperms** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Intertidal Sediments dominated by Aquatic Angiosperms** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

12. Sites to which this site is related

rRA W is located within the Morcambe Bay SAC, the closest reference area is rRA Y 5.5km to the north, this site is also very close (5km) to the Duddon Estuary SAC

13. Supporting documentation

Information	Type of information	Source
Location of Seagrass beds	Intertidal ecological surveys	APEM monitoring report for United Utilities.
Location of Seagrass beds	Intertidal ecological surveys	Natural History Museum report for onshore pipeline environmental development report.

14. References

Connor, D.W., Brazier, D.P., Hill, T.O., & Northen, K.O., 1997b. Marine biotope classification for Britain and Ireland. Vol. 1. Littoral biotopes. *Joint Nature Conservation Committee, Peterborough, JNCC Report* no. 229, Version 97.06., *Joint Nature Conservation Committee, Peterborough, JNCC* Report No. 230, Version 97.06.

Davidson, D.M. & Hughes, D.J. 1998. Zostera Biotopes: An overview of dynamics and sensitivity characteristics for conservation management of marine SAC's. Scottish Association for Marine Science, (UK Marine SACs Project) Available online at: http://www.ukmarinesac.org.uk/zostera.htm Accessed 25/08/2011.

English Nature. 2000. Morecambe Bay: European marine site English Nature's advice given under regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994.

Evans, N.J., Tittley, I., Robbins, R. S., Bamber, R. N., Huxley, R., Campbell, P., Salvador, & Spurrier, C.J. 2008. Natural History Museum Consultancy Report: Rivers fields development onshore pipeline environmental recovery monitoring programme. Report No. ECM 771E/08.

Fish, J. D., & Fish, S. 2011. A student's guide to the seashore. Cambridge University Press.

HUBBLE, M., CLOUGH, S., & O'KEEFFE, N. 2007. *Roosecote sands eelgrass and ephemeral algae survey*. APEM scientific report for United Utilities.

ISCZ. 2011b. *Meeting report from the 6th Irish Sea Conservation Zones Stakeholder Group meeting.* RK Partnership Ltd.

ISCZ. 2011c. *Meeting report from the 7th Irish Sea Conservation Zones Stakeholder Group meeting*. RK Partnership Ltd.

ISCZ. 2011d. *Meeting report from the 8th Irish Sea Conservation Zones Stakeholder Group meeting.* RK Partnership Ltd.

MARINE CONSERVATION ZONE: SELECTION ASSESSMENT DOCUMENT RA Y BARROW NORTH

Version and issue date	Amendments made
v1.0 August 2011	

1. Site name

rRA Y - Barrow North

2. Site centre location

54° 8' 26.316" N, 3° 15' 26.265" W
54.140643 Lat, -3.257295 Long. Lambert Azimuthal Equal Area projection, ETRS89 datum

3. Site surface area

1.24 Km^2 (123.93 Ha)

4. Biogeographic region

JNCC regional sea: Irish Sea.
OSPAR region III: Celtic Seas.

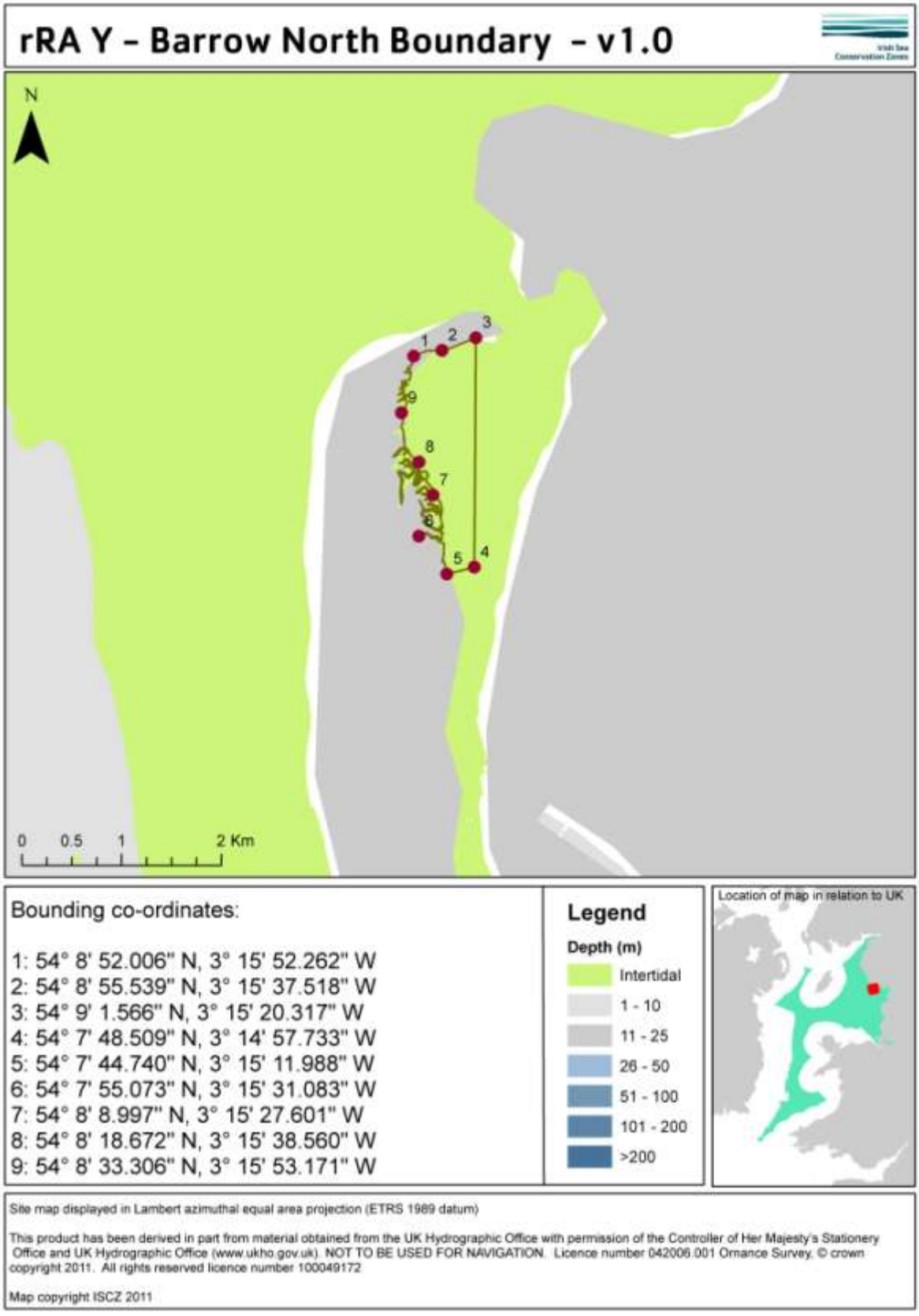
5. Features proposed for designation within rRA Y

Feature type	**Feature name**	**Area covered within site (for broad scale habitats and habitats of conservation importance)**
Broad scale habitat	A2.3 Intertidal mud A2.5 Coastal saltmarshes and saline reedbeds A5.1 Subtidal coarse sediments	0.11 Km^2 (10.74 Ha) 0.73 Km^2 (72.57Ha) 0.14 Km^2 (13.87 Ha)
Habitat of conservation importance	Seagrass beds	
Species of conservation importance	n/a	-
Geological feature	n/a	
Other feature	n/a	

6. Features within rRA: Y not proposed for designation

Feature type	Feature name	Reason that feature has not been proposed for designation
Broad scale habitat	n/a	
Habitat of conservation importance	n/a	
Species of conservation importance	n/a	

7. Map of site


rRA Y – Barrow North Boundary – v1.0
N
1
2
3
4
5
6
7
8
9
0
0.5
1
2 Km
Bounding co-ordinates:
1: 54° 8' 52.006" N, 3° 15' 52.262" W
2: 54° 8' 55.539" N, 3° 15' 37.518" W
3: 54° 9' 1.566" N, 3° 15' 20.317" W
4: 54° 7' 48.509" N, 3° 14' 57.733" W
5: 54° 7' 44.740" N, 3° 15' 11.988" W
6: 54° 7' 55.073" N, 3° 15' 31.083" W
7: 54° 8' 8.997" N, 3° 15' 27.601" W
8: 54° 8' 18.672" N, 3° 15' 38.560" W
9: 54° 8' 33.306" N, 3° 15' 53.171" W
Legend
Depth (m)
Intertidal
1 - 10
11 - 25
26 - 50
51 - 100
101 - 200
>200
Location of map in relation to UK
Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)
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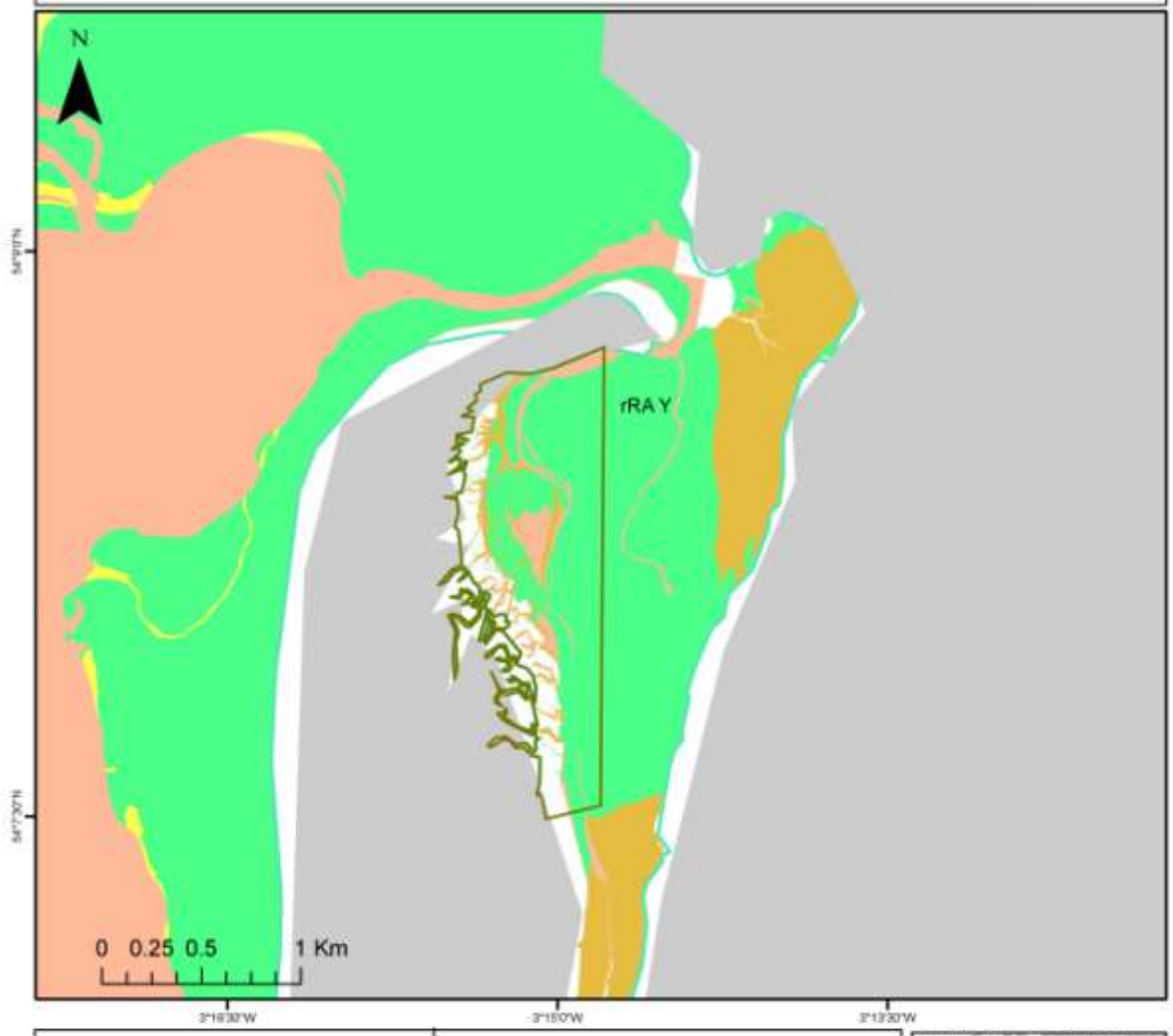
Map copyright ISCZ 2011

rRA Y – Barrow South – Broad-scale Habitats



This area is designated for the following BSHT:

- A2.3, Intertidal mud
- A2.5, Coastal saltmarshes and saline reedbeds
- A5.1, Subtidal coarse sediment

Area: 1.24 km²

Minimum dimension: 0.28 km

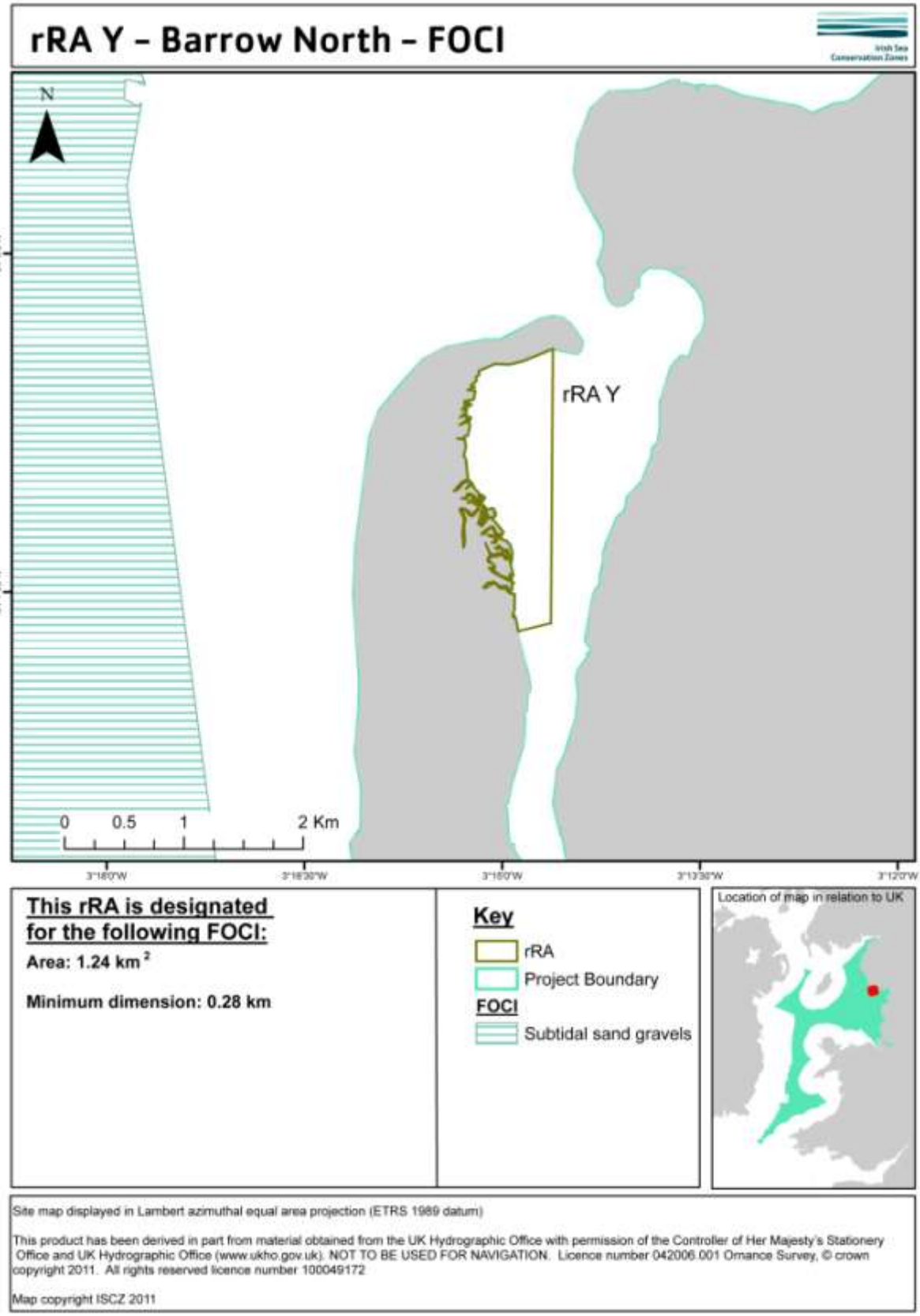
Key

rRA Project Boundary

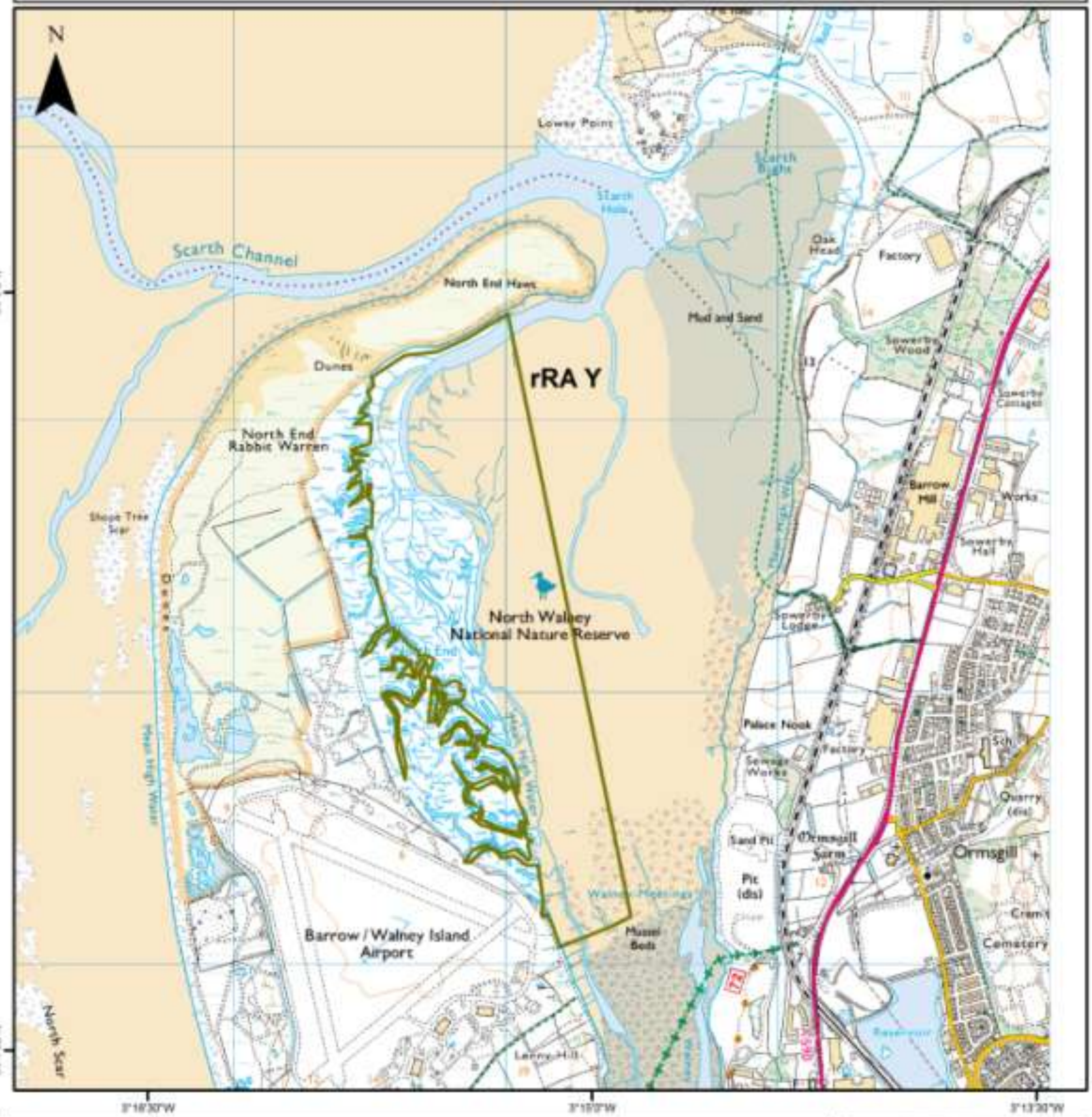
Broad-scale Habitats

- A2.2, Intertidal sand and muddy sand
- A2.3, Intertidal mud
- A2.5, Coastal saltmarshes and saline reedbeds
- A5.1, Subtidal coarse sediment
- A5.2, Subtidal sand

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)


rRA Y – Barrow North – FOCI
Irish Sea Conservation Zones
N
rRA Y
0
0.5
1
2 Km
This rRA is designated for the following FOCI:
Area: 1.24 km²
Minimum dimension: 0.28 km
Key
rRA
Project Boundary
FOCI
Subtidal sand gravels
Location of map in relation to UK
Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)
This product has been derived in part from material obtained from the UK Hydrographic Office with permission of the Controller of Her Majesty's Stationery Office and UK Hydrographic Office (www.ukho.gov.uk). NOT TO BE USED FOR NAVIGATION. Licence number 042006.001 Ornance Survey, © crown copyright 2011. All rights reserved licence number 100049172
Map copyright ISCZ 2011

rRA Y – Barrow North – Location



Key

Project Boundary

rRA

0 0.2 0.4 0.8 Km

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

8. Site summary

rRA Y is proposed for designation for the broad-scale habitat type coastal saltmarshes and saline reedbeds and their associated habitats of intertidal muds and subtidal coarse sediments. rRA Y lies within the north eastern aspect of Walney Channel where it enters the Duddon estuary. The saltmarshes in this area benefit from a number of marine protected areas: Morecambe Bay cSAC under the EC Habitats Directive as internationally important examples of this habitat; Duddon estuary SPA under the EC Directive on the Conservation of Wild Birds for its nationally and internationally important populations of wintering and passage waders and wildfowl (EN, 1997), and Duddon estuary SSSI. The Duddon Estuary is also a Ramsar site, one of a series of important wetlands around the world. The wildlife that has been identified for designation is the natterjack toad, the rich grouping of wetland plants and invertebrates, and again the wintering waders and waterfowl and breeding birds. North Walney is also a designated Natural Nature Reserve (NNR).

9. Detailed site description

The saltmarshes within rRA Y are unusual as it contains areas of ungrazed saltmarsh. Survey work carried out by Natural England (2009) showed that the marsh extent appeared to be stable with the natural creeks and pans remaining unaltered in comparison with historical aerial photographs (Evans 2009). The site exhibits typical saltmarsh zonation with a relatively species-poor low-mid marsh, and more diverse communities of the mid-upper marsh. The lower marsh is mostly dominated by sea purslane *Halimione portulacoides*, the mid marsh has abundant lax and common sea lavenders *Limonium humile* and *Limonium vulgare* along with a good range of typical saltmarsh indicator species. There is a small area of upper marsh with common reed *Phragmites* and sea rush *Juncus maritimus* (Evans 2009).

East of the low marsh described above is a fully intertidal area, primarily comprised of mud and sand habitats. This area is particularly important for birds, particularly wintering waterfowl including: wildfowl, waders and seabirds such as shelduck *Tadorna tadorna*, red-breasted merganser *Mergus serrator* (although there has been a slight decline in population in recent years; Evans 2010), oystercatcher *Haematopus ostralegus*, ringed plover *Charadrius hiaticula*, and curlew *Numenius arquata*.

At the time of writing, Natural England are still awaiting specific, detailed information on the intertidal mud and sand habitats in this specific area (Evans 2010). Characteristic species in such habitats have been classified by the JNCC Marine Nature Conservation Review (MNCR) as including species such as the common cockle *Cerastoderma edule,* sand-hopper *Corophium volutator,* laver spire shell *Hydrobia ulvae*, ragworm *Hediste diversicolor* and, when salinity is low, large numbers of oligochaete annelids (principally *Tubificoides* spp). With a slight increase in the proportion of sand, the polychaetes catworm *Nephtys hombergi* and lugworm *Arenicola marina* occur. This is, therefore, diverse and highly productive areas that support important bird populations. Such habitats are also important fish nursery areas. Within the southern boundary of rRA Y there are also good mussel *Mytilus edulis* cobble scars which extend further down into Walney channel (Evans 2010).

10. Stakeholder and boundary considerations

In order to meet the ENG target, most stakeholders on the RSG accepted the inclusion of rRA Y in the final suite of Reference Areas. For a fuller context on the RSG discussions associated with the selection of Reference Areas, readers of this report are encouraged to consult meeting reports from the ISCZ RSG workshops held in May, June and July 2011 (ISCZ, 2011b,c,d).

11. Conservation objectives

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Subtidal Coarse Sediment** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Subtidal Coarse Sediment** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Coastal Saltmarshes and Saline Reedbeds** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Coastal Saltmarshes and Saline Reedbeds** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Intertidal Mud** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Intertidal Mud** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

12. Sites to which this site is related

rRA Y lies within Duddon estuary SPA under the EC Directive on the Conservation of Wild Birds for its nationally and internationally important populations of wintering and passage waders and wildfowl (EN, 1997), and Duddon estuary SSSI. The Duddon Estuary is also a Ramsar site, one of a series of important wetlands around the world. The wildlife that has been identified for designation is the natterjack toad, the rich grouping of wetland plants and invertebrates, and again the wintering waders and waterfowl and breeding birds. North Walney is also a designated Natural Nature Reserve (NNR).

13. Supporting documentation

Information	Type of information	Source
Location of saltmarsh	Intertidal surveys	MESH
Location and verification of saltmarsh	Ecological Survey	Natural England Duddon Estuary SSSI (Unit 4 & 6)

References

ISCZ. 2011b. *Meeting report from the 6th Irish Sea Conservation Zones Stakeholder Group meeting.* RK Partnership Ltd.

ISCZ. 2011c. *Meeting report from the 7th Irish Sea Conservation Zones Stakeholder Group meeting*. RK Partnership Ltd.

ISCZ. 2011d. *Meeting report from the 8th Irish Sea Conservation Zones Stakeholder Group meeting.* RK Partnership Ltd.

Evans. 2010.) *Duddon Estuary SSSI Unit 4 ID: 1018345* available from http://www.sssi.naturalengland.org.uk/special/sssi/reportAction.cfm?report=sdrt13&category=S&reference=1000104. Last accessed 28th August 2011

Evans. 2009. *Duddon Estuary SSSI Unit 6 ID 1018346* available from http://www.sssi.naturalengland.org.uk/special/sssi/reportAction.cfm?report=sdrt13&category=S&reference=1000104. Last accessed 28th August 2011

MARINE CONSERVATION ZONE: SELECTION ASSESSMENT DOCUMENT
RRA Z SEFTON COAST

Version and issue date	Amendments made
v1.0 August 2011	

1. Site name

rRA Z - Sefton Coast

2. Site centre location

53° 31' 1.472" N, 3° 3' 48.717" W
53.517075 Lat, -3.063532 Long. Lambert Azimuthal Equal Area projection, ETRS89 datum

3. Site surface area

0.007 Km^2 (0.66 Ha)

4. Biogeographic region

JNCC regional sea: Irish Sea.
OSPAR region III: Celtic Seas.

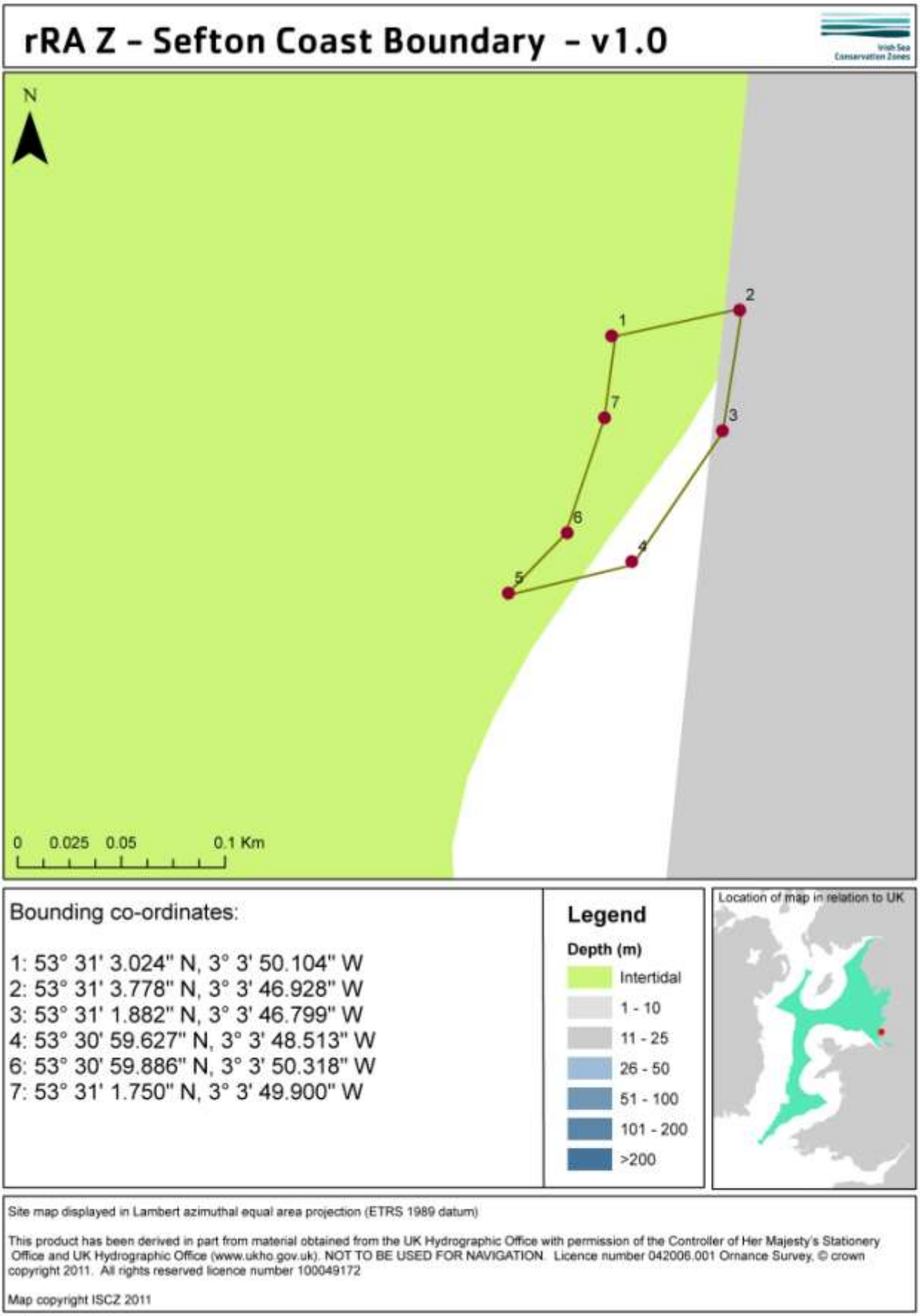
5. Features proposed for designation within rRA Z

Feature type	**Feature name**	**Area covered within site (for broad scale habitats and habitats of conservation importance)**
Broad scale habitat	n/a	
Habitat of conservation importance	Peat and clay exposures	-
Species of conservation importance	n/a	
Geological feature	n/a	
Other feature	n/a	

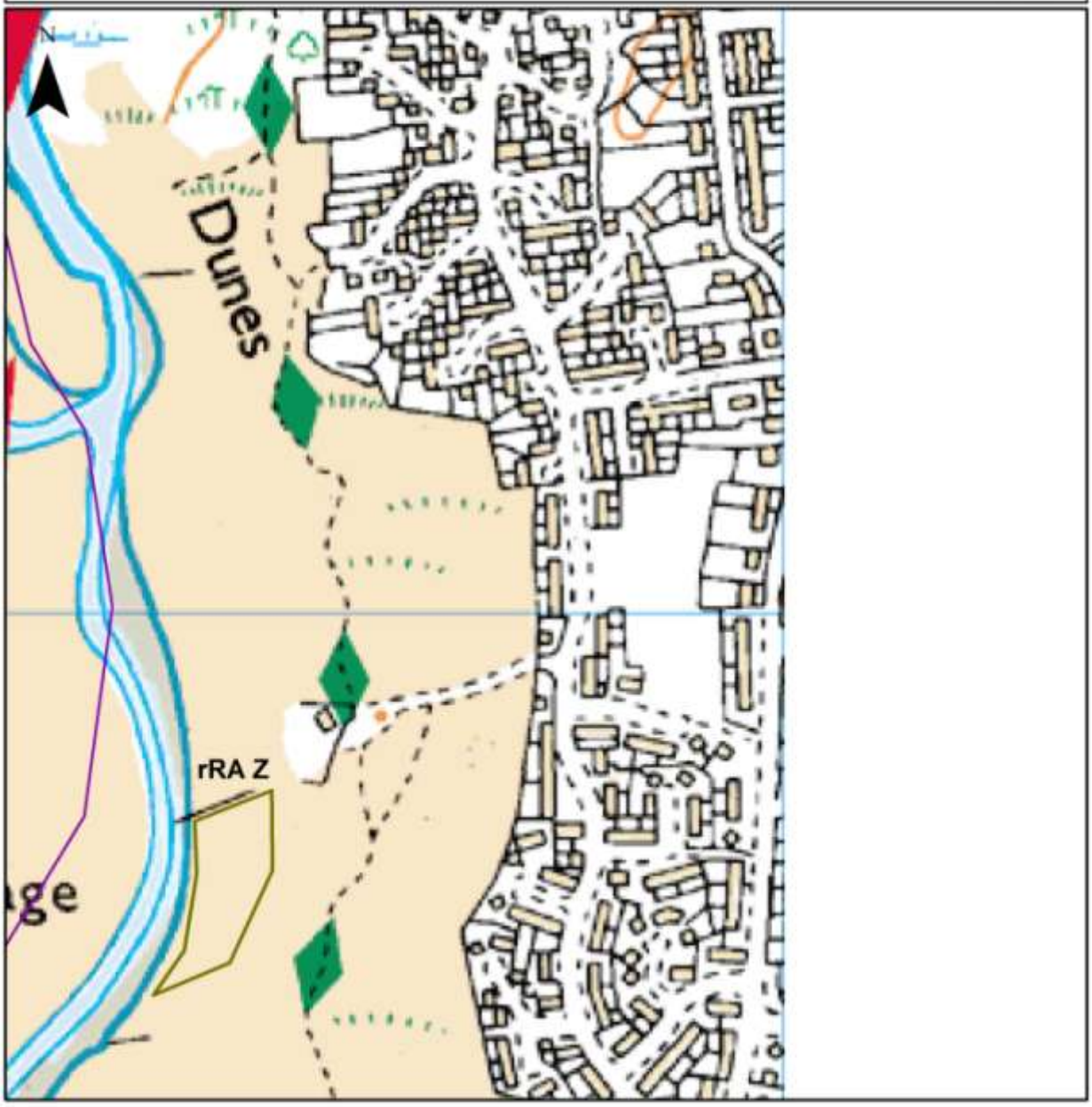
6. Features within rRA Z not proposed for designation

Feature type	Feature name	Reason that feature has not been proposed for designation
Broad scale habitat	n/a	
Habitat of conservation importance	n/a	
Species of conservation importance	n/a	

7. Map of site


rRA Z – Sefton Coast Boundary – v1.0
Irish Sea Conservation Zones
N
1
2
3
4
5
6
7
0 0.025 0.05 0.1 Km
Bounding co-ordinates:
1: 53° 31' 3.024" N, 3° 3' 50.104" W
2: 53° 31' 3.778" N, 3° 3' 46.928" W
3: 53° 31' 1.882" N, 3° 3' 46.799" W
4: 53° 30' 59.627" N, 3° 3' 48.513" W
6: 53° 30' 59.886" N, 3° 3' 50.318" W
7: 53° 31' 1.750" N, 3° 3' 49.900" W
Legend
Depth (m)
Intertidal
1 - 10
11 - 25
26 - 50
51 - 100
101 - 200
>200
Location of map in relation to UK
Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)
This product has been derived in part from material obtained from the UK Hydrographic Office with permission of the Controller of Her Majesty's Stationery Office and UK Hydrographic Office (www.ukho.gov.uk). NOT TO BE USED FOR NAVIGATION. Licence number 042006.001 Ornance Survey, © crown copyright 2011. All rights reserved licence number 100049172
Map copyright ISCZ 2011

rRA Z- Sefton Coast- Location



Key

rRA

0 0.05 0.1 0.2 Km

Site map displayed in Lambert azimuthal equal area projection (ETRS 1989 datum)

Location of map in relation to UK

8. Site summary

rRA Z is situated adjacent to the settlement of Hightown on the Sefton coast. The site is situated in the intertidal zone, and extends from just above the mean high water mark to the mean low water mark. rRA Z is proposed for designation for the habitat FOCI peat and clay exposures. Benthic habitats formed from exposed peat or clay, or in some cases both, are nationally rare and provide important habitats for a variety of species such as: burrowing bivalves (including piddocks), seaweeds and crabs (NBN Gateway 2011). In clay rich areas, such as Hightown (Clapham 1999), common mussels, periwinkles and polychaete worms have also been noted. This habitat feature is also of major archaeological interest, as the exposures are composed of former lake bed sediments and ancient forested peatland. Designation as a reference area would help to protect these vulnerable prehistoric landscapes from the threats posed by erosion, development or recreational pressure.

9. Detailed site description

Peat and clay exposures are a priority habitat for the UK Biodiversity Action Plan (UKBAP) and, although they are of ecological interest for the habitat itself, they provide for a range of species and are also of archaeological interest and importance.

The peat and clay exposures present in rRA Z have been verified with data from English Heritage and peer-reviewed records from the British Geological Society (primarily the Hazell 2008 database) (Clapham 1999; Seeley et al. 2010).

Protecting these peat and clay exposures will help fulfil the UK commitments to biodiversity through the UKBAP, for which peat and clay exposures are designated as a priority habitat. Records of piddocks, a type of burrowing bivalve (*Pholas dactylus*, *Barnea candida* and *Barnea parva*), which are key species for this habitat type have also been confirmed from the National Biodiversity Network (NBN Gateway, 2011). These exposures are an irreplaceable habitat type, as they are composed of former lake bed sediments and ancient forested peatland (also referred to as 'submerged forests') (Clapham1999; Maddock 2010).

Peat and clay exposures can be subject to cyclical inundation and exposure by sediment. Depending on the local level of sand scour, the surface of peat exposures can also become covered with algal mats made of red and green seaweeds (*Ceramium* sp. and *Ulva lactuca* and *Ulva intestinalis*). Hydroids can be present within small pools of water and crabs shelter within crevices e.g. *Carcinus maenas* and *Cancer pagurus* (Maddock 2010). On the surface of clay exposures, there tends to be less seaweed coverage, instead small clumps of blue mussels *Mytilus edulis* can be present, alongside barnacles and periwinkles *Littorina littorea*, whilst polychaete worms live within the clay, e.g. *Polydora* sp. and *Hediste diversicolor* (Maddock 2010). Both peat and clay exposures are soft enough to be burrowed into by piddocks *Pholas dactylus*, and the holes created by these burrowing bivalves provide an important micro-habitat for species such as crabs and anemones, e.g. the daisy anemone (*Cereus pedunculatus*) and the gem anemone (*Aulactinia verrucosa*) (Maddock 2010).

A single radiocarbon date of 4545 ± 90 BP (radiocarbon years before present), which calibrates to about 3,500 to 3,000 calendar years BC, is associated with the peat and forest beds and falls within the Neolithic period (Stallibrass, pers comm., 2011). The Hightown peat and forest beds are important for the rare preservation of organic remains (plants and animal fossils) of mid-Holocene growth, and for their underlying clay deposits. At face value, the date quoted above indicates that the forest/peat growth occurred during a low sea level stand in the early Neolithic. Subsequently, the relative sea level appears to

have risen slowly, with increased sedimentation in the coastal area and an accumulation of off-shore barriers and sand dunes, which have acted as a major protection against any subsequent high sea levels.

Clapham's (1999) study of the macrofossils indicates that the peat/forest remains consist of plant remains of ground flora/understorey. These consist of tall-herb fen vegetation, dominated by the common reed *Phragmites australis*, and tall herbaceous vegetation (both common blackberry *Rubus fruticosus* and woody nightshade *Solanum dulcamara*) producing a thick, tangled mass. Closer to the ground, smaller herbs can be found and, in wetter areas, aquatic species probably grow. At the settlement of Hightown, the nationally rare royal fern *Osmunda regalis* forms part of the understorey as well. At Hightown, the dominant tree was birch, with alder, oak and willow also present but in smaller proportions. Clapham (1999) noted the presence of other biological remains including, for example, insects such as beetles, and molluscs. There is, therefore, considerable value in trying to preserve/prevent damage to the Hightown reference area Z; it supports nationally scarce ecological features and, through continued research, has potential to provide evidence relevant to important issues such as climate change and our understanding of changes in relative sea level (Stallibrass, pers. comm., 2011).

The intertidal peat beds along this stretch of coast do not receive protection from the Sefton coast SAC or SSSI and, therefore, designating these as a feature for a reference area could provide protection against erosion, recreational activities (such as bait digging) and development.

10. Stakeholder and boundary considerations

In order to meet the ENG target, most stakeholders on the RSG accepted the inclusion of rRA Z in the final suite of Reference Areas. For a fuller context on the RSG discussions associated with the selection of Reference Areas, readers of this report are encouraged to consult meeting reports from the ISCZ RSG workshops held in May, June and July 2011 (ISCZ, 2011b,c,d).

11. Conservation objectives

Conservation Objective	
1 Maintain/ recover	Subject to natural change, **recover** the **Peat and Clay Exposures** to reference condition by 2020 and maintain thereafter, such that:
2 Attributes and parameters	the • extent, • diversity, • community structure, • natural environmental quality, and natural environmental processes Representative of the **Peat and Clay Exposures** in the biogeographic region are all recovered.
Advice on operations	
3 Human activities	Reference areas should be managed to remove or prevent all extraction, deposition or potentially damaging activities.

12. Sites to which this site is related

rRA Z lies within rMCZ 13.rMCZ 13 is adjacent to the Liverpool Bay SPA and situated within the Sefton Coast SAC/ SSSI. These designations offer no specific management measures to protect the peat and clay exposures, which is the main reason why the site has been recommended for designation.

As this site is being recommended for the designation of a habitat feature, and one that is primarily of archaeological interest, rather than a broad-scale habitat type, the distances between this rMCZ and other rMCZs within the region, which also contain peat and clay exposures, was not considered and is not reported here.

13. Supporting documentation

Information	Type of information	Source
Location of peat and clay exposures	Shoreline Survey	MESH
Location of peat and clay exposures	Survey	Hazell for British Geological Survey (2008)
Location of peat and clay exposures	Archaeological Survey	Clapham (1999) Unpublished PhD.

References

ISCZ. 2011b. *Meeting report from the 6th Irish Sea Conservation Zones Stakeholder Group meeting.* RK Partnership Ltd.

ISCZ. 2011c. *Meeting report from the 7th Irish Sea Conservation Zones Stakeholder Group meeting*. RK Partnership Ltd.

ISCZ. 2011d. *Meeting report from the 8th Irish Sea Conservation Zones Stakeholder Group meeting.* RK Partnership Ltd.

CLAPHAM, A.J. 1999. *The characterisation of two mid-holocene submerged forests*. PhD thesis. Liverpool John Moores University.

HAZELL, Z. 2008. *Offshore and intertidal peat deposits, England – a resource assessment and development of a database*. Environmental Archaeology **13**: 101-110.

MADDOCK, A. 2010. *UK Biodiversity Action Plan; Priority Habitat Descriptions*. BRIG (ed. Ant http://www.ukbap.org.uk/library/UKBAPPriorityHabitatDescriptionsRevised20100730.pdf[Accessed 14 March 2011]

National Biodiversity Network (NBN Gateway) 2011. Available at: http://data.nbn.org.uk/ [Last accessed: 6 April 2011]

SEELEY, B., LEAR, D., HIGGS, S., NEILLY, M., BILEWITCH, J., EVANS, J., WILKES, P. & ADAMS, L. 2010. *Accessing and developing the required biophysical datasets and datalayers for Marine Protected Areas network planning and wider marine spatial planning purposes*. Report No 16: Task 2C. Mapping of Protected Habitats. DEFRA Project Code: MB0102 Marine Biodiversity R&D Program.

ANNEXES

The Annexes can be found in the folder of additional information accompanying this report.