



**Phase 1 Intertidal Habitat Survey
for Brims Tidal Array Sheep Skerry
Cable Corridor and Landfall Area
of Search**

Report to BTAL

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1 INTRODUCTION

Aquatera has been commissioned to carry out a Phase 1 intertidal survey in the Sheep Skerry area of Hoy, Orkney (See Figure 1-3). BTAL has an Agreement for Lease (Afl) for this area, giving it exclusive rights to develop a tidal generation development at the Brims site with an installed capacity of up to 200MW. Installation will require associated electrical infrastructure including export cables coming ashore, landfall and onshore cable corridor to an onshore substation. This survey area has been identified as a potentially suitable cable landing point. The following document reports on the intertidal habitat survey conducted by Aquatera, which will ultimately be used to inform the Environmental Impact Assessment (EIA).

1.1 OBJECTIVES

The objectives of the survey were to:

- Identify and map biotopes present within the survey area;
- Identify and map the presence of any rare or protected species within the study area;
- Provide target notes for each biotope and any rare or protected species encountered.

1.2 SURVEY AREA

The survey area can be seen in Figure 1-3. The total survey area covered approximately 3.9ha, of which the main interest focused on the rocky shore habitat. There were also two sandy shore channels in the area covered. The boundary extended eastward to meet the boundary of the previously surveyed area to provide a complete dataset for the Brims coastline.

1.3 SURVEYORS

The survey was carried out by an experienced marine biologist and was accompanied by a second marine biologist to assist with species identification and recording of notes.

1.4 SURVEY CONDITIONS

The survey took place on Friday 19 June 2015, during low spring tide. The survey took place either side of low tide. Table 1-1 below outlines the survey conditions.

Table 1-1 Survey Details

Date	19 June 2015
Time at start	16.45
Time at finish	19.00
Tide height (m)	0.3m
Low tide (hours)	18.00 BST
Type of access	Foot
Sea condition	Sea State 3 - 4, unremarkable
Weather condition	Good – Very little wind, overcast conditions, slight periods of drizzle



1.5 SITE DESCRIPTION

The survey area is approximately 700m long and varies in width (from 50 - 150 m) due to variable substrate and tidal conditions. The littoral aspect of the area is south facing and is exposed to waves from the southwest round to the southeast.

The most western point of the survey area consists of a large boulder beach with a steep gradient. The boulders continue beyond the high water mark into grazed grassland. Moving east from the boulder area, the boulders become smaller in size and give way to a narrow sandy channel which has a fresh water source. Continuing eastward, the sand becomes patchy with a substantial area of bedrock revealing various biotopes. This bedrock contains occasional rock pools. A restricted lava outcrop between Sheep Skerry and Sands Geo forms a distinctive coastal platform which is backed by a small dune system and grazed pasture. At the most eastern point of the survey area is a second narrow sandy channel at Sands Geo.

The beach may not be commonly used by members of the public as there is no direct public access, however the beach can be accessed through farmland. Fishing gear and waste building materials were found on the site which had been discarded or washed up on the upper shore behind the boulder beach, and on the sandy bay.



Figure 1-1 Fishing gear present at survey site



Figure 1-2 Building materials discarded at survey site

The survey area is adjacent to the Hoy Special Protection Area (SPA), a designation under the European Union Directive on the Conservation of Wild Birds (Council Directive 2009/147/EC) and the Hoy Special Area of Conservation (SAC), designated under the Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive) (Council Directive 92/43/EEC). There is no overlap of these designations within the intertidal survey area, however qualifying bird species associated with the SPA may utilise this intertidal area.

1.6 LIMITATIONS

Due to the timing of the survey, only one low tide window was available on the day during daylight hours, however, it was possible to cover the entire survey area during the single survey period.



Figure 1-3 Survey area



2 METHODOLOGY

The methodology is based on the Countryside Council for Wales (CCW) 'Handbook for Marine Intertidal Phase 1 Biotope Mapping Survey' (Wyn *et al.*, 2000) and the 'Marine Nature Conservation Review: Rationale and Methods' (Hiscock, 1996).

The methods are designed to make the results compatible with subtidal habitat mapping and Terrestrial Phase 1 mapping. In terms of detail, the techniques utilised lie between Terrestrial Phase 1 mapping (JNCC, 1993) and Marine Nature Conservation Review Phase 2 marine survey methodologies (Hiscock, 1996). It is more detailed than Terrestrial Phase 1, but unlike Phase 2, does not collect full species lists for each biotope recorded.

2.1 THE INTERTIDAL ZONE

The methodology presented covers an area of the shore known as the littoral or intertidal zone. This realm extends from the splash zone just above Extreme High Water (EHW), right down the kelp zone at Extreme Low Water (ELW).

2.2 OUTLINE SURVEY AND MAPPING

Prior to the survey, satellite imagery from Esri Arc GIS at 1:5,000 scale was used to identify possible biotope boundaries in order to ensure the surveyors were familiarised with the area and that the survey could be conducted in a time efficient manner. A wireframe map was produced this way (Figure 2-1). The wireframe map was used alongside survey forms to record the extents of habitats respectively.





Figure 2-1 Wireframe map of intertidal survey area with predicted biotope delineation



2.3 RISK ASSESSMENT AND PRE-SURVEY CHECKLISTS

A pre-survey work checklist, taken from the CCW handbook (Wyn *et al.*, 2000) and adapted for Aquatera use, is provided in Appendix A. A full risk assessment is provided in Appendix C. The landowner was contacted prior to the survey to notify and request access to the private farmland in order to access the survey area.

2.4 FIELD SURVEY

Each biotope encountered was recorded as surveyors proceeded across the survey area. Each time the biotope changed, this was recorded. Photos were taken as well as notes of the dominant species present. A Garmin GPSMAP 62sc was used to mark target points and tracks.

In the sections of sandy sediment substrate, areas were dug and sampled at various intervals through a 0.85mm sieve. A section of the sediment was also sampled in order to examine the sediment profile and measure the presence and depth of the anoxic layer.

Post survey; all information was digitised using ArcMap 10. Maps were created using the guidance laid out in the CCW report (Wyn *et al.*, 2000). Biotopes were assigned and described with reference to The Marine Habitat Classification for Britain and Ireland (v04.05) (Connor *et al.*, 2004). All species names were taken from The Marine Life Information Network (MarLIN) and the Algaebase website for certain species of seaweed, which were not listed on the MarLIN site.



3 RESULTS

3.1 DESCRIPTION OF HABITAT TYPES AND LOCATIONS THROUGHOUT THE SURVEY AREA

In the most western point of the survey area, the intertidal zone is comprised of boulders. There is clear zonation of biotopes in this area from Extreme High Water (EHW) to Extreme Low Water (ELW) (Figure 3-1).

The rocks in the upper shore splash zone are characterised by the biotope LR.FLR.Lic (Lichens or small green algae on supralittoral rock). The boulders are covered in green, orange and black lichen (Figure 3-2). The green algae *Ulva latuca* is also present. Below this the biotope LR.MLR.BF.FspiB (*Fucus spiralis* on full salinity exposed to moderately exposed upper eulittoral rock) is present and is dominated by *F. spiralis*. The green algae *Cladophora spp.*, *S. balanoides*, *N. lapillus* and *P. vulgata* are also present.

In the lower shore area, the rocks show a similar faunal presence but with a higher level of *Fucus serratus*. Therefore this biotope is defined as LR.MLR.BF.Fser.Bo (*Fucus serratus* and under-boulder fauna on lower eulittoral boulders). The lowest level of the shore is part of the infralittoral zone and identified as IR.MIR.KR.Ldig (*Laminaria digitata* on moderately exposed sublittoral fringe rock) (Figure 3-3). *Hemanthalia elongate*, *Laminaria digitata*, and *F. serratus* are also present in this zone.

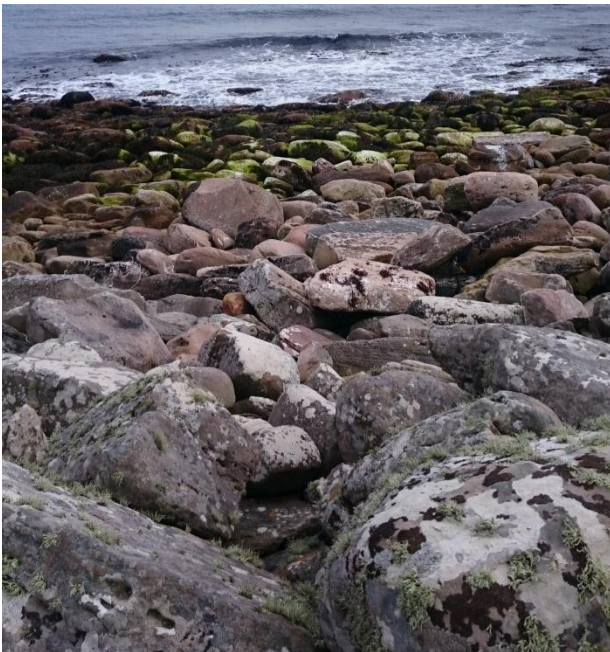


Figure 3-1 Changing biotopes from upper to lower shore



Figure 3-2 Lichen zone on the upper shore



Figure 3-3 Low shore dominated by *F. serratus* leading into the sublittoral kelp zone

Progressing eastwards, the boulders are smaller in size and the gradient from low to high shore is much flatter (Figure 3-4). The sheltered side of the boulders have a covering of *Fucus spiralis* and *Ascophyllum nodosum*. The more exposed side of the boulders also have *Fucus vesiculosus*, and infrequent *F. serratus*. Fauna in this area include periwinkles, barnacles (*Semibalanus balanoides*), *Actinia equina*, *Patella vulgata*, *Nucella lapillus*. The dominant biotope in this area is found on the sheltered side of the rock and is identified as LR.LLR.F.Asc (*Ascophyllum nodosum*, on very sheltered mid eu littoral rock). The boulder substrate gives way to sandy substrate and the boulders become more dispersed. These boulders have a cover of *F. serratus* and *Cladophora spp.*. This biotope is identified as LR.MLR.BF.Fser.R (*Fucus serratus* and red seaweeds on moderately exposed lower eu littoral rock).



Figure 3-4 Boulder beach

The boulder patches give way to a sandy bay with narrow channel (Figure 3-5). The lower shore has evidence of numerous lugworm *Arenicola marina* casts and the sand has an approximate grain size of 0.85mm (Figure 3-6). The

upper shore has the same grain size, but with no presence of lugworm casts. Sandhoppers *Talitridae sp.* are present in the upper shore biotope. The lower shore is designated as LS.LSa.FiSa.Po (Polychaetes in littoral fine sand), and the upper shore as LS.LSa.FiSa (Polychaete/amphipod dominated fine sand shores). On the upper shore there is also a source of fresh water running down to the beach (Figure 3-7). *F. serratus* is found growing on boulders in sections of the sand where the running fresh water creates impressions (Figure 3-8). This is designated as its own biotope LR.FLR.Eph (Ephemeral green or red seaweeds (freshwater or sand influenced)).



Figure 3-5 Narrow sandy channel



Figure 3-6 Lugworm casts visible on the lower shore



Figure 3-7 Freshwater source on the upper shore



Figure 3-8 Freshwater flows on ephemeral seaweeds

Moving on from the sandy beach habitat, there is a restricted lava outcrop which forms a distinctive coastal platform of bedrock (Figure 3-9). As the sand gives way to the bedrock area, there are sandy patches with a covering of *U. latuca*, red algae, *P. vulgata*, *Polisiphonia lanosa* and *A. nodosum*, identified as LF.FLR.Eph (Ephemeral green or red seaweeds (freshwater or sand influenced)). At the lower shore, which would normally be covered at high water, *L. digitata*, *F. serratus*, *P. vulgata* and *A. equina* are present. This is identified as IR.MIR.KR.Ldig (*Laminaria digitata* on moderately exposed sublittoral fringe rock).

The rocks above the tide level are covered in *S. balanoides* with some *P. vulgata* and *N. lapillus* present. This is identified as the biotope LR.HLR.MusB.Sem (*Semibalanus balanoides* on exposed to moderately exposed or vertical sheltered eulittoral rock) (Figure 3-9). Above this barnacle dominated area, is a layer of LR.MLR.BF.PelB (*Pelvetia canaliculata* and barnacles on moderately exposed littoral fringe rock.). The rocks below the tide level at high water are dominated by *F. serratus* and this area is designated LR.MLR.BF.Fser (*Fuccus serratus* on moderately exposed lower eulittoral rock).



Figure 3-9 Bedrock platform, dominated by barnacle cover

The bedrock platform is also interspersed with rockpools which can be divided into two biotopes. The first are permanent, large, deep rock pools, with *L. digitata*, *F. serratus*, *Cladophora spp.*, *A. equina*, *N. lapillus* and *P. vulgata* (Figure 3-10). This is designated as LR.FLR.Rkp.FK (Fucoids and kelp in deep eulittoral rockpools). The second type of rockpool biotope is much smaller, shallower and have a carpet of green algal cover (Figure 3-11). This is designated as LR.FLR.Rkp.G (Green seaweeds (*Enteromorpha spp.* and *Cladophora spp.*) in shallow upper shore rockpools).



Figure 3-10 Permanent, large, deep rock pool dominated by fucoids, kelps and thongweed

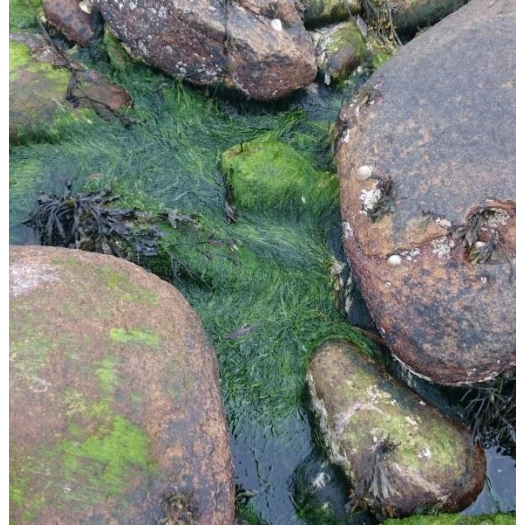


Figure 3-11 Small, shallow rockpool with green algae.

Progressing eastward, exposed bedrock above the high tide level, except perhaps at extreme high water, is dominated by black lichen (Figure 3-12). In this area, *F. serratus* and *Pelvetia canaliculata* are also present. This biotope is identified as LR.FLR.Lic.Ver.B (*Verrucaria maura* and sparse *S. balanoides* on exposed fringe rock).



Figure 3-12 Bedrock dominated by black lichen

The final biotope described at Sands Geo in the most westerly point of the survey area is comprised of another narrow sandy channel with coarse sand and a shallow anoxic layer (Figure 3-13 and Figure 3-14). The biotope is LS.LSa.MOSa.BarSa (Barren littoral coarse sand).



Figure 3-13 Fine sand with shallow anoxic layer



Figure 3-14 Sands Geo, narrow sandy channel

3.1 BIOTOPES

In total, 16 different biotopes have been recorded over the intertidal survey area. Table 3-1 outlines the biotopes found, each type of biotope is coloured to illustrate their distribution on the map in Figure 3-15 and individual polygons are mapped in relation to each discrete biotope. However, for clarity the colouring of each polygon is carried out at Lifeform level. Bunker & Foster-Smith (1996) was used to group the biotopes into 16 Lifeforms and to six biotope types – broader mapping units that usually include several biotopes.



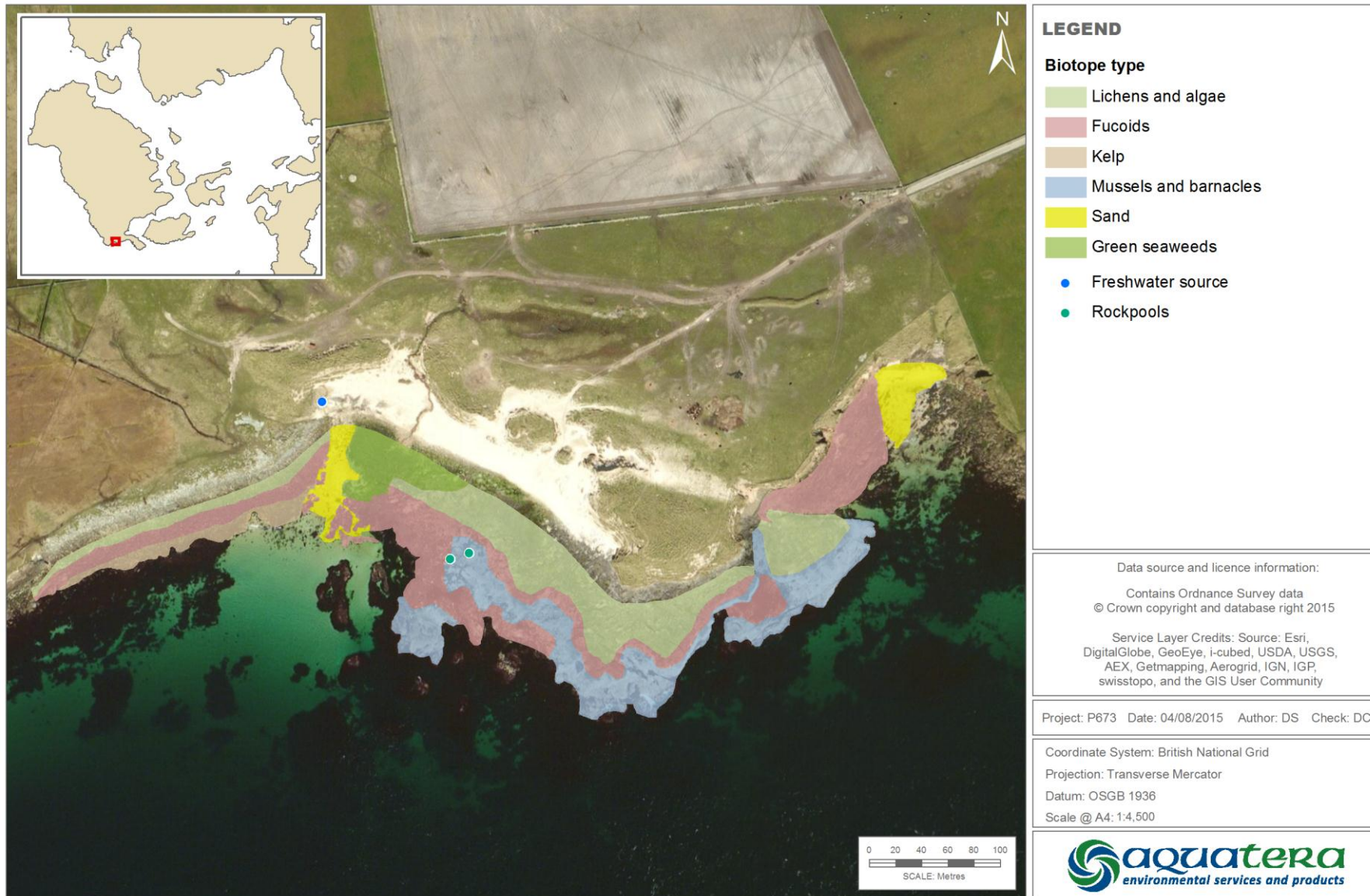


Figure 3-15 Sheep Skerry intertidal biotopes



Table 3-1 Detailed breakdown of biotopes

Biotope Code	Biotope Description	Notes
LR.FLR.Lic	Lichens or small green algae on supralittoral rock	Occurs in the upper splash zone. Characterised by presence of lichens and <i>Ulva latuca</i>
LR.MLR.BF.FspiB	<i>Fucus spiralis</i> on full salinity exposed to moderately exposed upper eulittoral rock	Mid- high shore, boulders dominated by <i>F. spiralis</i> and <i>Cladophora spp</i>
LR.MLR.BF.Fser.Bo	<i>Fucus serratus</i> and under-boulder fauna on lower eulittoral boulders	Low shore, large boulders dominated by <i>F. serratus</i>
IR.MIR.KR.Ldig	<i>Laminaria digitata</i> on moderately exposed sublittoral fringe rock	Sublittoral kelp zone. <i>Hemanthalia elongata</i> (thong weed) was mixed in with the kelp zone in this location
LR.LLR.F.Asc	<i>Ascophyllum nodosum</i> , on very sheltered mid eulittoral rock	This zone of mid-sized boulders was dominated by fucoids and a wide range of fauna including winkles, limpets, barnacles and anemones
LR.MLR.BF.Fser.R	<i>Fucus serratus</i> and red seaweeds on moderately exposed lower eulittoral rock	Lower shore, occurs on bedrock rather than boulders. Domiated by <i>F. serratus</i>
LR.FLR.Eph	Ephemeral green or red seaweeds (freshwater or sand influenced)	Feature in littoral rock of direct effect of sand or freshwater. Seen here as evidenced by freshwater source on sand, and presence of <i>F. serratus</i>
LS.LSa.FiSa.Po	Polychaetes in littoral fine sand	Fine sand with evidence of lugworms
LS.LSa.FiSa	Polychaete/ amphipod dominated fine sand shores	Fine sand with evidence of sandhoppers (no evidence of lugworm)
LS.LSa.MoSa.BarSa	Barren littoral coarse sand	Coarse sand lacking a macrofaunal community
LR.HLR.MusB.Sem	<i>Semibalanus balanoides</i> on exposed to moderately exposed or vertical sheltered eulittoral rock	Above the level of low tide was a large area of barnacle covered rock. This area also had <i>P. vulgata</i> and <i>N. lapillus</i>
LR.MLR.BF.Fser	<i>Fucus serratus</i> on moderately exposed lower eulittoral rock	Similar to LR.MLR.BF.Fser.Bo but without the presence of red algae
LR.MLR.BF.PelB	<i>Pelvetia canaliculata</i> and barnacles on moderately exposed littoral fringe rock	<i>P. canaliculata</i> zone in between barnacle zone and black lichen zone
LR.FLR.Lic.Ver.B	<i>Verrucaria maura</i> and sparse barnacles on exposed fringe rock	Presence of black lichen on high splash zone rock. Also sparsely populated with barnacles and limpets
LR.FLR.Rkp.FK	Fucoids and kelp in deep eulittoral rockpools	Rockpool that is big, deep and dominated by kelp, and fucoids
LR.FLR.Rkp.H	Hydroids, ephemeral seaweeds and <i>Littorina littorea</i> in shallow eulittoral mixed substrata and pools	Small, shallow rockpool covered in a carpet of green algae



4 CONCLUSIONS

4.1 HABITATS

Intertidal boulder communities are listed in the UK Biodiversity Action Plan list of priority habitats (JNCC, 2007). The aim of this list is to ensure that these habitats remain in focus and change to their frequency or health can be monitored. This habitat is on this list as it is a functional habitat and is in decline in the UK. It is also a habitat for which the UK has international obligations for conservation (Council Directive 92/43/EEC).

In addition, Maritime Cliff and Slopes as well as Coastal Sand Dunes, were found above the intertidal zone, and thus outside the survey area, are also defined as UK BAP priority habitats.

4.2 SPECIES

The dog whelk (*Nucella lapillus*) is an OSPAR species (OSPAR, 2008) and was found on most of the intertidal rock. The Convention for the Protection of the Marine Environment of the North-East Atlantic or OSPAR Convention is the current legislative instrument regulating international cooperation on environmental protection in the North-East Atlantic. However, the dog whelk is a common species in the UK and is not protected under any other piece of legislation. No UK BAP priority marine species were recorded.

4.3 CONSTRAINTS AT LANDFALL

There are no impacts foreseen on the intertidal sediment of Sheep Skerry. It is possible that there could be potential impacts on the sand dune system (a UK BAP priority habitat) within the supralittoral zone, or to the intertidal boulder community both directly from cable laying and indirectly from changes to the topography of the bay during the construction phase.



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6 APPENDICES



APPENDIX A

Task	Complete
Check that the aerial imagery available through ArcGIS is suitable, if not obtain aerial photography from the emapsite.	
Compile any existing survey data including information on habitats and species recorded in the area.	
Obtain local information about access, land ownership and hazards such as steep cliffs, deep mud or rivers.	
Obtain permission for access where necessary. Note that the presence of a public footpath does not automatically give the right of access to a site; permission from the landowner must still be obtained. N.B. BTAL will liaise with landowners in the first instance.	
Find out about scheduled species that may be disturbed by the survey e.g. breeding birds and pupping seals. Avoid these areas if possible and seek advice from the relevant Nature Conservation Agency (SNH/Marine Scotland). Obtain any required licences.	
Carry out a risk assessment of the survey work and train staff in health and safety issues as required (see Appendix C).	
Train staff and agree recording standards.	
Schedule survey days according to spring tides.	
Organise survey accommodation, travel arrangements and boat hire (if applicable).	
Divide coastline/survey area into sites as required e.g. SSSI, selection units.	
Produce wireframe maps at 1:5,000.	
Assemble survey equipment and Personal Protective Equipment (PPE).	



APPENDIX B



Intertidal Phase 1 Survey Form: Page 1

Site no.

Site Name:.....
 Survey Area:.....
 County:.....
 Area of Search:..... Selection Unit:.....
 Centre of Site (Grid ref):
 Extent of Site (N to S) From:..... To:.....
 Position derived from: OS Map GIS

	Visit 1	Visit 2	Visit 3	Visit 4
Surveyor 1				
Surveyor 2				
Surveyor 3				
Surveyor 4				

Date	
Time at Start	
Time at Finish	

Tide Height (m)	
Low Tide (hours)	
Type of Access (boat/foot)	
Sea Condition	
Weather Condition	

N.B. Sea / weather condition: Good, Poor and Bad

Additional people on survey: incl. date, job title, reason for coming on survey

Survey Status	✓	Comments
Further Phase 1 recommended		
Further Phase 2 recommended		
Phase 2 data available		



Physiographic features

Site no.

Physiographic Type ✓	
Open Coast	
Linear Coast	
Islands/Rocks	
Semi-enclosed Coast	
Strait/Sound	
Barrier Beach	
Enclosed Coast	
Embayment/Inlet	
Ria	
Estuary	
Isolated Saline Water	
Littoral Width ✓	
<1 m	
1 – 10 m	
10 – 100 m	
100 – 1000 m	
>1000 m	
Littoral Aspect ✓	
North	
North-east	
East	
South-east	
South	
South-west	
West	
North-west	
South and east facing	
South and west facing	
North and east facing	
North and south facing	
North and west facing	
West and east facing	
All Aspects (e.g. island)	

Wave Exposure ✓	
Exposed	
Moderately Exposed	
Sheltered	
Tidal Streams	
Strong (>3 kn)	
Mod.strong (1 – 3 kn)	
Weak (<1 kn)	
Unknown	
Salinity ✓	
Full (30 – 40 %)	
Variable (18 – 40 %)	
Reduced (18 – 30 %)	
Low (<18 %)	
Inclination ✓	
Vertical faces (80 – 100 E)	
Very steep faces (40 – 80 E)	
Upper faces (0 – 40 E)	
Architecture ✓	
Rockpools	
Overhangs	
Underboulders	
Gully	
Cave	
Shore Backing ✓	
Hard cliff	
Soft cliff/scree	
Boulder clay	
Storm beach	
Dunes	
Saltmarsh	
Pasture	
Artificial	

Substratum ✓	
Bedrock	
Very large boulders >1.024 m	
Large boulders 0.512 – 1.024 m	
Small boulders 25.6 – 51.2 cm	
Cobbles 6.4 – 25.6 cm	
Pebbles 1.6 – 6.4 cm	
Gravel 4 – 16 mm	
Stone	
Shell	
Dead maerl	
Live maerl	
Sand-coarse 1 – 4 mm	
Sand-medium 0.25 – 1mm	
Sand-fine 0.063 – 0.25 mm	
Mud <0.063 mm	
Artificial – metal	
Artificial stone/concrete	
Artificial – wood	
Peat	
Substratum Type ✓	
Hard – Unknown	
Hard – Slate	
Hard – Sandstone/Mudstone	
Moderately Hard – Unknown	
Moderately hard – Limestone	
Moderately Hard – Friable	
Moderately Hard – Slate/Shale	
Soft – Unknown	
Soft – Sandstone/Mudstone	
Soft – Chalk/Limestone	
Very soft – Unknown	
Very soft – Clay	
Very soft – Peat	

Uses and impacts

Site no.

Uses & Impacts	✓	Notes
Fishing – netting		
Fishing – angling		
Collection – bait digging		
Collection – shellfish		
Collection – algae		
Boulder turning for peelers		
Extraction – sand/gravel		
Extraction – maerl		
Aquaculture – algae		
Coastal defence – seawalls		
Coastal defence – dredging		
Coastal defence – groynes		
Land claim		
Military use		
Sewage discharge		
Waste dumping		
Industrial waste discharge		
Litter and debris		
Oil/tar/chemicals		
Educational/Scientific study		
Recreational – facilities		
Recreational – resort		
Recreational – marina		
Recreational – popular beach		
Recreational – water sports		
Recreational – wind surfing		
Mooring/beaching/launching		
Evidence of physical damage		
Other		

Conservation interests

Site no.

Conservation interests	✓	Notes
Unspoilt/Natural	<input type="checkbox"/>	
Intrinsic appeal	<input type="checkbox"/>	
Good zonation	<input type="checkbox"/>	
High biotope richness	<input type="checkbox"/>	
Highly species rich	<input type="checkbox"/>	
Ornithological interest	<input type="checkbox"/>	
Seal haul out	<input type="checkbox"/>	

Biotopes	✓	Specify biotopes
Specialised biotopes	<input type="checkbox"/>	
Nationally important	<input type="checkbox"/>	
BAP	<input type="checkbox"/>	
AoS rare	<input type="checkbox"/>	
AoS scarce	<input type="checkbox"/>	

Species	✓	Specify species abundance and biotopes
Internationally rare	<input type="checkbox"/>	
Nationally rare	<input type="checkbox"/>	
Nationally scarce	<input type="checkbox"/>	
BAP	<input type="checkbox"/>	
Northern distribution	<input type="checkbox"/>	
Southern distribution	<input type="checkbox"/>	

Introduced Species		
Non-native (established)	<input type="checkbox"/>	
Non-native (not established, e.g. Farmed, Washed up)	<input type="checkbox"/>	

Artificial Substrata

Site no.

Artificial Substrata	✓	Notes & Target Note References	Biotopes
Sea-wall (quay, bridge supports)			
Rip-rap (large boulders)			
Gabions			
Outfalls (sluice)			
Slipway			
Groyne			
Pontoon			
Jetty			
Moorings			
Drydock			
Breakwater			
Tip waste			
Other (wooden posts, wreck etc.)			

Site Description

Site no.

Site Description
[Specific reason for site selection; outline biotopes present, particularly their spatial arrangement; general location of site; highlight any unusual or important features of conservation value; shore type; existing SSSI designations; uses and impacts]

SSSI Designation:	Copy of SSSI citation on file:
Other Conservation Designations:	
Access Type: Road / Track / Path (Road – vehicular access, Track – 4x4 vehicular access, Path – foot access only)	
Status: Public / Private	
Contact Details:	
Notes:	
File name and location of site description:	

Typical biotopes for rocky shores

Site no.

Broad Habitat Code	Habitat Complex Code	Biotope Complex Code	Biotope (shortened)	Code	Sub-biotope (shortened)	Code	✓
LR	LR.HLR	LR.HLR.MusB	MytB				
			Cht				
				Cht.Cht			
				Cht.Lpyg			
			Sem				
				Sem.Sem			
				Sem.FvesR			
				Sem.LitX			
			LR.HLR.FR	Fdis			
		Coff					
				Coff.Coff			
				Coff.Puly			
		Him					
		Pal					
		Mas					
	Osm						
	RPid						
	LR.HLR.FT	AscT					
		FserT					
		FserTX					
	LR.MLR	LR.MLR.MusF	MytFves				
			MytFR				
			MytPid				
		LR.MLR.BF	PelB				
			FspiB				
			FVesB				
			Fser				
				Fser.R			
				Fser.Bo			
			Fser.Pid				
Rho							
LR.LLR	LR.LLR.F	Pel					
		Fspi					
			Fspi.FS				
			Fspi.X				
		Fves					
			Fves.FS				
			Fves.X				

Broad Habitat Code	Habitat Complex Code	Biotope Complex Code	Biotope (shortened)	Code	Sub-biotope (shortened)	Code	✓	
			Asc					
					Asc.FS			
					Asc.X			
			Fserr					
					Fserr.FS			
					Fserr.X			
		LR.LLR.FVS		PeIVS				
					FspiVS			
					FvesVS			
					AscVS			
					Ascmac			
					FserVS			
					Fcer			
		LR.FLR	LR.FLR.Lic		YG			
	Pra							
	Ver					Ver.B		
						Ver.Ver		
	Bli							
	UloUro							
	LR.FLR.Rkp			G				
					Cor		Cor.Cor	
						Cor.Par		
						Cor.Bif		
						Cor.Cys		
				FK				
						FK.Sar		
	SwSed							
	H							
	LR.FLR.CvOv		ChrHap					
				GCv				
				AudPil				
				AudCla				
				VmucHil				
				SpR				
						SpR.Den		
				SpByAs				
				FaCr				
				ScrFa				
				BarCv				
	LR.FLR.Eph		Ent					
				EnrPor				
				EphX				
BLitX								



Typical biotopes for sedimentary shores

Site no.

Broad Habitat Code	Habitat Code	Complex Code	Biotope Code	Complex Code	Biotope (shortened)	Code	Sub-biotope (shortened)	Code	✓		
LS	LS.LCS		LS.LCS.Sh		BarSh						
					Pec						
	LS.LSa		LS.LSa.St		Tal						
					MytFab						
					LS.LSa.MoSa		BarSa				
							OI				
			OI.FS								
			OI.VS								
			AmSco								
					AmSco.Sco						
					AmSco.Eur						
					AmSco.Pon						
			LS.LSa.FiSa				Po				
							Po.Pfui				
							Po.Aten				
			LS.LSa.MuSa				MacAre				
							CerPo				
							HedMacEte				
	BatCare										
	Lan										
	LS.LMu		LS.LMu.MEst		NhomMacStr						
					HedMac						
					HedMacScr						
			LS.LMu.UEst				NhomStr				
							Hed				
							Hed.Str				
					Hed.Cvol						
					Hed.OI						
					Tben						
	LS.LMx		LS.LMx.GvMu			HedMx					
						HedMx.Mac					
						HedMx.Scr					
HedMx.Str											
HedMx.Cir											
HedMx.Cvol											
		LS.LMx.Mx			CirCer						
LS.LMp					NVC types						
					LS.LMp.LSgr			Znol			

Broad Habitat Code	Habitat Complex Code	Biotope Complex Code	Biotope (shortened) Code	Sub-biotope (shortened) Code	✓
	LS.LBR	LS.LBR.Sab	Salv		
		LS.LBR.LMus	Myt		
				Myt.Mx	
				Myt.Sa	
				Myt.Mu	



Specialised Biotopes

Site no.

Complete species list for specialised and Nationally important biotopes	
Biotope	Species list
<p>File name and location of specialised biotope species lists:</p> <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	
<p>Typed species list attached to form</p>	

Species list checklist

Site no.

Species list Site Name/No.:

Date:

Surveyors:

	Insecta indet.
	<i>Petrobius maritimus</i>
MOLLUSCA	
	<i>Acanthochitona</i>
	<i>Lepidochitona cinerea</i>
	<i>Leptochiton asellus</i>
	Polyplacophora indet.
	<i>Calliostoma</i>
	<i>Crepidula fornicata</i>
	<i>Gibbula cineraria</i>
	<i>Gibbula umbilicalis</i>
	<i>Helcion pellucidum</i>
	<i>Hydrobia</i> sp.
	<i>Hydrobia ulvae</i>
	<i>Littorina littorea</i>
	<i>Littorina neglecta</i>
	<i>Littorina nigrolineata</i>
	<i>Littorina obtusata</i>
	<i>Littorina saxatilis</i>
	<i>Melarhaphe</i>
	<i>Nucella lapillus</i>
	<i>Osilinus lineatus</i>
	<i>Patella depressa</i>
	<i>Patella</i>
	<i>Patella vulgata</i> sp.
	Rissoidae indet.
	<i>Trivia monacha</i>
:OPISTHOBRANCHIA	
	<i>Acteon tornatilis</i>
	<i>Archidoris</i>
	<i>Philine aperta</i>
	<i>Retusa obtuse</i>
:BIVALVIA	
	<i>Angulus tenuis</i>
	<i>Anomia ephippium</i>
	<i>Barnea candida</i>
	<i>Cerastoderma edule</i>
	<i>Chamelea gallina</i>
	<i>Crassostrea gigas</i>
	<i>Donax vittatus</i>

	<i>Ensis ensis</i>
	<i>Ensis siliqua</i>
	<i>Fabulina fabula</i>
	<i>Heteranomia squamula</i>
	<i>Hiatella arctica</i>
	<i>Lutraria lutraria</i>
	<i>Macoma balthica</i>
	<i>Mya arenaria</i>
	<i>Mya truncate</i>
	<i>Mytilus edulis</i>
	<i>Ostrea edulis</i>
	<i>Pholas dactylus</i>
	<i>Scrobicularia plana</i>
	<i>Tapes rhomboides</i>
	<i>Venerupis senegalensis</i>
BRYOZOA	
	<i>Alcyonidium diaphanum</i>
	<i>Alcyonidium gelatinosum</i>
	<i>Alcyonidium hirsutum</i>
	Bryozoa indet. (crusts)
	Bryozoa indet. (non-crusts)
	<i>Bugula</i> sp.
	Crisiidae indet.
	<i>Electra pilosa</i>
	<i>Flustrellidra hispida</i>
	<i>Membranipora</i>
ECHINODERMATA	
	<i>Asterina gibbosa</i>
	<i>Asterias rubens</i>
:OPHIUROIDEA	
	<i>Amphipholis squamata</i>
	<i>Ophiothrix fragilis</i>
	<i>Ophiura ophiura</i>
	Ophiuroidea indet.
:ECHINOIDEA	
	<i>Echinocardium cordatum</i>
	<i>Echinus esculentus</i>
	<i>Psammechinus miliaris</i>

TUNICATA	
	:ASCIDIA
	<i>Aplidium punctum</i>
	<i>Ascidium conchilega</i>
	Ascidiacea indet.
	<i>Ascidiella scabra</i>
	<i>Ascidiella</i> sp.
	<i>Botrylloides leachi</i>
	<i>Botryllus schlosseri</i>
	<i>Clavelina lepadiformis</i>
	Didemnidae indet.
	<i>Morchellium argus</i>
	Polyclinidae indet.
	<i>Polyclinum aurantium</i>
	<i>Styela clava</i>
PISCES	
	:OSTEICHTHYES
	<i>Ammodytes</i> sp.
	Gobiidae indet.
	<i>Lipophrys pholis</i>
	<i>Pholis gunnellus</i>
	Pisces indet.
	<i>Pomatoschistus minutus</i>
RHODOPHYTA	
	<i>Ahnfeltia plicata</i>
	<i>Audouinella purpurea</i>
	<i>Gelidium latifolium</i>
	<i>Gelidium pusillum</i>
	<i>Hildenbrandia rubra</i>
	<i>Nemalion helminthoides</i>
	<i>Palmaria palmata</i>
	<i>Porphyra purpurea</i>
	<i>Porphyra umbilicalis</i>
	<i>Rhodothamniella floridula</i>
:CORALLINALES	
	<i>Corallina officinalis</i>
	Corallinaceae indet. (crusts)
	<i>Mesophyllum lichenoides</i>
:GIGARTINALES	
	<i>Calliblepharis jubata</i>
	<i>Catenella caespitosa</i>
	<i>Chondrus crispus</i>
	<i>Cystoclonium purpureum</i>

APPENDIX C

Sheep Skerry Intertidal Survey Risk Assessment Safe Work Method Statements

Aquatera currently operates an active and ongoing Health & Safety management system. This system is focused on protecting people's Health & Safety through the early identification and management of potential risks across all our activities.

It is Aquatera's policy to perform a risk assessment before each new task commences.

Aquatera recognises that aspects of the proposed role of **Intertidal Surveyor** for **Brims Tidal Array** will involve the following potential hazards:

- Environment (weather, terrain, working in remote areas)
- Health
- Safety
- Lone and out of hours working

The hazards will be individually risk assessed for **Sheep Skerry, Melsetter, Hoy** before work commences using Safe Work Method Statements.

Within the Safe Work Method Statements, the residual risks will be ascertained taking into account the successful implementation of the specific mitigation measures planned for each identified hazard.

The consequence and likelihood classification factors that will be used are described in Table 6-1 and Table 6-2. The overall classification scheme used for the risk assessment process is outlined below (Table 6-2).

How to calculate the level of risk:

A **hazard** is anything with the potential to cause harm.

The **probability** is the likelihood that an unplanned event involving a hazard will occur.



The **consequence** is the possible severity of the outcome.
 The **level of risk** is the product of the likelihood and the Consequence

Table 6-1 Categories used in calculating level of risk

Weighting	Probability Category	Consequence Category
0	Not possible	No effects
1	Extremely unlikely	Negligible
2	Very unlikely	Minor
3	Unlikely	Moderate
4	Uncommon	Major
5	Likely	Extreme

Table 6-2 Categories used in calculating level of risk

Key

	No perceptible risk
	No specific action for activity, but manage and monitor for continued improvement
	Risk reducing measures required to be included to allow the specific activity to be tolerable ALARP = as low as reasonably practicable
	Intolerable risk for activity, devise alternative method for this aspect



		Consequence					
		0	1	2	3	4	5
Probability	0	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
	1	Not applicable	Broadly acceptable	Broadly acceptable	Broadly acceptable	Tolerable if ALARP	Tolerable if ALARP
	2	Not applicable	Broadly acceptable	Broadly acceptable	Tolerable if ALARP	Tolerable if ALARP	Intolerable
	3	Not applicable	Broadly acceptable	Broadly acceptable	Tolerable if ALARP	Tolerable if ALARP	Intolerable
	4	Not applicable	Broadly acceptable	Tolerable if ALARP	Tolerable if ALARP	Intolerable	Intolerable
	5	Not applicable	Tolerable if ALARP	Tolerable if ALARP	Intolerable	Intolerable	Intolerable



Safe Work Method Statements

Intertidal Surveyor	Brims Sheep Skerry Cable Corridor
----------------------------	--

Work activity and task/s: **Carry out an intertidal survey of Sheep Skerry cable corridor and landfall AoS by foot**

Work Location and details: **Sheep Skerry, Melsetter, Hoy**

Persons undertaking work task/s:	Duncan Clarke and Sarah Murray
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Work task supervisor: xxxxx	Signature/date: [Insert date]
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Work Activities/Steps	Hazards Identified	Risk Level		Controls to be implemented		Residual risk		
	Hazards	Prob.	Cons.	Risk				
General	Risk of accident	4	4		<ul style="list-style-type: none"> Charged mobile phone will be carried in backpack. All individuals must have access to mobile phones with relevant stored emergency response contact numbers and Aquatera designated contact(s). First aid kit will be carried in backpack and site vehicle. 	2	1	



Work Activities/Steps	Hazards Identified	Risk Level		Controls to be implemented	Residual risk		
				<ul style="list-style-type: none"> • Report all injuries to Aquatera designated contact(s). • Inform Aquatera designated contact(s) of any restrictions due to medical reasons. • Any specific local information provided by Aquatera designated contact(s). • Alcohol is not permitted on site. 			
Driving to site	Road accident - resulting in personnel injury and property damage	2	4	<ul style="list-style-type: none"> • All drivers to be in possession of appropriate valid driving licence. • The statutory speed limit shall be adhered to. • Seatbelts to be worn at all times when vehicle is moving. • Care and attention should be paid when driving in adverse weather conditions. • If the driver or the project leader considers conditions to be too dangerous the trip should not be made until conditions improve. • Carry a charged mobile phone in case of emergency. • Park in a suitable location taking care not to block any gateways or access tracks. 	1	1	



Work Activities/Steps	Hazards Identified	Risk Level		Controls to be implemented	Residual risk		
General working in the field	Risk of injury or hypothermia due to weather conditions	4	3	<ul style="list-style-type: none"> Wear high visibility clothing when working on roadsides. Consult a daily weather forecast before setting out. Wear clothing suitable for expected weather conditions. Be prepared for sudden changes in weather and take plenty of spare clothing appropriate to all conditions. Wear plenty of layered clothing – remove layers as necessary. Take adequate supplies of food and water. Remember to stop for regular rest/food breaks. 	1	1	
General working in the field	Risk of injury due to working in conditions of poor visibility e.g. dawn and dusk, or deterioration in weather conditions e.g. fog	3	4	<ul style="list-style-type: none"> Always carry a compass and GPS to enable navigation in conditions of poor visibility. If working at dawn or dusk or during hours of darkness, ensure a torch is carried. Wear high visibility vest if walking along roads to site, so that you can be seen by other road users. 	1	1	
General working in the field	Sunburn	2	2	<ul style="list-style-type: none"> Use a high factor sun block and carry with you. 	1	1	



Work Activities/Steps	Hazards Identified	Risk Level		Controls to be implemented	Residual risk		
				<ul style="list-style-type: none"> Do not expose skin unnecessarily. 			
General working in the field	Dehydration	4	3	<ul style="list-style-type: none"> Drink plenty of fluids. Ensure sufficient water is carried at all times. 	1	1	
General working in the field	Risk of injury due to terrain (e.g slips, trips and falls, breaks and sprains, etc.)	4	3	<ul style="list-style-type: none"> Suitable walking boots that provide good grip and support for ankles to be worn at all times. Plan route carefully to avoid most uneven ground especially near watercourses, cliffs and bogs. Use gates where possible to pass between fields. If no gate, choose a suitable crossing point. Take particular care whilst crossing burns, drainage ditches, walls, fences etc. Choose a suitable crossing point. Do not jump over or off of anything e.g. burns, drainage ditches, fences, walls etc. Pass under fences where possible. Take note of weather conditions as ground conditions may deteriorate during the day. Access routes and prohibited 	2	2	



Work Activities/Steps	Hazards Identified	Risk Level		Controls to be implemented	Residual risk		
				areas to be clearly defined.			
General working in the field	Risk of injury from electric fences	2	3	<ul style="list-style-type: none"> Take care when working within the vicinity of electric fences. Follow advice shown on safety notices. 	2	2	
General working in the field	Risk of injury from livestock	4	4	<ul style="list-style-type: none"> Do not enter fields containing cattle. For fields containing sheep, if no alternative route available, walk slowly through fields containing sheep. 	1	1	
General working in the field	Fatigue - leading to lack of concentration, accidents and risk of injury	4	3	<ul style="list-style-type: none"> Take regular rest breaks. Lack of sleep can lead to accidents - ensure sufficient rest is taken. 	2	1	
General working in the field	Lone/out of hours working (e.g. bird surveys)	4	4	<ul style="list-style-type: none"> Notify Aquatera designated contact Maureen Brown email: maureen.brown@aquatera.co.uk of planned survey schedule via email no later than the day before, including planned start and finish time. The Aquatera Health & Safety Lone Working Call in Schedule should be adhered to. Also have a designated person 	2	1	



Work Activities/Steps	Hazards Identified	Risk Level		Controls to be implemented	Residual risk		
				<ul style="list-style-type: none"> (i.e. family member) who is notified when work starts and ends. If the surveyor does not return by the planned time, the designated person shall inform the Aquatera designated contacts. • If your plans change, inform Aquatera designated contact(s) as soon as possible. • Always carry a charged mobile phone. 			
Intertidal work	Rough seas with on-shore waves	3	3	<ul style="list-style-type: none"> • Abandon survey if waves impede access to lower shore. 	2	2	
Intertidal work	Windblown sand	2	2	<ul style="list-style-type: none"> • Abandon survey if windblown sand seriously impedes visibility. 	1	1	
Intertidal work	Intertidal habitats – cliffs, mudflats etc.	4	4	<ul style="list-style-type: none"> • Survey from a boat or have support boat cover for steep rocks and cliffs (n/a for Sheep Skerry). • Wear appropriate footwear for walking over wet algae covered rocks. • When surveying shores with soft mud or risk of quicksand, consider surveying from a boat (n/a for Sheep Skerry). • Know and plan for times and height of low and high water. 	2	1	



Work Activities/Steps	Hazards Identified	Risk Level		Controls to be implemented	Residual risk		
Intertidal work	Injury from animals – barnacle grazes, weaverfish stings	3	2	<ul style="list-style-type: none"> Wear protective clothing. Avoid pursuing fish in sand with bare hands. Avoid seal pupping beaches, carry a stick. Stay away from nest sites. 	2	1	
Intertidal work	Contamination, poisoning – pollutants, bird droppings	3	1	<ul style="list-style-type: none"> Ensure all inoculations are current. Use protective clothing. Wash hands before eating. Avoid immersion. 	1	1	

Completed:		Signed:		Last Reviewed:	12 June 2015	Signed:	
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Emergency Contact details	Ambulance Service	Based at Kirkwall	999 or 112 for emergency call out		Aquatera office:	01856 850088
	Hospital	Balfour Hospital, Garden House, New Scapa Road Kirkwall, Orkney KW15 1BQ	Tel: 01856 888000		Brims Tidal Array Ltd Contact	[Insert Relevant details]
	Health Centre	Hoy and Walls	01856 701209		Aquatera Contact	[Insert Relevant details]



	Health Centre	Emergencies: 01856 888000 and bleep Hoy Doctor		
Coastguard	Based at Lerwick	999 or 112 for emergency call out 01856 873268 for routine matters		
Police	Based at Kirkwall	999 or 112 for emergency call out. 01856 872241 for routine matters		

Notes:
Correct personal protective equipment to be worn.



Table 6-3 Intertidal Survey Costs

Task	Estimated hours	Estimated cost	Total
Survey set-up	4	£295	£295
Intertidal survey		£275 (x2 surveyors)	£550
Post survey report	2	£110	£110
Biotope mapping	8	£515	£515
Report production	20	£1,300	£1,300
Project management	2	£160	£160
Total (ex. VAT)			£2,930

Plus expenses (travel and subsistence, at cost)

