Sound of Islay Demonstration Tidal Array

Inter-tidal survey of potential cable routes

Scottish Power Renewables

31 August 2009
Final Report
9T3474

A COMPANY OF

ROYAL HASKONING

HASKONING UK LTD.
ENVIRONMENT

10 Bernard Street
Leith
Edinburgh EH6 6PP
United Kingdom
+44 (0)131 555 0506 Telephone
Fax
info@edinburgh.royalhaskoning.com E-mail
www.royalhaskoning.com Internet

Document title	Sound of Islay Demonstration Tidal Array Inter-tidal survey of potential cable routes
Document short title	
Status	Final Report
Date	31 August 2009
Project name	
Project number	9T3474
Client	Scottish Power Renewables
Reference	9T3474/R/303352/Edin

Drafted by	Jen Trendall	
Checked by	Frank Fortune and Fiona Nimmo	
Date/initials check	…….	29/08/09…….
Approved by	Frank Fortune	
Date/initials approval	…….	29/08/09…….

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1 INTRODUCTION

1.1 Scheme description

Scottish Power Renewables (SPR) has commissioned Haskoning UK Ltd to assist in applications for consent to install a demonstration tidal turbine array within the Sound of Islay, Scotland. The proposed area of interest lies within the central channel of the Sound of Islay. The demonstration tidal array of ten devices would be deployed within this area and is anticipated to have a footprint of approximately 0.4 km^2. The turbines would generate up to 10MW of power and will be linked via underwater cabling to onshore infrastructure on Islay. SPR are currently investigating six potential landing sites on Islay for cable routing onshore to a substation that is currently proposed to be located in Keills.

To inform the Environmental Impact Assessment an intertidal survey was undertaken across an area shown in Figure 1.1. The intertidal survey was completed in conjunction with the Phase 1 habitat survey of potential cable routes.

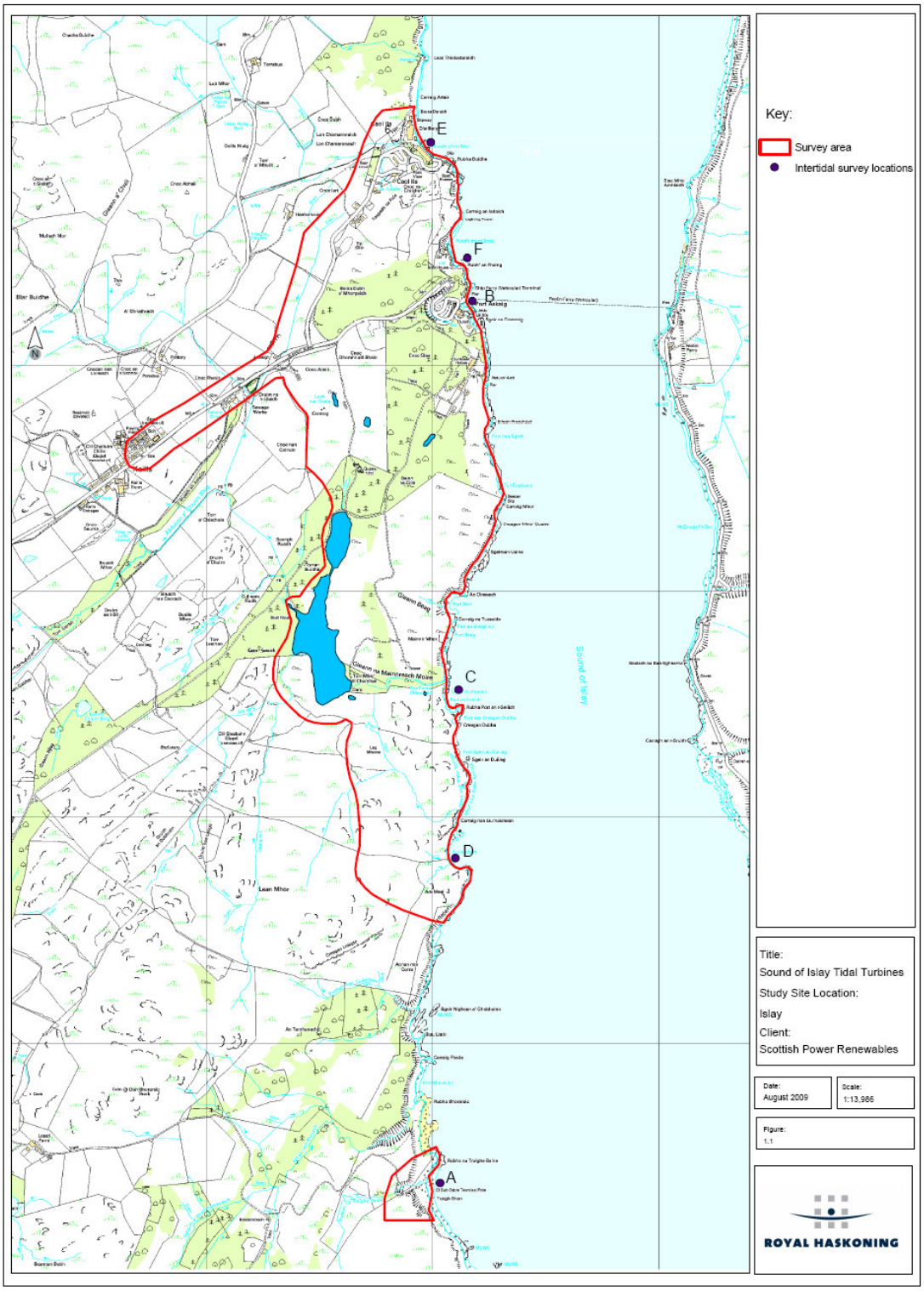

Figure 1.1 Locations of intertidal survey sites A – F.

1.2 Aims and Objectives

The intertidal survey aimed to identify the zonation of biotopes at six locations within bays along the Sound of Islay, each of which has been identified by Scottish Power as potential cable routes for the tidal array.

The main objectives were to:

a) Complete at minimum 1 re-locatable transect at each of the six locations;
b) Identify species present at each bay, noting rare, protected or non-native species;
c) Provide photographic records of each bay; and
d) Identify the biotopes present at each bay.

2 METHODOLOGY

Four bays were surveyed at low spring tide on the 6th and 7th of August, 2009 (Figure 1.1). Weather conditions were fair throughout the survey, with little wind and good visibility. The surveys were completed by foot by two experienced ecologists.
A number of methods and techniques were used, including techniques based upon those specified in the Countryside Council for Wales (CCW) report 'CCW Handbook for marine intertidal Phase 1 mapping' (Wyn *et al.*, 2000) and the 'Marine Nature Conservation Review: Rationale and methods' (Hiscock, 1996).

A hand held Garmin Global Positioning System (GPS) was used to provide positioning data for each transect and throughout the survey. Transects were predominantly placed at a location most suited for cables to be brought ashore, i.e. avoiding large areas of bedrock and rough boulders. Where a matrix of substrates were present, an additional transect was completed to inform on all potential biotopes present at each bay.

Each bay was surveyed from the top of the shore to the low shore, with the aim of recording all typical biotopes within the study area and recording details in field notes. A 100m tape measure transect was surveyed down the shore and was assessed and photographed. Where features (biological or physical) were encountered of interest outside of the transects (and in geographically discrete areas) target notes recorded the detail of those features. Biotopes within each transect and quadrat were assigned codes under the 2004 JNCC Biotope classification (Connor, *et al*, 2004). A species list is provided in Section 5.1 with a description of each biotope provided in Section 5.2.

A 100m tape measure was used to mark out the length of each transect, and the mark (in cm) where distinct biotope zones changed on the shore were noted. Field notes were completed for each distinct section of the shore. Target notes were completed for features or biotopes of notable value, quality or uniqueness.

A drawing was made of each bay on site, recording the substrates and main biotopes encountered and identifying the location of each transect and other features of interest.

Notes were additionally taken of marine mammals observed, including tracks or signs, during the intertidal survey.

3 RESULTS

3.1 Site A – Traigh Bhan

Site A was the most southern site, and was accessed via farm tracks from Lossit Farm. The site was surveyed on the 5th August at 1pm.

The site consisted of a large sandy bay with cobbles and pebbles in the upper shore and rocky outcrops with rockpools to the north and south. An existing cable to the mainland is present in the sandy substrate, and is colonised by seaweeds, providing an artificial reef habitat. A small stream runs into the sea just north of the cable, with abundant *Ulva intestinalis* and *Fucus spiralis* present on the cobbles. *Arenicola marina* was present in the sands around and north of the existing cable, however no dig was taken to confirm the other infauna present and therefore the exact biotope of the sandy substrate is unknown.

Plate 3.1 Transect A1 location along existing cable, viewed from the south west

Plate 3.2 Transect A2 location at rocky outcrop, viewed from the south

Two transects were surveyed at this site (Figure 3.1) – the first (A1: NR 42951 65348, Plate 3.1) took the line of the existing cable to determine the species which had established on the artificial reef created by the cable armouring. Biotopes for this transect are described in Table 3.1 and Plates 3.3 and 3.4. The second transect (A2: NR 43047 65472, Plate 3.2) assessed the bedrock/rock pool outcrop to the north of the cable. Biotopes for this transect are described in Table 3.2 and Plates 3.5 to 3.8

During the surveys two common (harbour) seals (*Phoca vitulina*) were observed milling close to the shore at the beginning of the survey, with a common seal hauled out at the north end of the bay at the end of the survey. Otter (*Lutra lutra*) spraints and anal jelly were found on bedrock outcrops near Transect A2, along with crustacean remains.

Table 3.1 Transect biotopes at Site A1

Location on tape measure (m)	Description	Biotope
0 - 11.30	Silverweed (*Potentilla anserina*), nettle (*Urtica dioca*) and red dead nettle (*Lamium purpureum*) on cobbles, with tormentil (*Potentilla erecta*) and bracken (*Pteridium*	LS.LCS.Sh

Location on tape measure (m)	Description	Biotope
	aquilinum) on shingle	
11.30 – 14.00	Cobble and pebble shingle	LS.LCS.Sh
14.00	Strandline on cobble and pebble shingle.	LS.LSa.St
14.00 – 19.90	Cobble and pebble shingle, with *Ulva intestinalis*	LR.FLR.Eph.Ent
19.90	End of cable armouring, with *Ulva intestinalis* on cable end and on scattered cobbles. Clean fine sand sediments.	LR.FLR.Eph.Ent
19.90 – 22.20	Upper cable with *Ulva intestinalis*	LR.FLR.Eph.Ent
22.20 – 24.10	Cable dominated by *Ulva intestinalis* with occasional *Fucus spiralis*	LR.FLR.Eph.Ent
24.10 – 27.70	*Fucus serratus* and *Fucus vesiculosis,* with *Ulva intestinalis, Littorina obtusata* and *Cladophora rupestris.* Algae cover is less dense than in lower down the shore and *no Arenicola marina* is present in the clean fine sand sediments	LR.LLR.F.Fserr.FS
27.70 – 43.50	*Fucus serratus* dominating cable armouring, with *Ulva intestinalis, Actinia equina, Littorina obtusata, Spirorbis spirorbis, Semibalanus balanoides, Sagartia elegans, Cladophora rupestris, Colpomenia peregrina, Polyides rotundus* and *Carcinus maenas,* with *Arenicola marina* on clean fine sand sediments 40/m^2	LR.LLR.F.Fserr.FS and LS.LSa.FiSa.Po
27.70 – 43.50	Cable armouring dominated by *Fucus serratus supporting Spirorbis spirorbis,* rare *Laminaria digitata* on scattered boulders. Cable armouring is on on clean fine sand sediments supporting *Arenicola marina* casts 5/m^2.	LR.LLR.F.Fserr.FS and LS.LSa.FiSa.Po
Below 43.50	*Laminaria digitata, Laminaria saccharina* and *Himanthalia elongata* on scattered half buried boulders, with *Fucus serratus* dominating the cable.	IR.MIR.KR.Ldig.Bo

Plate 3.3 Transect A1 lower shore facing west, view along cable armouring

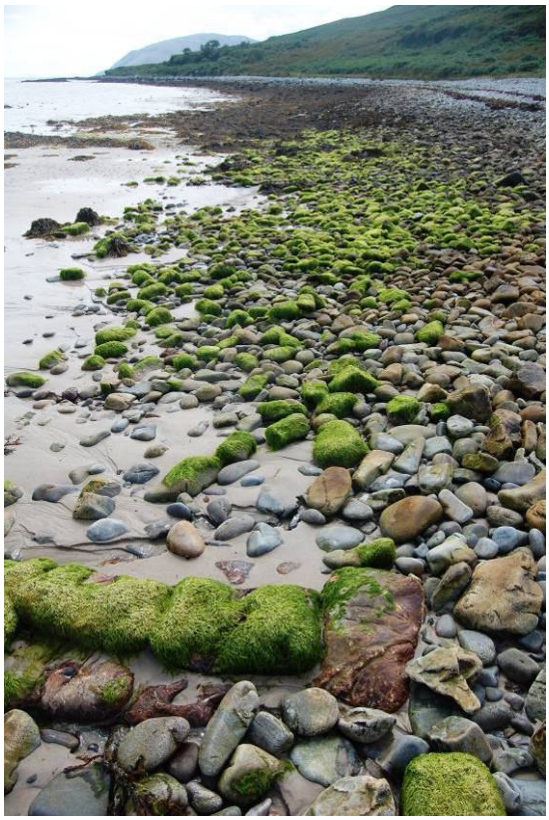

Plate 3.4 Transect A1 top of existing cable facing south

Table 3.2 Transect biotopes at Site A2

Location on tape measure (m)	Description	Biotope
0-18.40	Bare cobble and shingle, with patches of red dead nettle (*Lamium purpureum*)	
18.40	Strandline on cobble and shingle	
31.00 – 18.40	*Xanthoria parietina, Ramalina siliquosa, Armeria maritima* and rockpools containing *Ulva intestinalis*.	LR.FLR.Lic.YG
32.30 – 31.80	*Verrucaria maura* on steep rock	LR.FLR.Lic.Ver.Ver
31.80 - 36.50	*Pelvetia canaliculata, Hildenbrandia rubra, Fucus spiralis, Patella vulgata* on bedrock	*LR.MLR.BF.PelB*
36.50 - 37.50	*Fucus spiralis, Patella vulgata, Hildenbrandia rubra, Semibalanus balanoides, Littorina obtusata, Actinia equina, Ascophyllum nodosum, Polysiphonia lanosa* on bedrock.	LR.LLR.F.Fspi.FS
37.50 - 49.00	*Ascophyllum nodosum, Chondrus*	LR.HLR.FT.AscT

Location on tape measure (m)	Description	Biotope
	crispus, Polysiphonia lanosa, Halichondria panicea, Littorina obtusata, Patella vulgata, Lomentaria articulata, Spirorbis spirorbis, Nucella lapillus, Semibalanus balanoides, Actinia equina, Ulva intestinalis, Ulva lactuca, Cladophora rupestris, Corallina officinalis Lithophyllum incrustans, orange encrusting sponge indet. (possibly *Myxilla sp.)* and *Dilsea carnosa* on bedrock and rockpools. Rare *Laminaria digitata* was present in rockpools	
Below 49.00	*Laminaria digitata, Fucus serratus, Chondrus crispus, Corallina officinalis, Patella vulgata, Lithophyllum incrustans, Himanthalia elongata, Semibalanus balanoides, Nucella lapillus, Littorina obtusata, Halichondria panicea, Sagartia elegans* on steep bedrock	IR.MIR.KR.Ldig.Ldig

Plate 3.5 Transect A2 lower shore with bedrock supporting *Laminaria hyperborea* and *Himanthalia elongata*

Plate 3.6 Transect A2 view down shore from upper shore. Upper shore bedrock supporting yellow and grey lichens

Plate 3.7 *Dilsea carnosa* and *Corallina officinalis* in rockpools

Plate 3.8 *Halichondria panicea* and orange sponge indet. (possibly *Myxilla* sp.)

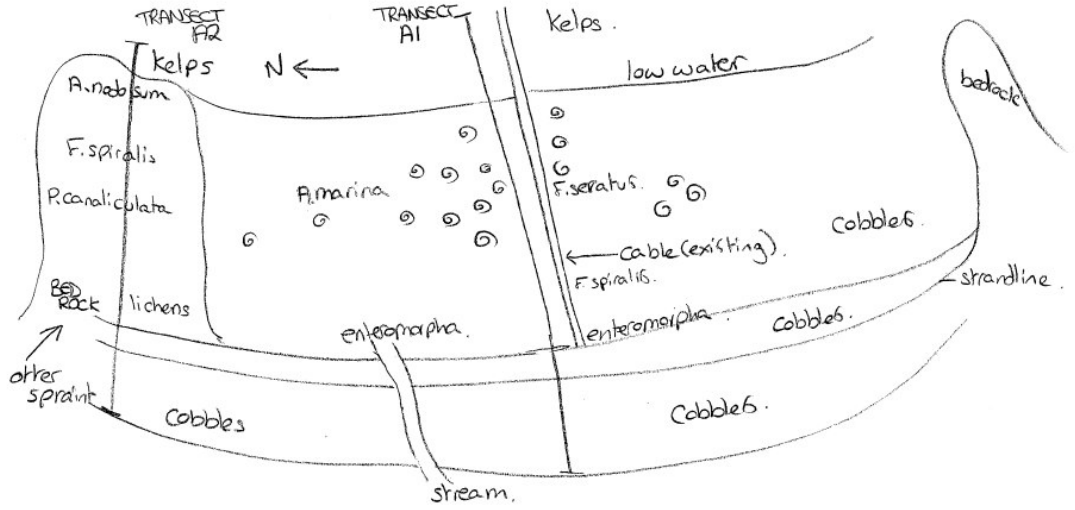

Figure 3.1 Map of Site A

3.2 Site B – Port Askaig

Site B was surveyed on the 7th August 2009 at 1.50pm. The area to focus on as a potential cable route at Site B was identified by staff from the Islay Energy Trust just south of the lifeboat station, adjacent to the stone wall running down the intertidal zone from upper to lower shore, between land owned by the Port Askaig Hotel and the Dunlossit Estate. A transect was completed down the north side of the wall, with an assessment completed to the south and across the bay. No additional biotopes were recorded outside the transect.

Zonation occurred vertically up the wall, as well as horizontally up the shore. Zonation was similar on both sides of the wall, with no new species on the south side. Biotopes are described in Table 3.3 and Plates 3.9 – 3.12, while Figure 3.2 provides a map of the bay.

The substrate was characterised by a complex matrix of bedrock encompassing natural steps, with a natural slipway through the bedrock of pebbles and shingles. Shingle and cobbles were present in the upper shore.

Table 3.3 Biotopes at Transect B

Location on tape measure (m)	Description	Biotope
0 – 6.90	*Xanthoria parietina, Ramalina siliquosa, Armeria maritima* on bedrock and shingle	LR.FLR.Lic.YG
6.90 – 8.70	*Pelvetia canaliculata* with *Xanthoria parietina, Ramalina siliquosa, Armeria maritima* on taller bedrock	LR.FLR.Lic.YG
8.70 - 13.40	Common *Pelvetia canaliculata*, with *Spirorbis spirorbis* and *Ulva intestinalis*	LR.MLR.BF.PelB
13.40 – 13.90	*Fucus spiralis*, with *Cladophora*	LR.LLR.F.Fspi.FS and

Location on tape measure (m)	Description	Biotope
	rupestris, *Actinia equina, Patella vulgata, Semibalanus balanoides and Ascophyllum nodosum*, with *Pelvetia canaliculata* present on taller bedrock. Rockpools also present, containing additionally *Codium tomentosa, Lithophyllum incrustans, Sagartia elegans* and *Carcinus maenas* on stepped bedrock	LR.FLR.Rkp
Below 13.90	*Steep drop to Laminaria digitata, with Ascophyllum nodosum, Fucus serratus, Polysiphonia lanosa, Chondrus crispus, Actinia equina, Sagartia elegans, Patella vulgata, Lomentaria articulata, Nucella lapillus, Semibalanus balanoides, Electra pilosa, Halichondria panicea and Calliostoma zizyphinum* on stepped bedrock	IR.MIR.KR.Ldig.Ldig

Plate 3.9 Transect B facing down the shore

Plate 3.10 Transect B facing up the shore

Plate 3.11 *Calliostoma zizyphinum*

Plate 3.12 view north from the wall

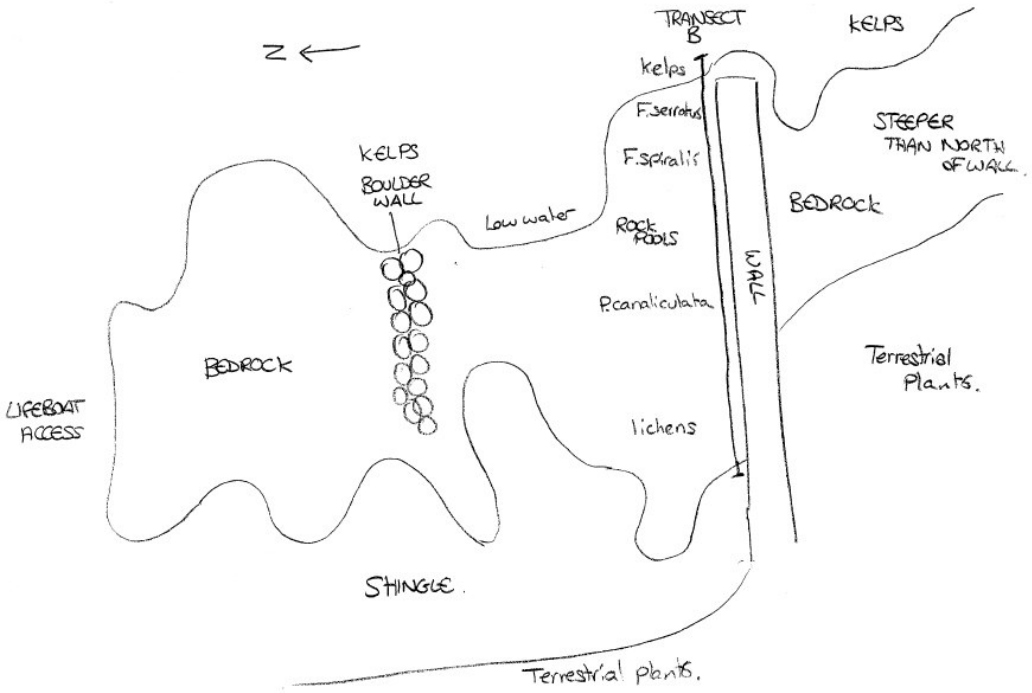

Figure 3.2 Map of Site B

3.3 Site C – Toll Chili-chiarain

Site C was a small embayment of cobbles, boulders and bedrock, accessed via tracks through the Dunlossit Estate, which lead to a small hydro-electric substation hut close to the shore. The site was surveyed on the 5th August 2009 at 12.30pm. To the south of the bay, a boundary wall continued from the terrestrial down shore to a small steep rocky headland. Inshore of the bay a deciduous woodland habitat is present, with a river running down the south side containing several large waterfalls. A small area of saltmarsh was present between the river and the wall, and the mouth of the river was dominated by *Fucus ceranoides*.

A transect was surveyed north of the river (NR 43070 67629) to provide an assessment of the intertidal zones without freshwater influence. Due to the rocky nature of the

substrate, zonation often occurred vertically up boulders in addition to horizontally up the shore, and therefore several biotopes may occur at any location.

Biotopes found within the transect are described in Table 3.4, with additional biotopes recorded at the site shown in Table 3.5. Plates 3.13 to 3.16 describe the site, and a map is provided in Figure 3.3.

South of the wall, 14 common seals (*Phoca vitulina*) were observed hauled out on bedrock and milling in the sea immediately offshore on the 4th and 5th August at low tide. Otter spraints were found on the rocky headline at the end of the wall, and up to the river as far as the waterfall. Following the survey a male Orca whale (*Orcinus orca*) was observed milling in the Sound of Islay approximately 200m offshore.

Table 3.4 Transect biotopes at Site C

Location on tape measure (m)	Description	Biotope
0 – 5.90	*Xanthoria parietina*, *Ramalina siliquosa* and *Verrucaria maura* on boulders	LR.FLR.Lic.YG and LR.FLR.Lic.Ver.Ver
5.90 – 10.70	Frequent *Pelvetia canaliculata* with *Xanthoria parietina, Ramalina siliquosa* and *Verrucaria maura* on boulders	LR.MLR.BF.PelB
10.70 – 21.60	Common *Fucus spiralis* with occasional *Ascophyllum nodosum* and *Pelvetia canaliculata* on taller rocks. *Nucella lapillus, Actinia equina, Patella vulgata, Littorina littorea, Littorina obtusata* and *Hildenbrandia rubra* also present.	LR.LLR.F.Fspi.FS
21.60 – 22.80	Abundant *Ascophyllum nodosum* with *Fucus vesiculosis, Fucus serratus, Chondrus crispus, Halichondria panicea, Semibalanus balanoides, Actinia equina, Ulva intestinalis, Corallina officinalis, patella vulgata, Sagartia elegans, Polysiphonia lanosa, Spirorbis spirorbis, Gelidium sp. Hypoglossum woodwardii, Ceramium sp., Lithophyllum* incrustans on bedrock and boulders. Additionally, *Codium tomentosum*, was recorded in a small rockpool *and* mollusc egg mass on large boulder (potentially Nudibranchia)	LR.HLR.FT.AscT
22.80 and below	*Laminaria digitata* and *Fucus serratus,* with *Ascophyllum nodosum Ulva intestinalis, Polysiphonia*	IR.MIR.KR.Ldig.Ldig

Location on tape measure (m)	Description	Biotope
	lanosa, Spirorbis spirorbis, Gelidium sp (potentially spinosum), Hypoglossum woodwardii, Lithophyllum incrustans, Chondrus crispus, Lomentaria articulata, Halichondria panacea, Nucella lapillus, Patella vulgata, Actinia equina, Littorina obtusata, Electra pilosa,,Ulva lactuca, and Semibalanus balanoides on bedrock and boulders.	

Table 3.5 Additional biotopes at Site C

Location	Description	Biotope
River mouth	*Fucus ceranoides*	LR.LLR.FVS.Fcer
Between river and wall	Sea sandwort *(Honkenya peploides),* sea plantain *(Plantago maritima),* small red goosefoot *(Chenopodium rubrum)*	LS.LMp.Sm

Plate 3.13 Site C transect up the shore

Plate 3.14 Lower shore

Plate 3.15 Codium tomentosa

Plate 3.16 Mollusc egg mass

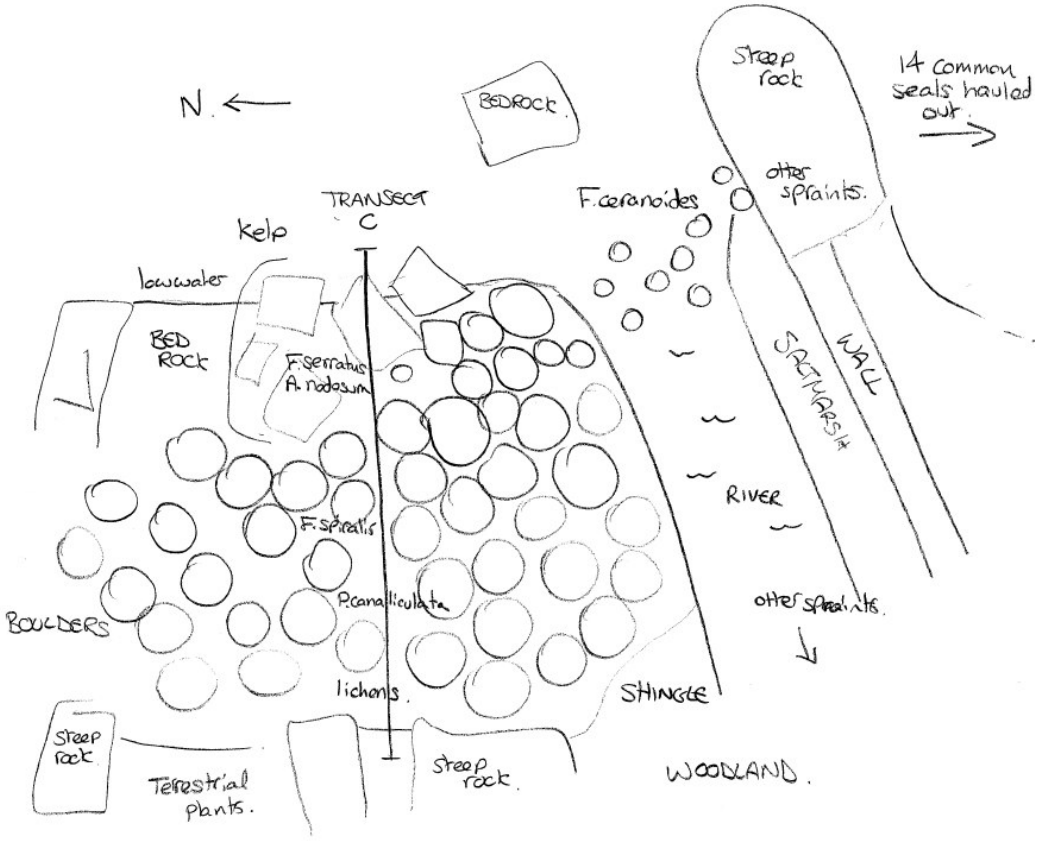

Figure 3.3 Map of Site C

3.4 Site D – Fionn Point

Site D was a wide west facing bay and predominantly consisted of a gentle gradient pebble-cobble beach leading down the shore into the subtidal zone. The site was surveyed on 5th August at 11.30am. Viewing this bay from the cliff top at low tide, it was apparent no species were present in the intertidal where cables were likely to be brought ashore due to the mobile nature of the beach substrate, and so a transect was not

completed at this bay (Plates 3.17 and 3.18). From the vantage point, dense *Himanthalia elongata* was observed in the subtidal waters.

Steep seacliffs were present to the north of the bay, supporting bracken (*Pteridium aquilinum*), bell heather (*Erica cinerea*), silver birch (*Betula pubescens*) and grey willow (*Salix cinerea*). To the south of the bay, a gentle slope of dense bracken led away from the shore.

Access to this site was across rough hilly moorland and marshy ground, with no current access track to the bay.

Plate 3.17 North end of Site D

Plate 3.18 South end of Site D

A common seal (*Phoca vitulina*) was observed hauled out on the rocks to the south of the bay, and an otter (*Lutra lutra*) was observed foraging, fishing and eating approximately 200m north of the bay.

3.5 Site E – Caol Ila Distillery

Site E was a west facing sheltered bay and was surveyed on the 7th August 2009 at 11:30am. This site was industrialised compared to other potential cable route sites. The road to the distillery runs adjacent with the shore, with the intertidal substrate dominated by steep rock armour and vertical artificial seawall. A large pier was present in the middle of the bay.

A transect was completed at the south of the bay (NR 43019 65471) close to the road where it was presumed best access for a cable route. The rest of the bay was walked over, with additional species recorded.

Table 3.6 describes the biotopes present in the transect, with Table 3.7 describing the additional biotopes located at Site E. Plates 3.19 to 3.23 describe the shore and the bay is mapped in Figure 3.4.

Otter prints and crustacean remains were found in the dirt on the road margin on the coastal front of the distillery buildings.

Table 3.6 Transect biotopes at Site E

Location on tape measure (m)	Description	Biotope
0 – 1.10	Lichens on rock armour, appear to be historically terrestrial prior to rock armour being placed, occasional *Xanthoria parietina*	LR.FLR.Lic.YG
1.10 – 2.00	Occasional *Pelvetia canaliculata*, with *Littorina littorea, Semibalanus balanoides* and mayfly larvae indet. on rock armour	LR.MLR.BF.PelB
2.00 – 3.60	*Fucus spiralis*, with *Littorina obtusata, Patella vulgata, Semibalanus balanoides*, and *Littorina littorea* on rock armour	LR.LLR.F.Fspi.FS
3.60 – 7.30	Abundant *Fucus vesiculosis, with Ulva intestinalis, Fucus serratus, Ulva lactuca, Littorina obtusata* and *Lithophyllum incrustans* on rough jagged pebbles and cobbles.	LR.LLR.F.Fves.X
7.30 – 9.20	*Fucus serratus, Fucus vesiculosis, Ascophyllum nodosum, Spirorbis spirorbis, Littorina obtusata, Ceramium sp., Polysiphonia lanosa, Calliostoma zizyphinum, Lithophyllum incrustans, Ulva lactuca, Electra pilosa, Anemonia viridis* and *Dilsea carnosa* on rough jagged pebbles and cobbles	LR.LLR.F.Fserr.X
Below 9.20	*Occasional Laminaria digitata with Fucus serratus* on rough jagged pebbles and cobbles and boulders	IR.MIR.KR.Ldig.Bo

Table 3.7 Additional biotopes at Site E

Location	Description	Biotope
Slipway north of pier	*Actinia equina, Asterias rubens, Botryllus schlosseri, Pomatoceros triqueter* and *Nucella lapillus in Fucus serratus zone*	LR.MLR.BF.Fser.Bo

Plate 3.19 Site E transect up the shore

Plate 3.20 south of transect

Plate 3.21 Site E north of transect

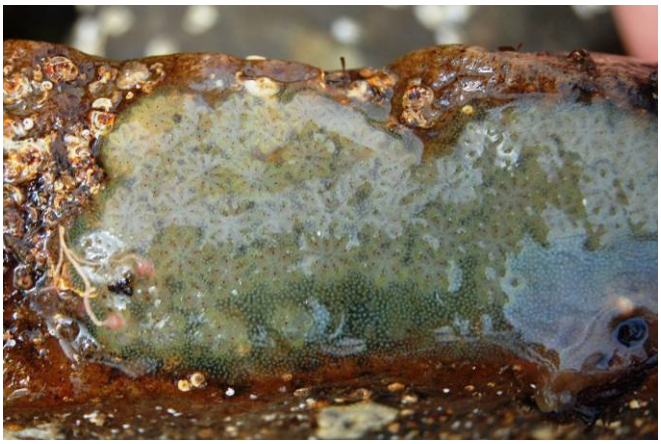

Plate 3.22 *Botryllus schlosseri*

Plate 3.23 *Anemonia* viridis

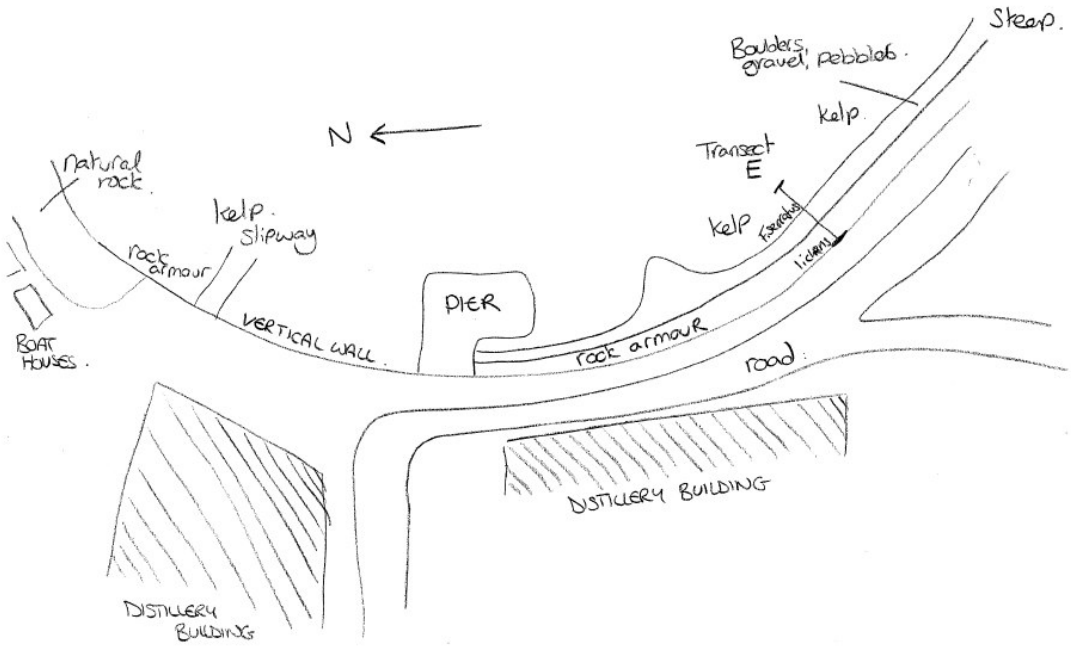

Figure 3.4 Map of Site E

3.6 Site F - Ruadh phort Beag

The area to focus on as a potential cable route at Site F was identified by staff from the Islay Energy Trust as a small sheltered west facing bay set back from the cliffs, located between Port Askaig ferry terminal and Caol Ila Distillery. The survey was completed on 7th August 2009 at 12:50pm.

The transect (NR 43116 69433) was completed just north of a stone jetty where a pebble gravel substrate natural slipway was present leading up to a boathouse. Large boulders and bedrock existed across the rest of the shore. Several small boats were anchored in the embayment, and holiday cottages and a small boat house are present just above the shore. A small jetty was present in the rock in the south of the bay. North of the jetty the lichens *Ramalina siliquosa* and *Xanthoria parietina* were present above the high-tide mark with thrift (*Armeria maritima*). No other biotopes were observed on the site.

Table 3.8 describes the biotopes present in the transect, with Table 3.9 describing the additional biotopes present at Site F. The site is shown in Plates 3.24 and 3.25, and mapped in Figure 3.5.

The non-native algae *Sargassum muticum* was identified within the transact at NR 43116 69433. This alga can cause displacement of native species and the sighting has been reported to SNH, who are currently monitoring the spread of *S. muticum* around the Scottish coastline.

Table 3.8 Transect biotopes at Site F

Location on tape measure (m)	Description	Biotope
0-1.40	Above strandline, gravel and pebbles leading to coastal grassland habitat	LS.LCS.Sh
1.40	strandline	LS.LSa.St
1.40-7.20	Below strandline, gravel and pebbles	LS.LCS.Sh
7.20 – 10.60	Occasional *Fucus spiralis* and *Fucus vesiculosus* on gravel and pebbles	LR.LLR.F.Fspi.X
10.60 – 12.40	*Fucus serratus and Fucus vesiculosis, Ulva intestinalis, Fucus spiralis, Ceramium sp., Ascophyllum nodosum*, *Pomatoceros triqueter, Actinia equina, Patella vulgata, Littorina obtusata* on pebbles and cobbles	LR.LLR.F.Fserr.X
12.40 – 16.60	*Fucus serratus* and *Himanthalia elongata*, with *Sargassum muticum*, *Pomatoceros triqueter, Littorina obtusata, Actinia equina,* and *Lithophyllum incrustans* on rocky cobbles	LR.LLR.F.Fserr.X
Below 16.60	*Laminaria digitata, Ulva lactuca, Spirorbis spirorbis* and *Chondrus crispus* on rocky cobble substrate	IR.MIR.KR.Ldig.Bo

Table 3.9 Additional biotopes at Site F

Location	Description	Biotope
Above high tide south of jetty	*Ramalina siliquosa* and *Xanthoria parietina*, and *Armeria maritima* on rocks and bedrock.	LR.FLR.Lic.YG

Plate 3.24 Site F transect down the shore

Plate 3.25 Site F transect up the shore

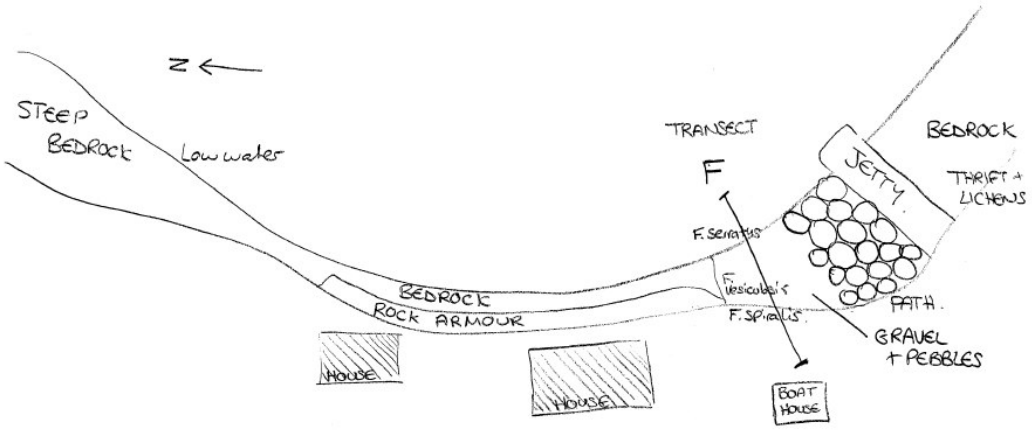

Figure 3.5 Map of Site F

4 CONCLUSIONS

4.1 Rare and protected species and biotopes

No rare or protected biotopes were found within the proposed footprint of the scheme during the intertidal survey, and the zonation of biotopes identified (lichens through to fucoids to kelp) were typical of the area.

The following species of note were recorded:

- *Sargassum muticum* – Non native fucoid recorded at Site F, sighting recorded to Scottish Natural Heritage.
- Otter (*Lutra lutra*) – European Protected Species listed in Appendix 74 of the CRoW Act 2000 and protected under Section 5 of the Wildlife and Countryside Act 1981 (as amended). In addition, otters are also protected under the Conservation (Natural Habitats &c.) Regulations 1994. Signs of otters were recorded throughout the study area.
- Orca whale (*Orcinus orca*) - All cetaceans found within Scottish waters are protected by a range of national and international obligations: Council Directive 92/43/EC on the Conservation of Natural Habitats and of Wild Fauna and Flora, Annex IV (the 'Habitats Directive'); Convention on the Conservation of Migratory Species (The Bonn Convention); Wildlife and Countryside Act 1981; and Nature Conservation (Scotland) Act 2004. A male orca whale was observed milling at low water slack approximately 200m off shore from Site C.
- Common seal (*Phoca vitulina*) Classified as Least Concern (LC) on the IUCN Red List. Protected in Britain under the Conservation of Seals Act 1970 (closed season from 1 September until 31st December) and schedule 3 of the Conservation Regulations (1994). Listed as a protected species under Annex II and Annex V of the European Community's Habitats Directive. Common seal was recorded hauled out or close to the shore at sites C, D and E.

4.2 Recommendations

From an environmental perspective, some of the potential landfall sites are preferable to others. Landfall Sites E (Caol Ila distillery) and B and F (Port Askaig respectively) are considered to be ideal as these areas are already developed with high anthropogenic influence relative to the other sites. In addition the surrounding terrestrial habitats for sites E, B and F do not contain the higher quality habitats or species richness found elsewhere in the footprint (Royal Haskoning, 2009). In addition, while landfall point A to the south of the footprint constituted a beautiful landscape with good quality intertidal habitat, there are already cables present at the site, as well as access and infrastructure. The presence of these attributes does not appear to have had a negative impact on the landscape or the quality of the habitat. Indeed, the cables seem to have created artificial reefs providing substrate for a diversity of sea weeds.

Potential landfall Sites C and D however, may be better avoided. Site C is at the site of a river mouth. This source of freshwater may be important for otters to maintain the waterproof properties of their fur. Indeed, several spraints were found on rocks in this river indicting that it is used by otters. Freshwater as easily accessible yet undisturbed as this river mouth may be scarce along the coastline, so if disturbance to the area can be avoided then that is to be recommended. This does not mean that works are totally precluded in this area, but a targeted otter survey would be recommended in advance of any construction.

At potential landfall Site D, the area comprises a remote stretch of coastline surrounded by high quality wet heath habitat (Royal Haskoning, 2009). There is no access to the area and the disturbance that would be required to bring machinery and plant into the area would be high. It is therefore recommended that this area should not be developed.

Works are not precluded here, and the environmental impact would be high compared to Sites E, B and A.

5 SPECIES AND BIOTOPE LIST

5.1 Species

Algae

Ascophyllum nodosum
Ceramium sp
Chondrus crispus
Cladophora rupestris
Codium tomentosa
Colpomenia peregrina
Corallina officinalis
Dilsea carnosa
Fucus ceranoides
Fucus serratus
Fucus spiralis
Fucus vesiculosis
Gelidium sp
Hildenbrandia rubra
Himanthalia elongata
Hypoglossum woodwardii
Laminaria digitata
Laminaria saccharina
Lithophyllum incrustans
Lomentaria articulata
Pelvetia canaliculata
Polyides rotundus
Polysiphonia lanosa
Sargassum muticum
Ulva intestinalis
Ulva lactuca

Marine Invertebrates

Actinia equina
Anemonia sulcata
Arenicola marina
Botryllus schlosseri
Calliostoma zizyphinum
Carcinus maenas
Electra pilosa
Halichondria panicea
Littorina littorea
Littorina obtusata
Nucella lapillus

Orange encrusting sponge indet. (*Myxilla sp.)*
Patella vulgata
Pomatoceros triqueter
Sagartia elegans
Semibalanus balanoides
Spirorbis spirorbis
Lichens
Ramalina siliquosa
Verrucaria maura
Xanthoria parietina
Terrestrial plants
Armeria maritima
Betula pubescens
Chenopodium rubrum
Erica cinerea
Honkenya peploides
Lamium purpureum
Plantago maritima
Potentilla anserina
Potentilla erecta
Pteridium aquilinum
Salix cinerea
Urtica dioica
Mammals
Lutra lutra
Orcinus orca
Phoca vitulina

5.2 Biotopes

IR.MIR.KR.Ldig.Bo *Laminaria digitata* and under boulder fauna on sublittoral fringe boulders
IR.MIR.KR.Ldig.Ldig *Laminaria digitata* on moderately exposed sublittoral fringe rock
LR.FLR.Eph.Ent *Enteromorpha* spp. on freshwater-influenced and/or unstable upper
LR.FLR.Lic.Ver.Ver *Verrucaria maura* on very exposed to very sheltered upper littoral fringe rock
LR.FLR.Lic.YG Yellow and grey lichens on supralittoral rock
LR.FLR.Rkp Rockpools
LR.HLR.FT.AscT *Ascophyllum nodosum*, sponges and ascidians on tide-swept mid eulittoral rock
LR.LLR.F.Asc.FS *Ascophyllum nodosum* on full salinity mid eulittoral rock
LR.LLR.F.Asc.FS *Ascophyllum nodosum* on full salinity mid eulittoral rock
LR.LLR.F.Fserr.FS Dense *Fucus serratus* on moderately exposed to very sheltered full salinity lower eulittoral rock
LR.LLR.F.Fserr.X *Fucus serratus* on full salinity lower eulittoral mixed substrata
LR.LLR.F.Fspi.FS *Fucus spiralis* on full salinity moderately exposed to very sheltered upper eulittoral rock

LR.LLR.F.Fspi.X *Fucus spiralis* on full salinity upper eulittoral mixed substrata
LR.LLR.F.Fves.X *Fucus vesiculosus* on mid eulittoral mixed substrata
LR.LLR.FVS.Fcer *Fucus ceranoides* on reduced salinity eulittoral rock
LR.MLR.BF.Fser.Bo *Fucus serratus* and under-boulder fauna on lower eulittoral
LR.MLR.BF.PelB *Pelvetia canaliculata* and barnacles on moderately exposed littoral
LS.LCS.Sh Shingle (pebble) and gravel shores
LS.LMp.Sm Saltmarsh
LS.LSa.FiSa.Po Polychaetes in littoral fine sand
LS.LSa.St Strandline

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