



# Hywind Scotland Pilot Park Project Phase 1 Intertidal Survey Report Statoil ASA

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# Phase 1 Intertidal Survey Report

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## EXECUTIVE SUMMARY

To support the development of the Hywind Scotland Pilot Park Project ('the Project'), Statoil Wind Limited (SWL) is undertaking an Environmental Impact Assessment (EIA). Part of the EIA will involve the assessment of potential impacts on intertidal ecology, related to the proposed onshore cable route options at Peterhead.

To inform the EIA and to evaluate the potential for impacts on intertidal ecology, SWL has appointed Xodus Group to undertake a marine intertidal Phase 1 biotope mapping survey. The aim of the survey was to characterise and map baseline ecological conditions within the survey area. At the time of the survey three potential locations for bringing the export cable ashore (cable landfall) were under consideration within the intertidal survey area: one located across the mouth of the River Ugie in the north; one at the sandy bay at The Ive in the middle of the survey area; and another to the south of the survey area adjacent to the harbour sea defences.

Prior to the survey a desk-based assessment was undertaken to identify habitats and species including protected habitats and species likely to be present in the survey area.

The intertidal survey identified 16 main biotopes and four subsidiary biotopes including biotopes dominated by lichens, fucoids, barnacles, kelp, calcareous red algae in rock pools and ephemeral green algae. The distribution of biotopes across the site relates to a range of physical factors including substrate type, degree of exposure to wave action, height on the shore and modifiers such as salinity and sand scour. The spatial extent of the intertidal zone and topography varied throughout the survey area, creating a mosaic of biotopes. Biotopes were broadly similar across the site, although local conditions e.g. sand and freshwater influence, and geology, resulted in differences in the zonation patterns on the shore and therefore the presence and extent of biotopes.

Rockpool biotopes were present throughout the site and were also present in discrete mappable areas in places. Rockpools are considered specialised biotopes of particular nature conservation interest because they are often species-rich and therefore increase the biodiversity of the shore. The north-east Scotland Biodiversity Action Plan (BAP) has a Principle Target of 'no loss, or reduction in quality, of existing estuarine and intertidal habitat'. For these reasons it is recommended that the species-rich rockpool areas are avoided and that mitigation measures are implemented to minimise intertidal impacts. Best working practice guidance, including that provided in the CIRIA coastal and marine environmental site guide (CIRCA, 2003) and the SEPA Pollution Prevention Guidelines (PPG) (SEPA, 2013), should be followed to minimise disturbance to intertidal habitats.



## 1 INTRODUCTION

A marine intertidal Phase 1 biotope mapping survey was undertaken on behalf of Statoil Wind Limited (SWL) during August 2013 to map the intertidal (eulittoral) biotopes within the coastal area being considered for the export cable route landfall for the Hywind Scotland Pilot Park Project ('Project'). The area surveyed, as shown in Figure A.1, extends approximately 1.5 km from Buchanhaven in the north, where the River Ugie discharges to sea, to the sea defences located at the North Harbour in the south.

The aim of the survey was to characterise and map baseline ecological conditions within the survey area to enable accurate assessment and to identify potential for impacts of the Project on intertidal ecology. The survey area has not been the subject of any previous intertidal biotope mapping. However, a study of the River Ugie was undertaken by Bennett and McLeod (1998). The desk-based assessment undertaken to support the survey (Section 3) cited a lack of available biodiversity records for the area and also described the site based on photographic material collected during a geotechnical walkover survey. The desk-based assessment was used to describe the site, to determine whether any habitats and species of conservation value were likely to be present and to determine the types of biotopes likely to be present within the survey area.



## 2 METHODOLOGY

The intertidal survey was carried out in accordance with the marine intertidal Phase 1 biotope mapping survey methodology as described by Wyn *et al.* (2000). This method is a standardised system of surveying and mapping littoral habitats. It is a rapid survey technique designed to produce illustrative maps of biotope distribution. The methodology advises that surveys are undertaken between April and October and during spring tides to offer the most complete results in terms of both the amount of growth on the shore and the extent of the intertidal exposed during low tide periods. Biotope mapping of soft sediments within the survey area was not included within the survey scope. These areas are, however, indicated on the biotope map as appropriate.

The surveyors walked along the shore to identify, differentiate and map the extent of biotopes. The survey was undertaken during a window of four hours (i.e. two hours either side of low tide); however, it was possible to survey three hours before and after low water due to the shore topography.

The mosaic of biotope data collected in the field was transferred onto a Geographical Information System (GIS) and colour-coded in accordance with the standard colour scheme described in the survey manual (Wyn *et al.*, 2000).



## 3 DESK-BASED ASSESSMENT RESULTS

### 3.1 Methodology

A detailed desk-based assessment was undertaken to establish background information to inform and guide the intertidal field survey. Data sources consulted as part of this assessment included:

- > Multi Agency Geographic Information for the Countryside (MAGIC) website ([magic.defra.gov.uk](http://magic.defra.gov.uk));
- > North-east Scotland Biodiversity (NESB, 2004);
- > National Biodiversity Network (NBN) gateway website ([www.nbn.org.uk](http://www.nbn.org.uk));
- > Coasts and Seas of the United Kingdom Region 3 North-east Scotland: Cape Wrath to St. Cyrus (Barne *et al.*, 1996); and
- > Photographs taken during a geotechnical walkover survey in July 2013 (Xodus, 2013).

### 3.2 Protected sites

The survey area is not located within any international or national protected sites. The nearest protected site is the Buchan Ness to Collieston Coast Special Protection Area (SPA) approximately 2 km to the south of the intertidal survey area. There are no protected sites for intertidal habitats or species within 20 km of the intertidal survey area.

### 3.3 Biodiversity Action Plans

#### 3.3.1 The UK Biodiversity Action Plan (UK BAP)

The UK BAP was published in 1994 as a response by the UK Government to the Convention on Biological Diversity which the UK signed up to in 1992 in Rio de Janeiro. It describes the biological resources of the UK and provides detailed plans for conservation of these resources, at both national and local levels. Action plans for the most threatened species and habitats have been set out to aid recovery, and reporting rounds every three to five years show how the UK BAP has contributed to the UK's progress towards the significant reduction of biodiversity loss called for by the Convention on Biological Diversity. The UK BAP encompasses over 160 Local Biodiversity Action Plans (Local BAPs), which highlight local priorities for biodiversity and conservation and work to deliver agreed actions and targets for priority habitats and species and locally important wildlife and sites.

Priority species and habitats are those that have been identified as being the most threatened and requiring conservation action under the UK BAP. Following a review in August 2007, the UK BAP priority list contained 1,150 species and 65 habitats. Although the UK Biodiversity Framework published in 2012 supersedes the UK BAP, the priority species and habitats agreed under UK BAP still form much of the basis of the new framework.

#### 3.3.2 North-east Scotland Local Biodiversity Action Plan (LBAP)

The north-east Scotland LBAP includes a specific local habitat action plan for estuarine and intertidal habitats (NESB, 2004), which includes the following important habitats:

- > Estuaries;
- > Coastal saltmarsh;
- > Seagrass beds;
- > Mudflats;



- > Sheltered muddy gravel; and
- > Littoral rock.

Of these habitats, littoral rock was identified as being the most likely to be found in the survey area.

The UK biodiversity objectives and proposed targets for littoral rock are 'to maintain the extent and quality of littoral rocky habitats in the UK, including the full diversity of communities'.

The objectives and proposed targets for littoral rock habitat set out in the north-east Scotland LBAP are:

- > Principal Objective
  - o To maintain, enhance and rejuvenate the quality, extent and status of the estuarine and intertidal habitats in north-east Scotland through appropriate habitat management, data collection, promotion, education, liaison and legislation.
- > Principal Target
  - o No loss, or reduction in quality, of existing estuarine and intertidal habitat.

### 3.4 Species and habitats records

#### 3.4.1 Existing records

There are very few existing records of the intertidal environment within or close to the survey area. Bennett and McLeod (1998) described the River Ugie, the mouth of which enters the intertidal survey area, as supporting an abundance of the fucoid *Fucus ceranoides*.

A species and habitats records request to the North East Biological Records Centre (NESBReC) did not indicate the presence of any intertidal species records identified under Annex I of the Habitats Directive, UKBAP or north-east Scotland LBAP. A high level integrated habitat system of littoral rock was identified within the intertidal survey area (NESBReC, 2013).

#### 3.4.2 Review of photographs from the geotechnical walkover survey already conducted for the Project

In July 2013, as part of the Xodus Geotechnical Support Services Scope of Work for the Project, a geotechnical walk over survey was conducted over the same area as the intertidal survey area (Xodus, 2013). A high level review of the photographs taken during this survey has been conducted to give an indication of the likely habitats, species and biotopes present in the survey area.

The whole of the intertidal area would be categorised largely as an open coast physiographic type, with a littoral width ranging from 100 – 1,000 m. It faces largely north-east, and is exposed to moderately-exposed.

The whole of the intertidal area is mostly backed by a man-made coastal wall and to the south, along Horseback (see Figure A.1), this is further supported by sea defences. There is also a Scottish Water outfall pipe bisecting the whole of the shore and a small stone pier towards Buchanhaven in the north of the survey area.

From the photographs, the majority of the intertidal habitat appears to be rock with occasional rockpools in the south, progressing to less bed rock and more large boulders to the centre. There are occasional patches of barren cobbles and boulders at the high shore, especially in the centre of the survey area. In the north of the survey area, on approach to the mouth of the River Ugie, smaller boulders and eventually sand begins to dominate the littoral habitat, with outcrops of rock.

Some of the possible biotopes (based on Connor *et al.*, 2004 classifications) observed across the majority of the survey area include those characterised by:

- > Lichens in the supra littoral and upper littoral fringe (e.g. LR.FLR.Lic.YG, LR.FLR.Lic.Ver, LR.FLR.Lic.Ver.B, LR.FLR.Lic.Ver.Ver.);





- > Barnacle dominated communities in the upper and mid shore (e.g. LR.HLR.MusB.Cht, LR.HLR.MusB.Cht.Cht, LR.HLR.MusB.Sem, LR.HLR.MusB.Sem); and
- > Furoid and kelps in the lower shore (e.g. IR.MIR.KR.Ldig.Ldig, IR.MIR.KR.Ldig.Bo)<sup>i</sup>.

Towards the northern section of the survey area, including on the stone Buchnahaven pier and amongst the sand, ephemeral green algae can be seen, possibly indicating the possible presence of the biotopes LR.FLR.Eph.Eph.Ent or LR.FLR.Eph.EphX.

Species observed from the photographs include:

- |                                  |                                 |
|----------------------------------|---------------------------------|
| > <i>Alaria esculentus</i> ;     | > <i>Littorina littorea</i> ;   |
| > Barnacle sp;                   | > <i>Patella</i> sp;            |
| > <i>Corallina officinalis</i> ; | > <i>Porphyra</i> spp.;         |
| > Corallinaceae crusts (pools);  | > <i>Laminaria digitata</i> ;   |
| > <i>Enteromorpha</i> sp;        | > <i>Ulva</i> sp;               |
| > <i>Fucus serratus</i> ;        | > <i>Verrucaria maura</i> ; and |
| > <i>Halidrys siliquosa</i> ;    | > Yellow lichens.               |

Although it is not possible to identify from the photographs taken during the geotechnical walkover survey, there is potential for some of the specialist biotopes described by Wyn *et al.* (2000) to be present within the intertidal survey area. These include rockpool and underboulder community biotopes.

A selection of photographs taken during the geotechnical survey is presented in Table 3.1.

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<sup>i</sup> Full descriptions of the biotopes observed during the survey are presented in Table 4.1

**Table 3.1** Selection of photos taken during the geotechnical walk over survey conducted in July 2013 (Xodus, 2013)



Southern section, coastal defences (background) and upper shore yellow and black lichens and rockpools.



Southern to middle of the survey area, mid shore bed rock dominated by barnacles and occasional rockpools.



Bedrock shore with cobbles and boulders in the upper supralittoral.



Middle to northern shore, bedrock progressing to large boulders. Dominated by barnacles in mid shore and kelp in lower shore.

Ephemeral green algae on Buchanhaven stone pier.



Mixed bedrock and boulder shore with rockpools.



In the north of the survey area on approach to the mouth of the River Ugie, sand begins to dominate the littoral habitat, with outcrops of rock.



## 4 SURVEY RESULTS

### 4.1 Survey conditions

The survey was undertaken by Andrea Taylor (B.Sc. Marine Biology, MCIEEM) and Polly Tarrant (B.Sc. Marine Biology, MCIEEM) on the 22<sup>nd</sup> and 23<sup>rd</sup> of August during a period of spring low tides. Low water on these days was predicted to be 0.3 m at 08:21 a.m. and 0.4 m at 09:00 a.m. respectively.

Weather conditions during the survey period were humid with fog and mist, with some fine rain on the morning of the 22<sup>nd</sup>. Visibility and light conditions were generally poor during first light when the fog was thickest. Conditions improved as the day progressed. Access to the site was gained from public highways and stairways from the sea wall to the shore. Egress from the shore was limited to points with stairways due to the inaccessibility of the sea wall defence.

### 4.2 Biotope mapping

Biotores are the basic mapping units for intertidal survey and are biological communities based on conspicuous plants or algae and animals, together with the physical characteristics of their habitat:

- > Substratum;
- > Wave exposure;
- > Tidal stream; and
- > Modifiers such as sand scour and freshwater runoff (Hiscock, 1996).

The biotores present therefore reflect the physical characteristics of the littoral zone.

#### 4.2.1 Biotores recorded

A total of 16 main biotores and four subsidiary biotores were identified from six lifeform groups. The main biotores recorded are shown in Figure A.1 and listed in Table 4.1 along with notes on species recorded, their standard codes (Connor *et al.*, 2004) and lifeform groups. Photographs of biotores recorded are shown in Table A.1.

#### 4.2.2 Subsidiary biotores

Four subsidiary biotores occurred throughout the survey area; in areas either not large enough to map or associated with different biotores at different tidal levels. Table 4.2 outlines these biotores and their occurrence throughout the survey area, but they are not displayed on Figure A.1.

The exception to this is coralline algae rockpool biotope LR.FLR.Rkp.Cor.Cor. This biotope occurred throughout the mid to low shore in relatively small pools, but was also present in large mappable pools in the north and the south of the site as shown in Figure A.1. Rockpool biotores are considered specialised biotores (Wyn *et al.*, 2000), of particular nature conservation interest because they are often species-rich and therefore increase the biodiversity of the shore (Wyn *et al.*, 2000). Rockpools (in addition to other features and criteria) are described as biotores for additional consideration in the Site of Special Scientific Interest (SSSI) Guidelines (JNCC, 1996).



Table 4.1 Phase 1 biotopes present within the survey area

Biotope number	Biotope code (ver 94.05)	Biotope name	Notes	Lifeform group
1a	N/a	N/a	Barren sea defences	N/a
1b	LR.FLR.Lic.Ver	<i>Verrucaria maura</i> on littoral fringe rock	Lichen: <i>Verrucaria maura</i> Algae: <i>Porphyra</i> sp., <i>Ulva</i> sp. Fauna: <i>Littorina saxatilis</i> , <i>Patella vulgata</i>	Lichens and algae
1c	LR.FLR.Lic	Lichens or small green algae on supralittoral rock	Lichen: <i>V. maura</i> , <i>Xanthoria</i> sp., <i>Caloplaca</i> sp., grey lichens Algae: <i>Prasiola stipitata</i> , ephemeral green algae, <i>Porphyra</i> sp., <i>Pelvetia canaliculata</i> Fauna: <i>L. saxatilis</i> , <i>Actinia</i> , <i>Littorina littorea</i> , <i>Patella</i> sp.	Lichens and algae
1d	LR.FLR.Eph.EphX	Ephemeral green and red seaweeds on variable salinity and/or disturbed eulittoral mixed substrata	Algae: <i>Enteromorpha</i>	Algal turf
1e	LR.FLR.Eph	Ephemeral green or red seaweeds (freshwater of sand-influenced)	Algae: <i>Enteromorpha</i> , <i>Ulva</i> Fauna: <i>Semibalanus balanoides</i> , <i>Patella</i> sp. <i>L. littorea</i>	Algal turf
1f	LR.FLR.Eph.EntPor	<i>Porphyra purpurea</i> and <i>Enteromorpha</i> spp. on sand –scoured mid or lower eulittoral rock	Algae: <i>Porphyra purpurea</i> , <i>Ulva</i> , <i>Enteromorpha</i> , <i>Fucus vesiculosus</i> , <i>Ascophyllum nodosum</i> Fauna: <i>S. balanoides</i>	Algal turf
1g	LS.LCS.Sh.BarSh	Barren littoral shingle	None	Shingle, coarse sand and mixed sediment
1h	LS	Littoral sediments	Fauna: <i>Arenicola marina</i> casts observed, <i>Lanice conchilega</i>	Shingle, coarse sand and mixed sediment



Biotope number	Biotope code (ver 94.05)	Biotope name	Notes	Lifeform group
2a	LR.HLR.MusB.Sem.Sem	<i>Semibalanus balanoides</i> , <i>Patella vulgata</i> and <i>Littorina</i> spp. on exposed to moderately exposed or vertical sheltered eulittoral rock	Fauna: <i>Patella vulgata</i> , <i>S. balanoides</i> , <i>Nucella lapillus</i> , <i>Mytilus edulis</i>	Mussels and Barnacles
2b	LR.HLR.MusB.Sem.FvesR	<i>Semibalanus balanoides</i> , <i>Fucus vesiculosus</i> and red seaweeds on exposed to moderately exposed eulittoral rock	Algae: <i>Fucus vesiculosus</i> , <i>Hildenbrandia</i> , <i>Chaetomorpha</i> , <i>Chondrus crispus</i> , <i>Osmundea pinnatifida</i> , <i>Fucus serratus</i> Fauna: <i>Patella</i> sp., <i>S. balanoides</i> , <i>N. lapillus</i> , <i>L. littorea</i> , <i>L. obtusata</i> , hermit crabs, <i>Spirorbis</i> , <i>M. edulis</i>	Mussels and Barnacles
2c	LR.HLR.MusB.Sem.LitX	<i>Semibalanus balanoides</i> and <i>Littorina</i> spp. on exposed to moderately exposed eulittoral boulders and cobbles	Lichen: <i>V. maura</i> Algae: <i>F. vesiculosus</i> , <i>Mastocarpus stellatus</i> , <i>Cladophora</i> , <i>Chaetomorpha</i> Fauna: <i>S. balanoides</i> , <i>Patella</i> sp., <i>N. lapillus</i> , <i>L. littorea</i> , <i>L. saxatilis</i>	Mussels and Barnacles
2d	LR.HLR.MusB.MytB	<i>Mytilus edulis</i> and barnacles on very exposed eulittoral rock	Algae: <i>Porphyra umbilicalis</i> Fauna: <i>S. balanoides</i> , <i>Patella</i> sp., <i>N. lapillus</i> , <i>L. littorea</i> , <i>M. edulis</i> , <i>Actinia equina</i> , Littorinidae	Mussels and Barnacles
2e	N/a	N/a	Sand and bedrock mosaic comprising small areas of barnacle and furoid biotopes recorded throughout the site	Shingle, coarse sand and mixed sediment



Biotope number	Biotope code (ver 94.05)	Biotope name	Notes	Lifeform group
3a	LR.MLR.BF.Fser.R	<i>Fucus serratus</i> and red seaweeds on moderately exposed lower eulittoral rock	Algae: <i>F. serratus</i> , <i>F. vesiculosus</i> , <i>C. crispus</i> , <i>M. stellatus</i> , <i>Lomentaria articulata</i> , <i>Osmundea</i> sp., Corallinaceae, <i>Ulva</i> , <i>Chaetomorpha</i> , <i>Enteromorpha</i> , <i>Corallina</i> sp. <i>Membranoptera alata</i> , <i>Leathesia difformis</i> , <i>Palmaria palmata</i> ,  Fauna: <i>Patella</i> sp., <i>Halichondria panicea</i> , <i>N. lapillus</i> , <i>S. balanoides</i> , <i>Gibbula cineraria</i> , <i>L. obtusata</i> , <i>L. littorea</i> , <i>Carcinus maenas</i> , bryozoans	Fucoids
3b	LR.LLR.F.FSpi.FS	<i>Fucus spiralis</i> on full salinity moderately exposed to very sheltered upper eulittoral rock	Lichen: <i>V. maura</i>  Algae: <i>Pelvetia canaliculata</i> , <i>F. spiralis</i> , <i>Hildenbrandia</i> , <i>Ulva</i> , ephemeral green algae  Fauna: <i>Patella</i> sp., <i>S. balanoides</i> , <i>L. obtusata</i> , <i>L. saxatilis</i> , <i>L. littorea</i>	Fucoids
3c	LR.LLR.F.Asc.X	<i>Ascophyllum nodosum</i> on full salinity mid eulittoral mixed substrata	Algae: <i>Ascophyllum nodosum</i> , <i>Polysiphonia lanosa</i> , <i>Polysiphonia</i> sp., <i>F. serratus</i> , <i>Lithothamnia</i> , <i>Cladophora</i> , <i>M. stellatus</i> , <i>Cladostephus spongiosus</i> , <i>F. vesiculosus</i>  Fauna: <i>Patella</i> sp., <i>L. littorea</i> , <i>L. obtusata</i> , <i>Spirorbis</i>	Fucoids
3d	LR.MLR.BF.PeIB	<i>Pelvetia canaliculata</i> and barnacles on moderately exposed littoral fringe rock	Lichen: <i>V. maura</i>  Algae: <i>P. canaliculata</i> , <i>Prasiola stipitata</i>  Fauna: <i>Patella</i> sp., <i>S. balanoides</i> , <i>L. saxatilis</i>	Fucoids



Biotope number	Biotope code (ver 94.05)	Biotope name	Notes	Lifeform group
4a	IR.MIR.KR.Ldig.Ldig	<i>Laminaria digitata</i> on moderately exposed sublittoral fringe bedrock	<p>Algae: <i>Laminaria digitata</i>, <i>F. serratus</i>, <i>F. vesiculosus</i>, <i>Osmundea</i> sp., <i>P. palmata</i>, <i>Corallinaceae</i>, <i>C. crispus</i>, <i>L. articulata</i>, <i>Heterosiphonia plumosa</i>, <i>M. stellatus</i>, <i>Corralina</i>, <i>Ulva</i>, <i>Dilsea carnososa</i>, <i>Elachista</i>, <i>L. difformis</i>, <i>Hildenbrandia</i>, <i>C. spongiosus</i>, <i>M. alata</i>, <i>Odonthalia</i></p> <p>Fauna: <i>L. obtusata</i>, <i>Patella</i> sp., <i>Idotea</i> sp., <i>Actinia</i>, <i>Scypha</i>, <i>H. panicea</i>, scale worm, <i>Nassarius</i> sp., <i>Spirorbis</i>, <i>Urticina felina</i>, <i>N. lapillus</i>, Bryozoans</p> <p><u>On vertical faces of gullies:</u></p> <p>Algae: <i>Porphyra</i>, <i>L. articulata</i>, <i>Corallinaceae</i>, <i>Ceramium</i> spp., <i>Alaria esculenta</i>, <i>Laminaria digitata</i>, <i>Saccharina latissima</i>, <i>M. alata</i>, <i>D. carnososa</i>, <i>F. serratus</i>, <i>Osmundea</i> sp., <i>C. crispus</i>, <i>Polyides rotundus</i>, <i>Plocamium cartilagineum</i>, <i>Delesseria sanguinea</i>, <i>Cladophora</i>, <i>Ulva</i></p> <p>Fauna: <i>Calliostoma ziziphynum</i>, <i>Scypha</i>, <i>H panicea</i>, <i>Spirorbis</i>, <i>Actinia</i>, <i>Leuteocincta</i>, <i>L. obtusata</i>, <i>Asterias rubens</i></p>	Kelp
5a	LR.FLR.Rkp.Cor.Cor	<i>Corallina officinalis</i> and coralline crusts in shallow eulittoral pools	<p>Algae: <i>Corallinaceae</i>, <i>Chaetomorpha</i>, <i>Corallina officinalis</i>, <i>Cladophora</i>, <i>M. stellatus</i>, <i>L. difformis</i>, <i>Osmundea</i>, <i>Halidrys siliquosa</i>, <i>Ceramium</i> spp., <i>Polysiphonia</i> spp.</p> <p>Fauna: <i>L. littorea</i>, hermit crabs (Paguridae), <i>Patella</i> sp., <i>A. equina</i></p>	Algal turf



Table 4.2 Subsidiary biotopes present within the survey area

Biotope code (ver 94.05)	Biotope name	Occurrence	Species notes
LR.FLR.Lic.Ver.B	<i>Verrucaria maura</i> and sparse barnacles on exposed littoral fringe rock	Observed high shore in the littoral fringe in the amongst the biotope LR.FLR.Lic	Lichen: <i>V. maura</i> Fauna: <i>S. balanoides</i> , <i>P. vulgata</i> , <i>L. saxatilis</i>
LR.FLR.Rkp.Cor.Cor	<i>Corallina officinalis</i> and coralline crusts in shallow eulittoral pools	Observed throughout the mid to low shore in relatively small pools, associated with the <i>F. vesiculosus</i> and <i>F. serratus</i> biotopes A.LR.MLR.BF.Fser.R and LR.HLR.MusB.Sem.FvesR but was also present in large mappable pools.	As 5a above in Table 4.2
LR.HLR.FR.Him	<i>Himanthalia elongata</i> and red seaweeds on exposed to moderately exposed lower eulittoral rock	Observed in the low shore on bedrock platforms above the biotopes LR.MLR.BF.Fser.R and IR.MIR.KR.Ldig.Ldig	Algae: <i>Himanthalia elongata</i> , <i>Osmundea</i> , <i>M. stellatus</i> , <i>F. serratus</i> Fauna: <i>S. balanoides</i> , <i>Patella</i> sp., <i>N. lapillus</i>
LR.MLR.BF.Rho	<i>Rhodothamniella floridula</i> on sand scoured lower eulittoral rock	Observed throughout the site north of 'The Ive' associated with the <i>F. vesiculosus</i> and <i>F. serratus</i> biotopes LR.HLR.MusB.Sem.FvesR and LR.MLR.BF.Fser.R	Algae: <i>Rhodothamniella floridula</i> , <i>Porphyra</i> , <i>Ulva</i> , <i>F. serratus</i> , <i>C. crispus</i> , <i>L. articulata</i> , <i>M. stellatus</i> , <i>Elachista</i> Fauna: <i>H. panicea</i>





### 4.3 General site overview

The topography and wave exposure of the site varies across the entire intertidal survey area. The southern part (Horseback to Ive) and the very northern part of the survey area (towards the mouth of the River Ugie) are composed of elevated and steep bedrock. The middle part of the survey area (the Gadle) is composed of lower lying bedrock in the upper and mid shore, with elevated steep bedrock only present in the low shore where patches of boulders and cobble are present amongst bedrock. The patchwork of topography creates variable levels of wave exposure throughout the site, therefore creating a mosaic of substrates and subsequent biotopes, particularly fucoid and barnacle biotopes. In areas with a more extensive intertidal area, particularly in the north of the site, more space is available to support mid-shore biotopes such as the *F. vesiculosus* and barnacle biotope LR.HLR.MusB.Sem.FvesR.

Rockpools of varying sizes and supporting a range of communities were present throughout the high shore to the low shore. In the high shore, pools tended to support high numbers of *Actinia* sp. and were dominated by coralline crusts. Pools with ephemeral green algae were also present in the high shore. In the mid shore, the pools were of the type LR.FLR.Rkp.Cor.Cor, sometimes overgrown with green algae and with very high *L. littorea* abundances. In the low shore, large pools were dominated by fucoids and kelp (mainly *L. digitata* with some *Alaria esculenta* individuals).

Boulders and cobbles, and bedrock with barnacles and *Littorina* spp, identified as the biotope LR.HLR.MusB.Sem.LitX, was recorded throughout the survey area.

The biotope mapping described below has been divided into four sections based on the broadly similar topography and/or biotopes present in these areas. Each of the four sections are generally described from south to north (unless identified noted).

#### 4.3.1 Horseback to The Ive

##### *Area overview*

This section of the survey area extends from the sea defences the vicinity of Green Hill and North Harbour in the south of the site to the sand patch at 'The Ive'. The flora and fauna present were impoverished in the high and mid-shore levels, but diversity increased in the low shore where the *Fucus* and kelp biotopes LR.MLR.BF.Fser.R and IR.MIR.KR.Ldig.Ldig were present. A dense red algae understory was present throughout the mid and low shore areas associated with *F. vesiculosus*, *F. serratus* and *L. digitata*.

The majority of the natural intertidal environment in this section of the survey area is bedrock with some patches of cobble and small boulders interspersed through all tidal levels. High shore pools supporting high numbers of *Actinia* sp. and dominated by Corraline crusts were present. In the mid shore, rockpools with coralline algae (biotope LR.FLR.Rkp.Cor.Cor) were present.

The bedrock occasionally sloped steeply thereby creating areas characteristic of high-shore and in some cases mid-shore biotopes across the entire intertidal extent. For example, *V. maura* was present from the high shore to the low shore on elevated bedrock, and mid shore biotopes dominated spatially where the intertidal zone was wide enough to support additional biotopes.

##### *Top shore*

At the top of the shore, lichens or small green algae assigned to the biotope LR.FLR.Lic were present with yellow and grey lichens and *V. maura*. On the uppermost surface of supralittoral bedrock there were small patches of *Prasiola stipitata* indicating localised areas of enrichment due to the use of this area by seabirds. There were also some areas of barren cobble and shingle towards the middle of this section.

##### *Mid shore to shallow infralittoral*

The mid shore biotopes in this section were highly variable, related to the topography and the variation in wave exposure. In the south of this section, below the lichens or small green algae biotopes LR.FLR.Lic, the *F. spiralis*



biotope LR.LLR.F.FSpi.FS was present, followed by the *S. balanoides* and *F. vesiculosus* biotope, LR.MLR.BF.Fser.R and the kelp *Laminaria digitata* biotope IR.MIR.KR.Ldig.Ldig in the shallow infralittoral.

### *Key features*

The 'Almanythie Creek' is a deep gully extending from the low shore to the mid shore. The creek supported the *L. digitata* kelp biotope IR.MIR.KR.Ldig.Ldig along its length before it was replaced by the *F. serratus* and red seaweed biotope LR.MLR.BF.Fser.R in the upper mid shore. Shelving bedrock in the low shore was recorded to support the *Himanthalia elongata* and red seaweeds subsidiary biotope LR.HLR.FR.Him. North of the creek the width of the intertidal increased to support extensive areas of barnacle dominated biotopes including LR.HLR.MusB.Sem.FvesR and LR.HLR.MusB.Sem.LitX. The barnacle and *Littorina* spp. biotope LR.HLR.MusB.Sem.LitX was present on bedrock in this area; however, it was also present on boulders and cobbles in other sections in the north. In sheltered areas the *F. spiralis* biotope LR.LLR.F.FSpi.FS was still present higher up the shore. A small area dominated by *Ascophyllum nodosum*, corresponding to the biotope LR.LLR.F.Asc.X, was recorded at the head of the creek.

In the middle of this section, in the mid shore, the geology of the site changed and was characterised by a large area of coralline algal rock pools (LR.FLR.Rkp.Cor.Cor). At the time of the site visit these pools were overgrown by the green algae *Chaetomorpha* spp. This green algae was recorded throughout the whole of the survey area in pools in the high to mid shore.

In the north of this area there is a feature called 'The Ive'. Here, an island of bedrock is created by two deep channels cut into the bedrock at either side. In the mid shore, *F. spiralis* (LR.LLR.F.FSpi.FS) became less prevalent and was replaced by barnacles and other gastropods (*P. vulgata* and *Littorina* spp), identified as the biotopes LR.HLR.MusB.Sem.Sem and LR.HLR.MusB.Sem.LitX. There are a number of large rock pinnacles in this area adjacent to 'The Ive'. The tops of the rock pinnacles supported lichens or small green algae (LR.FLR.Lic) and the fucoid *Pelvetia canaliculata* with barnacles as biotope LR.MLR.BF.PelB with the aforementioned barnacle biotopes at the mid shore level. In flatter areas, *F. serratus* with an understory of red seaweeds (LR.MLR.BF.Fser.R) was present in the mid shore, which then gave way to the kelp *L. digitata* biotope, IR.MIR.KR.Ldig.Ldig, in the infralittoral fringe.

## 4.3.2 The Gadle

### *Area overview*

This section of the survey area extends from the sand patch at 'The Ive' to the Scottish Water pipeline and outfall to the north. The topography in this section was much more uniform than that present in the south. Fewer elevated bedrock areas were present at the lower shore and there were not as many steeply sloping bedrock faces. There were some areas of elevated bedrock at the low water area on which the barnacles with the biotope LR.HLR.MusB.Sem.Sem were found. The mid shore region was much more extensive than further south and was dominated by barnacle biotopes as described below.

### *Detailed description*

In the supralittoral at the sand patch at 'The Ive' was an area of barren cobble and boulders with a narrow band of ephemeral green and red seaweeds, assigned the biotope LR.FLR.Eph.EphX, below. The rest of this area was comprised of littoral sediments. Adjacent to this sand patch was a small area of lichens LR.FLR.Lic present on elevated steep bedrock. In the high shore adjacent to these lichens was also a discrete area of *F. spiralis* which was assigned the biotope LR.LLR.F.FSpi.FS. The rest of the high and mid shore in this area to the north was then dominated by barnacle biotopes.

In the north of this area, boulders and cobbles on the upper shore were colonised by *S. balanoides* and *Littorina* spp., with *L. saxatilis* at the top of the shore and *L. littorea* lower. This was assigned the biotope LR.HLR.MusB.Sem.LitX. The mid and low shore comprised of a mosaic kelps and barnacles assigned the biotopes LR.MLR.BF.Fser.R and LR.HLR.MusB.Sem.LitX in the lower mid shore and LR.HLR.MusB.Sem.FvesR in the upper mid shore. The kelp *L. digitata* biotope IR.MIR.KR.Ldig.Ldig dominated the low shore and also formed a finger of kelp alongside the outfall pipeline from the low to the mid shore.



### *Key features*

To the north of this section, in the mid shore, there was a large area of rockpools dominated by coralline algae and assigned to the biotope LR.FLR.Rkp.Cor.Cor. The pools contained high abundances of *L. littorea* and were also overgrown by *Chaetomorpha* sp.

Sand-coured rock, colonised by the filamentous red alga *Rhodothamniella floridula* alongside other red and green algae such as *C. crispus*, *L. articulata* and *M. stellatus* was found in this area associated with the fucoid biotopes LR.HLR.MusB.Sem.FvesR and LR.MLR.BF.Fser.R. These areas were assigned the subsidiary biotope LR.MLR.BF.Rho.

### **4.3.3 Cargeddie**

#### *Area overview and description*

This section of the survey area extends from the Scottish Water pipeline and outfall in the south to the Buchanhaven Harbour Pier in the north. This small area is relatively uniform and low lying and was dominated again by a mosaic of barnacle biotopes. At the top of the shore *F. spiralis*, LR.LLR.F.FSpi.FS, formed a band below barren boulders and shingle. Below the *F. spiralis* zone followed a succession of barnacle and fucoid biotopes before kelp IR.MIR.KR.Ldig.Ldig dominated in the low shore. The mid shore barnacle and fucoid biotopes were composed of LR.HLR.MusB.Sem.LitX, a mosaic of LR.HLR.MusB.Sem.LitX and LR.HLR.MusB.Sem.FvesR and a mosaic of LR.HLR.MusB.Sem.LitX and LR.MLR.BF.Fser.R.

#### *Key features*

Sand-scoured rock colonised by the filamentous red alga *R. floridula* was also found in this area, associated with the *F. serratus* and red seaweed biotope LR.MLR.BF.Fser.R. These areas were also assigned the subsidiary biotope LR.MLR.BF.Rho. In littoral sediment patches interspersed between bedrock and boulders was evidence of polychaetes including *Arenicola marina* and *Lanice conchilega*.

Ephemeral green algae were present in higher abundances in this section and were recorded adjacent to the outfall and throughout the barnacle and *Fucus vesiculosus* biotope LR.HLR.MusB.Sem.FvesR. Where ephemeral green algae were present adjacent to the outfall there was also a higher incidence of other kelps including small *A. esculenta* and *L. saccharina* plants. *Mytilus edulis* were also observed in cracks and crevices in bedrock and in rockpools.

### **4.3.4 White Stane, Red Stane and the Skirrie**

#### *Area overview and description*

This section of the survey area extends from the Buchanhaven Harbour Pier in the east to the northern limit of the survey area where the River Ugie discharges into the sea. The geology and topography of this section is different to the previous areas surveyed. Adjacent to the Buchanhaven pier was an area of littoral sediment with ephemeral green algae and kelps in the low water. Freshwater or sand-influenced ephemeral green algae (LR.FLR.Eph) occurred on both littoral sediment and littoral rock in this area. The low water was dominated by kelps with the biotope IR.MIR.KR.Ldig.Ldig; however, as was observed in the previous survey section, a higher incidence of small *A. esculenta* and *L. saccharina* plants were present where green ephemeral algae were present.

A mosaic of barnacle biotopes again dominated the shore:

- > In the high shore, a mosaic of LR.HLR.MusB.Sem.Sem and LR.HLR.MusB.Sem.LitX;
- > In the mid shore, a mosaic of LR.HLR.MusB.Sem.Sem and LR.HLR.MusB.MytB; and
- > In the low shore, LR.HLR.MusB.Sem.Sem and LR.MLR.BF.Fser.R

To the west of the bedrock was an area of sand interspersed with small bedrock pinnacles. The biotopes present were a mosaic of the barnacle and fucoid biotopes already described and have not been mapped in detail. Within



the area of influence of the River Ugie the bedrock pinnacles supported a different community comprising of *Porphyra purpurea* and *Enteromorpha* (LR.FLR.Eph.EntPor). The bladderless form of *F. vesiculosus* was present on the uppermost surfaces of the rock pinnacles.

#### 4.4 Other noteworthy observations

A single grey seal was observed on the morning of the 22<sup>nd</sup> August 2013 in the vicinity of 'The Roan'.

Seabirds including gulls and cormorants/shags were observed on elevated bedrock throughout the site but were most abundant in the low shore. A large flock of unidentified waders was present on the shore between 'The Ive' in the south and the Scottish Water outfall in the north.



## 5 SUMMARY AND RECOMMENDATIONS

The results of the intertidal survey provide a baseline description of the rocky littoral habitats around Peterhead. The biotopes present are a reflection of the physical characteristic of the shoreline and vary depending on the degree of exposure. The topography of the coast varies, with areas of exposed elevated rock outcrops in the low shore, sheltered enclosed areas of mixed sediment in the high shore and large extents of bedrock in the mid shore supporting a mosaic of barnacle and furoid biotopes. The survey area is complex and highly variable with steeply sloping bedrock at all tidal levels and in some cases creating significant rock pinnacles.

The exposed shore and rock outcrops across the whole of the survey area were dominated by barnacles *S. balanoides* and limpets *P. vulgata*, which in the north of the survey area, were accompanied by mussels *M. edulis*. The periwinkle *L. littorea* is conspicuous on the more sheltered barnacle biotopes. Most of the survey extent comprises a mosaic of barnacle and furoid biotopes. Fucoids with an understorey of turf forming red algae and rock pools dominated by encrusting corraline algae dominate the less elevated areas.

Zonation is variable throughout the site. At the top of the shore yellow and grey lichens are present in patches with the black lichen *V. maura* present throughout the site and tidal range. Patches of the green alga *P. stipitata* are present on elevated rock frequently by seabirds. *F. spiralis* was the most abundant species in the high shore, although *P. canaliculata* was found alongside it on areas of elevated rock with steep faces in the north of the survey area. The mid shore is highly variable with *F. vesiculosus*, *F. serratus* and barnacle biotopes dominating in different areas of the shore. In the mid to low shore, furoid biotopes were dominated by *F. serratus* with an understorey of turf forming red algae often occurring as a wide band on flatter areas. However, on the more common steep rock faces in the mid to low shore, barnacle biotopes dominated.

Rockpool biotopes were found throughout the site and also form distinct mappable areas in the north and south of the site. Corraline and encrusting red algae dominated the pools with furoid and other brown and red algae. In some cases the pools were overgrown by the green algae *Chaetomorpha* spp. and supported high abundances of *L. littorea*. The sand binding alga, *R. floridula*, was recorded through the *F. vesiculosus* and *F. serratus* biotopes in the north of the site in the section of the Gadle.

Rockpool biotopes were present throughout the site and were also present in discrete mappable areas in places. Rockpools are considered specialised biotopes of particular nature conservation interest because they are often species-rich and therefore increase the biodiversity of the shore. The north-east Scotland Biodiversity Action Plan has a Principle Target of 'no loss, or reduction in quality, of existing estuarine and intertidal habitat'. For these reasons it is recommended that species rich rockpool areas are avoided and that mitigation measures are implemented to minimise intertidal impacts. Best working practice guidance including that provided in the CIRIA coastal and marine environmental site guide (CRICA, 2003) and the SEPA Pollution Prevention Guidelines (PPG) (SEPA, 2013) should be followed to minimise disturbance to intertidal habitats.



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## APPENDIX A INTERTIDAL BIOTOPES

Table A.1 Representative images of intertidal biotopes in the survey area

<p>1b. <i>Verrucaria maura</i> on littoral fringe rock</p>	<p>1c. Lichens or small green algae on supralittoral rock</p>
<p>1d. Ephemeral green and red seaweeds on variable salinity and/or disturbed eulittoral mixed substrata</p>	<p>1e. Ephemeral green or red seaweeds (freshwater of sand-influenced)</p>



1f. *Porphyra purpurea* and *Enteromorpha* spp. on sand-scoured mid or lower eulittoral rock



1g. Barren littoral shingle



1h. Littoral sediments



2a. *Semibalanus balanoides*, *Patella vulgata* and *Littorina* spp. on exposed to moderately exposed or vertical sheltered eulittoral rock





2b. *Semibalanus balanoides*, *Fucus vesiculosus* and red seaweeds on exposed to moderately exposed eulittoral rock



2c. *Semibalanus balanoides* and *Littorina* spp. on exposed to moderately exposed eulittoral boulders and cobbles



2d. *Mytilus edulis* and barnacles on very exposed eulittoral rock



2e. Sand and bedrock mosaic comprising small areas of barnacle and fucoid biotopes recorded throughout the site

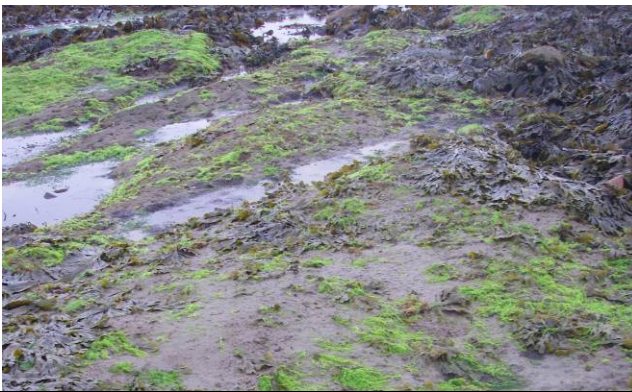
<p>3a. <i>Fucus serratus</i> and red seaweeds on moderately exposed lower eulittoral rock</p>	<p>3b. <i>Fucus spiralis</i> on full salinity moderately exposed to very sheltered upper eulittoral rock</p>
<p>3c. <i>Ascophyllum nodosum</i> on full salinity mid eulittoral mixed substrata</p>	<p>3d. <i>Pelvetia canaliculata</i> and barnacles on moderately exposed littoral fringe rock (on the high shore rock pinnacle)</p>
<p>4a. <i>Laminaria digitata</i> on moderately exposed sublittoral fringe bedrock</p>	<p>5a. <i>Corallina officinalis</i> and coralline crusts in shallow eulittoral pools</p>



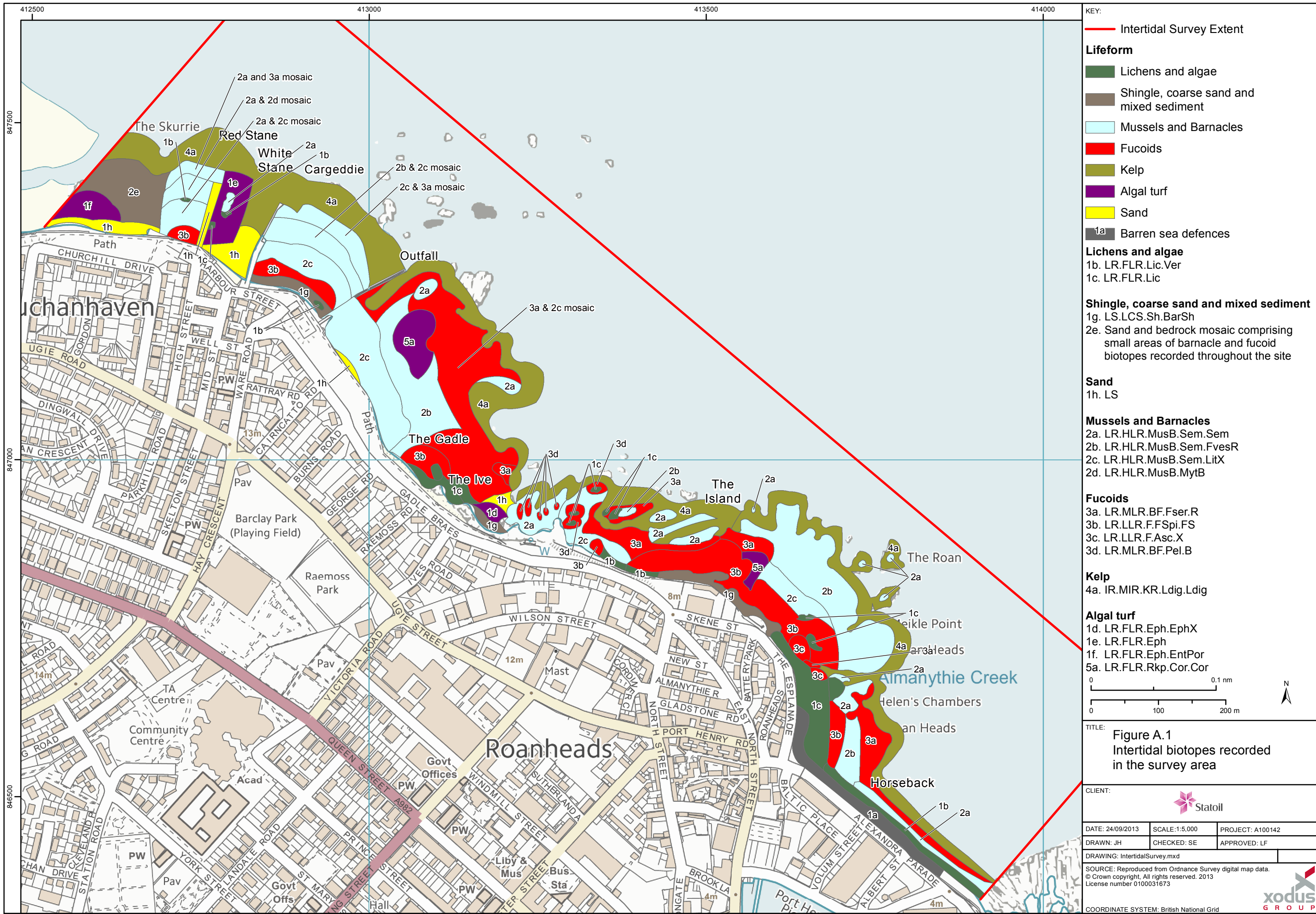
Subsidiary biotope: *Verrucaria maura* and sparse barnacles on exposed littoral fringe rock



Subsidiary biotope: *Himanthalia elongata* and red seaweeds on exposed to moderately exposed lower eulittoral rock



Subsidiary biotope: *Rhodothamniella floridula* on sand scoured lower eulittoral rock



**KEY:**

- Intertidal Survey Extent

**Lifeform**

- Lichens and algae
- Shingle, coarse sand and mixed sediment
- Mussels and Barnacles
- Fucoids
- Kelp
- Algal turf
- Sand
- 1a Barren sea defences

**Lichens and algae**

- 1b. LR.FLR.Lic.Ver
- 1c. LR.FLR.Lic

**Shingle, coarse sand and mixed sediment**

- 1g. LS.LCS.Sh.BarSh
- 2e. Sand and bedrock mosaic comprising small areas of barnacle and fucoid biotopes recorded throughout the site

**Sand**

- 1h. LS

**Mussels and Barnacles**

- 2a. LR.HLR.MusB.Sem.Sem
- 2b. LR.HLR.MusB.Sem.FvesR
- 2c. LR.HLR.MusB.Sem.LitX
- 2d. LR.HLR.MusB.MytB

**Fucoids**

- 3a. LR.MLR.BF.Fser.R
- 3b. LR.LLR.F.FSpi.FS
- 3c. LR.LLR.F.Asc.X
- 3d. LR.MLR.BF.Pel.B

**Kelp**

- 4a. IR.MIR.KR.Ldig.Ldig

**Algal turf**

- 1d. LR.FLR.Eph.EphX
- 1e. LR.FLR.Eph
- 1f. LR.FLR.Eph.EntPor
- 5a. LR.FLR.Rkp.Cor.Cor

0 0.1 nm  
0 100 200 m

**TITLE:** Figure A.1  
Intertidal biotopes recorded in the survey area

**CLIENT:** Statoil

DATE: 24/09/2013	SCALE: 1:5,000	PROJECT: A100142
DRAWN: JH	CHECKED: SE	APPROVED: LF
DRAWING: IntertidalSurvey.mxd		

**SOURCE:** Reproduced from Ordnance Survey digital map data. © Crown copyright. All rights reserved. 2013. License number 0100031673

**COORDINATE SYSTEM:** British National Grid

**xodus GROUP**