BRITISH TELECOMMUNICATIONS PLC

R100 Scottish Isles Fibre-optic Project

Marine Environmental Appraisal - Inner Hebrides

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APPENDIX A

Survey

A.1 INTERTIDAL SURVEY REPORT FOR CABLE CORRIDOR 2.13 EIGG TO MAINLAND: EIGG LANDING POINT

Phase 1 Intertidal Survey Report for Bay of Laig, Eigg (Route 2.13)

Version 1

Report to Intertek

Issued by Aquatera Ltd

P961 – October 2021

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Members of:

OREF Orkney Renewable Energy Forum
ADEMAR
poet PACIFIC OCEAN ENERGY TRUST
APPA Asociación de Empresas de Energías Renovables
Scottish Hydrogen & Fuel Cell Association
Australian Ocean Energy Group

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1 INTRODUCTION

Aquatera has been commissioned to carry out a Phase 1 intertidal survey of the shore at Bay of Laig on the northwest coast of Eigg (Figure 1.1). The area has been identified as a suitable location for the onshore landfall and onward connection for fibre optic cables as part of network improvements to connect a number of remote locations on the Scottish west coast.

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; and
- Provide target notes to describe key features of the shore

The survey was carried out by Dr Iain Dixon contracted to Aquatera Ltd, a marine biologist experienced in intertidal biological survey and mapping. Iain was accompanied by a second biologist, Alison Skene of Aquatera Ltd, to assist with species identification and recording of notes.

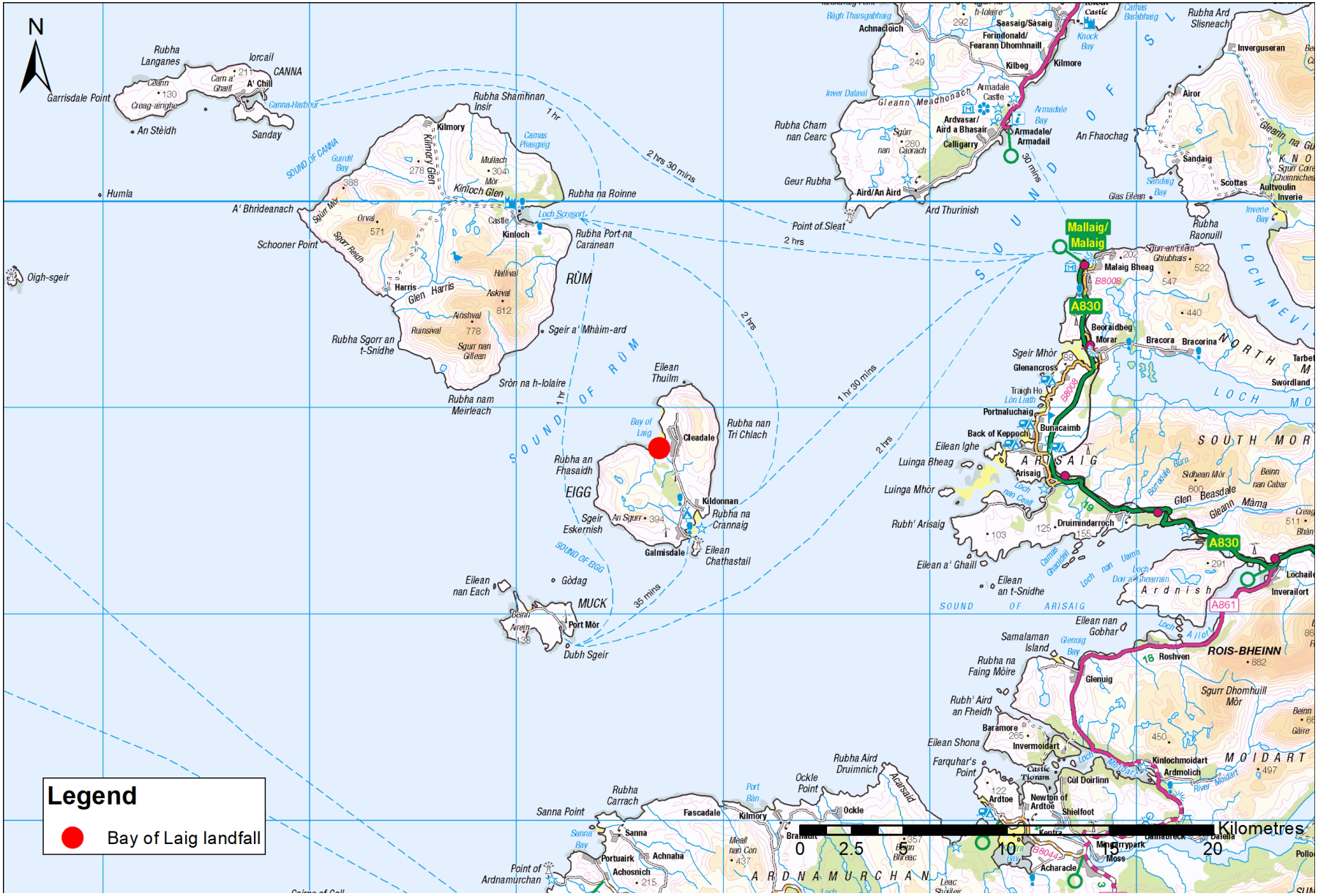

Figure 1.1 Location of the Bay of Laig, Eigg survey site (© Crown copyright and database rights 2021 OS 0100040827)

2 PHASE 1 INTERTIDAL SURVEY

2.1 INTRODUCTION

The survey took place on 6 September 2021, during low spring tides. The survey took place either side of low tide. Table 2.1 below outlines the survey conditions.

Table 2.1 Survey details

Date	6 September 2021
Time at start	11:45
Time at finish	15:00
Low tide (hours)	12:57 BST
Tide height (m)	0.6
Lowest Astronomical Tide (m)	-0.2
Mean Low Water Springs (m)	0.5
Type of access	Foot
Sea condition	Calm
Weather condition	SSW2; fog; drizzle

2.2 METHODOLOGY

2.2.1 Phase 1 survey method

The survey was carried out on foot using a variety of survey techniques that are described in the Countryside Council for Wales (CCW) report 'Handbook for Marine Intertidal Phase 1 Biotope Mapping Survey' (Wyn *et al.*, 2000) and the 'Marine Nature Conservation Review Rationale and Methods' (Hiscock, 1996).

Prior to commencing the survey in the field, a wireframe map (a basic outline drawing of obvious features and/or changes in habitat was produced to aid with the recording of biotopes.

Areas of sediment were dug and sampled at various intervals at the upper mid shore, mid shore, and lower shore. All samples were filtered through a 5 mm and 0.5 mm sieve. For both the sediment and rock areas, target notes and photographs were taken when there was a change in biotope type or zonation. An iPhone equipped with the ArcGIS app "Field Maps" was used to mark target points and tracks. All information was digitised to GIS using ArcMap 10, post survey. Maps were created using the guidance laid out in the CCW methodology.

Biotopes were assigned and described with reference to The Marine Habitat Classification for Britain and Ireland (v04.05) (Connor *et al.*, 2004) and the Joint Nature Conservation Committee (JNCC) website's online search facility.

All species names were taken from The World Register of Marine Species (WoRMS) website.

2.2.2 Survey area

The proposed survey area comprised an approximate 570 m corridor. This was based on the provided areas of search for the proposed cable route with an additional 25 m added on to the east and west edges to allow for any movement

of the beach manhole (BMH) and cable within this corridor. The survey area extended from the splash zone down to the Lowest Astronomical Tide (LAT) (Figure 2.1)

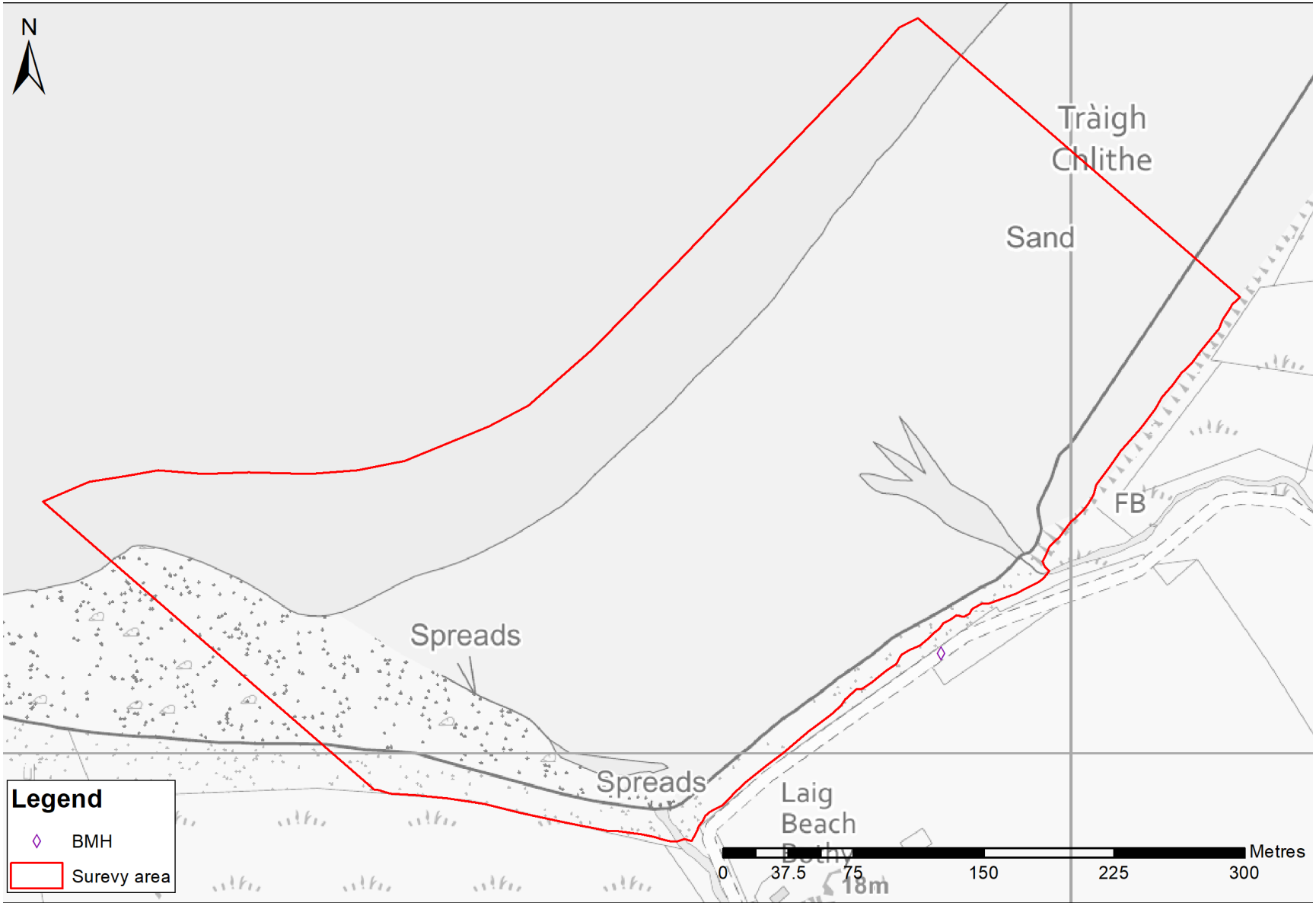

Figure 2.1 Survey area and proposed BMH location at Bay of Laig, Eigg (© Crown copyright and database rights 2021 OS 0100040827)

2.2.3 Limitations of survey

Only one low tide window was available in which to complete the survey. However, it was possible to cover the entire survey area during the single survey period.

2.3 SURVEY FINDINGS

2.3.1 Site description

The proposed landfall in the Bay of Laig is located on the northwest coast of Eigg (Figure 2.1). This west coast is exposed to the prevailing wind and sea conditions from the open Atlantic to the west and southwest, although it receives a little protection from the island of Rum 8 km to the northwest and the southern end of the Outer Hebridean island chain approximately 80km to the west. The proposed cable makes landfall on the sandy beach towards the southern end of the Bay of Laig, also known as Tràigh Chlithe. Tràigh Chlithe is a mostly sandy beach, although at its southern flank the sand is overlain by small boulders and patches of shingle. At roughly mid tide level the beach profile is raised into a low sandbank running the full length of the beach. The beach is also crossed by a small burn, approximately 120m north of the proposed cable route, the course of which in the upper shore is marked by cobbles and small boulders. South of the burn, the beach above the strandline consists of a mobile cobble bank that rises steeply to a rough pasture backing.

2.3.2 Biotopes

A summary of biotopes recorded within the survey area is provided in Table 2.2, and a map of lifeforms is shown in Figure 2.2.

Table 2.2 List of Biotopes found within the survey area

Biotope code	Biotope description	Occurrence on site	Typical species on site
LR.MLR.BF.Fser	*Fucus serratus* on moderately exposed lower eulittoral rock	Present on small boulders overlying sand in mid to lower shore flanking the south end of the beach and survey area.	*Fucus serratus* *F. vesiculosus* *Corallina officinalis* *Porphyra* sp. Pink coralline algal crusts *Hildenbrandia rubra* *Ulva* sp. indet. *Cladophora rupestris* *Actinia equina* *Spirobranchus triqueter* *Semibalanus balanoides* *Patella* spp. *Nucella lapillus* *Littorina littorea* *L. obtusata* *Gibbula cineraria*

Biotope code	Biotope description	Occurrence on site	Typical species on site
LR.LLR.F.Pel	*Pelvetia canaliculata* on sheltered littoral fringe rock	In a thin band in the upper shore on small boulders flanking the south end of the beach and survey area (shelter provided by south headland of bay). Co-occurring in mosaic within a thin band at top of fucoid zone with LR.LLR.F.Spi.X).	Sparse *Semibalanus balanoides* *Littorina saxatilis* *Fucus spiralis* *Pelvetia canaliculata* *Verrucaria maura*
LR.LLR.F.Fspi.X	*Fucus spiralis* on full salinity upper eulittoral mixed substrata	In a thin band in the upper shore on small boulders flanking the south end of the beach and survey area (shelter provided by south headland of bay). Co-occurring in mosaic within a thin band at top of fucoid zone with LR.LLR.F.Pel.	Sparse *Semibalanus balanoides* *Littorina saxatilis* *Fucus spiralis* *Pelvetia canaliculata* *Verrucaria maura* *V. mucosa*
LR.LLR.F.Fves.X	*Fucus vesiculosus* on mid eulittoral mixed substrata	In a wide band in the mid shore on small boulders flanking the south end of the beach and survey area (shelter provided by south headland of bay).	*Fucus vesiculosus* *Ascophyllum nodosum* Pink coralline algal crusts *Corallina officinalis* *Chondrus crispus* ?*Gelidium* sp. ?*Grateloupia* sp. *Littorina littorea* *L. obtusata* *Spirobranchus triqueter* Spirorbidae *Arenicola marina* *Semibalanus balanoides* *Patella* spp. *Nucella lapillus* *Carcinus maenas*
LR.FLR.Rkp.Cor	*Corallina officinalis*, coralline crusts and brown seaweeds in shallow eulittoral rockpools	Forming a mosaic within the *F. serratus* zone, rockpools with sandy floors are occasionally present in mid to lower shore boulders flanking the south end of the beach and survey area.	*Fucus serratus* *Corallina officinalis* *Chondrus crispus* *Arenicola marina*
LS.LCS.Sh.BarSh	Barren littoral shingle	Mobile and sand-scoured cobble bank along the strandline in the upper shore and supralittoral to the rough pasture backing. Also present in mid and upper shore in the burn where it crosses the beach.	Strandline algal and other debris with flies and talitrid amphipods
LS.LSa.MoSa.BarSa	Barren littoral coarse sand	Mid to upper shore over full length of survey area.	No species seen

Biotope code	Biotope description	Occurrence on site	Typical species on site
LS.LSa.FiSa.Po	Polychaetes in littoral fine sand	Mid shore and below in narrow zone across southern edge of sandy beach.	*Arenicola marina* *Sphaerodoridae* indet.
LS.LSa.FiSa.Po.Aten	Polychaetes and *Angulus tenuis* in littoral fine sand	Fine sand in mid shore and below over full length of survey area.	*Nephtys* sp. Tellinidae indet (*Macomangulus tenuis*).

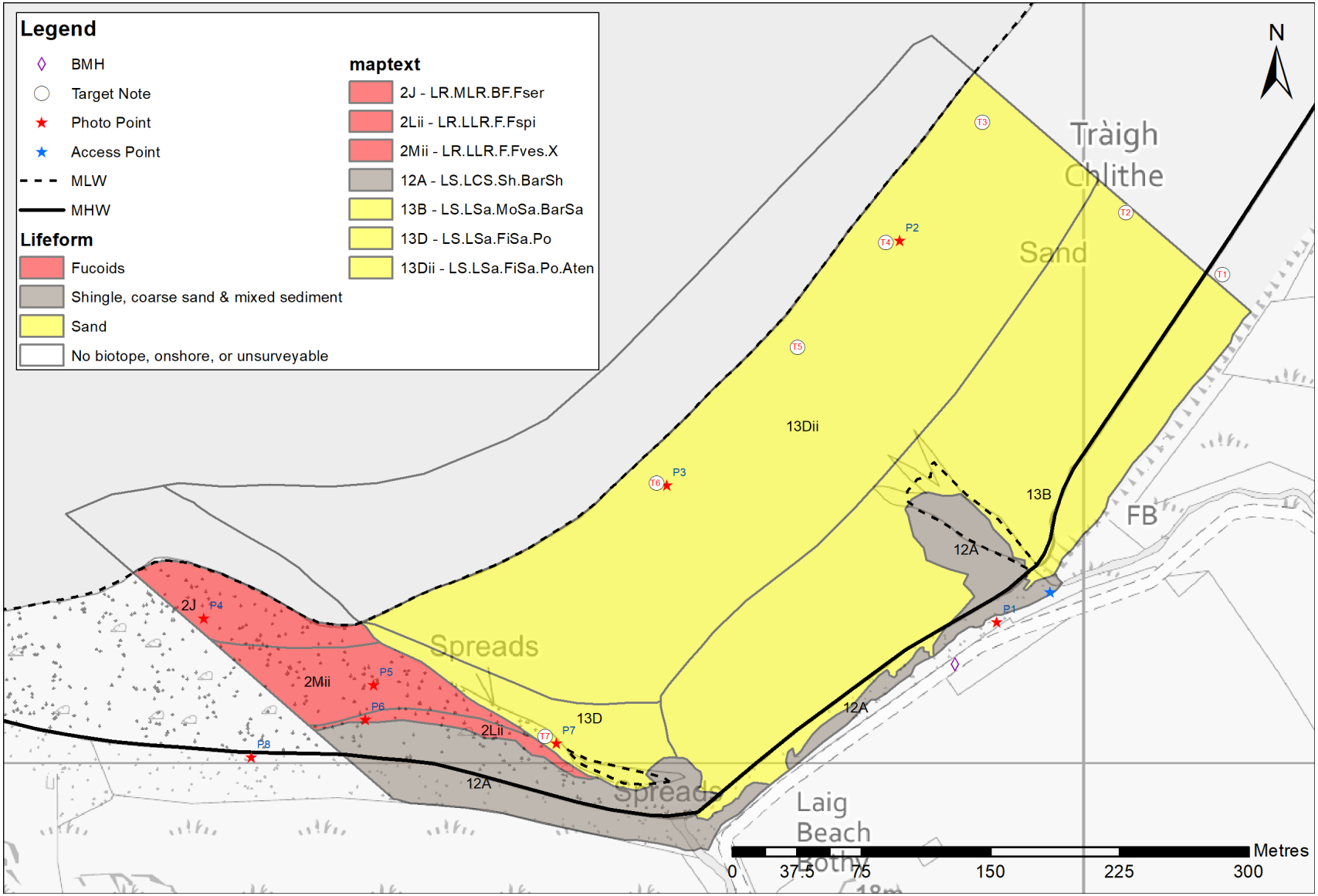

Figure 2.2 Lifeforms map of the Bay of Laig intertidal survey area (© Crown copyright and database rights 2021 OS 0100040827)

2.3.3 Target notes

Target Notes and corresponding photographs are shown in Table 2.3. The locations of each of the Target Notes is indicated on the lifeforms map (Figure 2.2). Figure 2.2 also shows the locations of additional photographs as shown in Section 2.7.

Table 2.3 Target notes

Target note No.	Description	Photograph
T1	Dig-over site #1 in upper shore (approx. MHWS) at north end of survey area (view along beach to south). Strandline visible to left. Mobile well sorted fine grey sand with a single amphipod observed	
T2	Dig-over site #2 in upper shore – at upper edge of sandbank in upper shore, north end of survey area (view along beach to north); mobile well sorted fine grey sand with no life observed	

Target note No.	Description	Photograph
T3	Dig-over site #3 in mid/lower shore at north end of survey area. View up shore along northern edge of survey area. Mobile well sorted fine grey sand with a single tellin bivalve mollusc observed	
T4	Dig-over site #4 in lower shore towards north end of survey area; mobile well sorted fine grey sand with two polychaetes (*Nephtys* sp) observed	

Target note No.	Description	Photograph
T5	Dig-over site #5 in lower shore directly below the burn; view up shore. Mobile well sorted fine black river sand evident, with no life observed	
T6	Dig-over site #6 in lower shore close by the proposed cable route; view up shore. Mobile well sorted fine sand with black river sand evident, with a single tellin bivalve mollusc observed	

Target note No.	Description	Photograph
T7	Dig-over site #7 in mid shore at southern edge of sandy beach; mobile well sorted fine grey sand with frequent *Arenicola marina* casts; plus three polychaetes (single sphaerodorid and two *Nephtys* sp) observed in sieve	
T8	Lower shore boulders, at upper edge of *Fucus serratus* zone (biotope is *Fucus serratus* on moderately exposed lower eulittoral rock; LR.MLR.BF.Fser).	

2.3.4 Importance of Biotope types

There were no biotopes of conservation importance found within the survey area. The dog whelk (*Nucella lapillus*) is highlighted by OSPAR as a threatened/declining species and was found occasionally on the intertidal rock. However, the dog whelk is a common species in the UK and is not protected under any other piece of legislation. No UK Biodiversity Action Plan (BAP) priority marine species, or species/habitats on the Scottish list of Priority Marine Features were recorded.

2.4 DISCUSSION

From a biological perspective, there are no reasons that would prevent the landing of a cable at the proposed location, or anywhere within the survey area. There is also a gap in the dune system via the route taken by the burn where it meets the beach for easy access. Above high water the beach is backed by dunes and rough pasture. It should be noted that the sediment over the whole beach and its backing is mobile and subject to movement and re-distribution according to weather.

2.5 RECOMMENDATIONS

A further Phase 2 intertidal survey is not required at this site. It is also understood that the sediments on this shore are mobile and that locations of sediment deposits can vary from year to year and month to month.

2.6 REFERENCES

Connor, D.W., Allen, J.H., Golding, N. Howell, K.L., Lieberknecht, L.M., Northen, K.O. and Reker, J.B. 2004. The Marine Habitat Classification for Britain and Ireland, Version 04.05. JNCC, Peterborough (internet version www.jncc.gov.uk/MarineHabitatClassification).

Hiscock, K. (ed). 1996. Marine Nature Conservation Review: rationale and methods. JNCC, Peterborough. (Coasts and seas of the United Kingdom. MNCR series).

Wyn, G., Brazier, P., Birch, K., Bunker, A., Cooke, A., Jones, M., Lough, N., McMath, A. and Roberts, S. 2000. Handbook for Marine Intertidal Phase 1 Biotope Mapping Survey. CCW, Bangor.

2.7 PHOTOGRAPHS

The locations of photo points are shown in Figure 2.2.

Photo 1a Overview of Bay of Laig from behind beach to north

Photo 1b Overview of Bay of Laig from behind beach down shore to the sea (overlooking the burn crossing the survey area)

Photo 1c Overview of Bay of Laig from behind beach to south

Photo 2 The 0.5mm sieve content and Nephtys sp. at T4; lower shore near north end of survey area

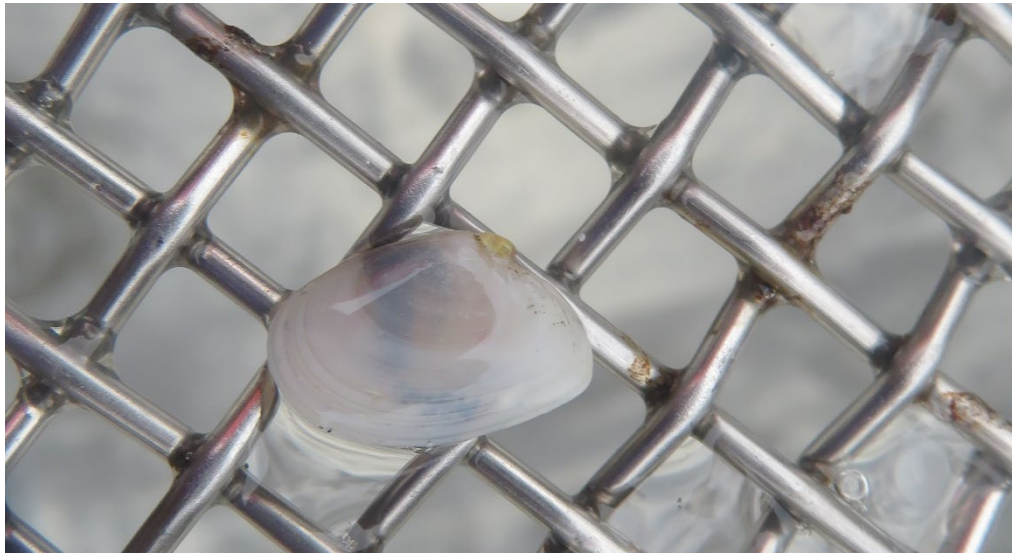

Photo 3 **The 5mm sieve with the tellin *Macomangulus tenuis*; at T6; lower shore near proposed cable route**

Photo 1a **Views of small sediment-floored rockpools in lower shore characterised by seaweeds *Fucus serratus, Corallina officinalis* and *Chondrus crispus* and the polychaete *Arenicola marina* (LR.FLR.Rkp.Cor)**

Photo 2b **View of lower shore boulders with the fucoid algae *Fucus serratus* and *F. vesiculosus* and the green alga *Ulva* sp. (LR.MLR.BF.Fser)**

Photo 3c **View of lower shore boulders with the fucoid algae *Fucus serratus* and *F. vesiculosus* and dog whelks *Nucella lapillus* (LR.MLR.BF.Fser)**

Photo 5a View of mid shore boulders with the fucoid algae ***Fucus vesiculosus,*** barnacles and the dog whelk ***Nucella lapillus*** **(LR.LLR.F.Fves.X)**

Photo 5b Mid shore boulders with mixed fucoids ***Fucus vesiculosus,*** and ***Ascophyllum nodosum*** (**LR.LLR.F.Fves.X**)

Photo 6a Upper shore boulders with mixed fucoids ***Fucus spiralis*** **(foreground) and** ***Pelvetia canaliculata*** **(to right) illustrating mosaic of LR.LLR.F.Pel and LR.LLR.F.FSpi.X**

Photo 6b Upper shore cobbles and boulders with ***Pelvetia canaliculata*** **(LR.LLR.F.Pel)**

Photo 7 View of mid shore fine sand with the casts of the polychaete *Arenicola marina*

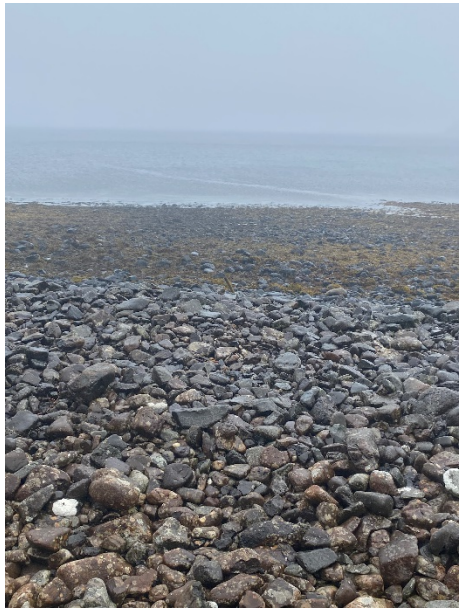

Photo 8a View down shore over barren cobble bank to fucoid-dominated boulder beach at southern end of survey area

Photo 8b View along cobble bank at top of shore to north from southern end of survey area

Photo 8c View along cobble bank at top of shore to south from southern end of survey area

A.2 INTERTIDAL SURVEY REPORT FOR CABLE CORRIDOR 2.13 EIGG TO MAINLAND: MAINLAND LANDING POINT

Phase 1 Intertidal Survey Report for Morar (Route 2.13)

Version 1

Report to Intertek

Issued by Aquatera Ltd

P961 – November 2021

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V1	01 Nov 2021	Draft issued to client

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1 INTRODUCTION

Aquatera has been commissioned to carry out a Phase 1 intertidal survey of two sandy bays near Morar, Camas Rubha a' Mhurain and the adjacent bay to the north, both part of the Silver Sands series of beaches between Arisaig and Morar (Figure 1.1). The area has been identified as a suitable location for the onshore landfall and onward connection for fibre optic cables as part of network improvements to connect a number of remote locations on the Scottish west coast.

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; and
- Provide target notes to describe key features of the shore

The survey was carried out by Dr Iain Dixon contracted to Aquatera Ltd, a marine biologist experienced in intertidal biological survey and mapping. Iain was accompanied by a second biologist, Alison Skene of Aquatera Ltd, to assist with species identification and recording of notes.

Figure 1.1 Location of the Morar survey site (© Crown copyright and database rights 2021 OS 0100040827)

2 PHASE 1 INTERTIDAL SURVEY

2.1 INTRODUCTION

The survey took place on 7 September 2021, during low spring tides. The survey took place either side of low tide. Table 2.1 below outlines the survey conditions.

Table 2.1 Survey details

Date	7 September 2021
Time at start	11:15
Time at finish	16:00
Low tide (hours)	13:29 BST
Tide height (m)	0.7
Lowest Astronomical Tide (m)	0.0
Mean Low Water Springs (m)	0.8
Type of access	Foot
Sea condition	Calm
Weather condition	SSW2-3; dry; sunny

2.2 METHODOLOGY

2.2.1 Phase 1 survey method

The survey was carried out on foot using a variety of survey techniques that are described in the Countryside Council for Wales (CCW) report 'Handbook for Marine Intertidal Phase 1 Biotope Mapping Survey' (Wyn *et al.*, 2000) and the 'Marine Nature Conservation Review Rationale and Methods' (Hiscock, 1996).

Prior to commencing the survey in the field, a wireframe map (a basic outline drawing of obvious features and/or changes in habitat was produced to aid with the recording of biotopes.

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All species names were taken from The World Register of Marine Species (WoRMS) website.

2.2.2 Survey area

The proposed survey area comprised an approximate 570 m corridor. This was based on the provided areas of search for the proposed cable route with an additional 25 m added on to the east and west edges to allow for any movement

of the beach manhole (BMH) and cable within this corridor. The survey area extended from the splash zone down to the Lowest Astronomical Tide (LAT) (Figure 2.1)

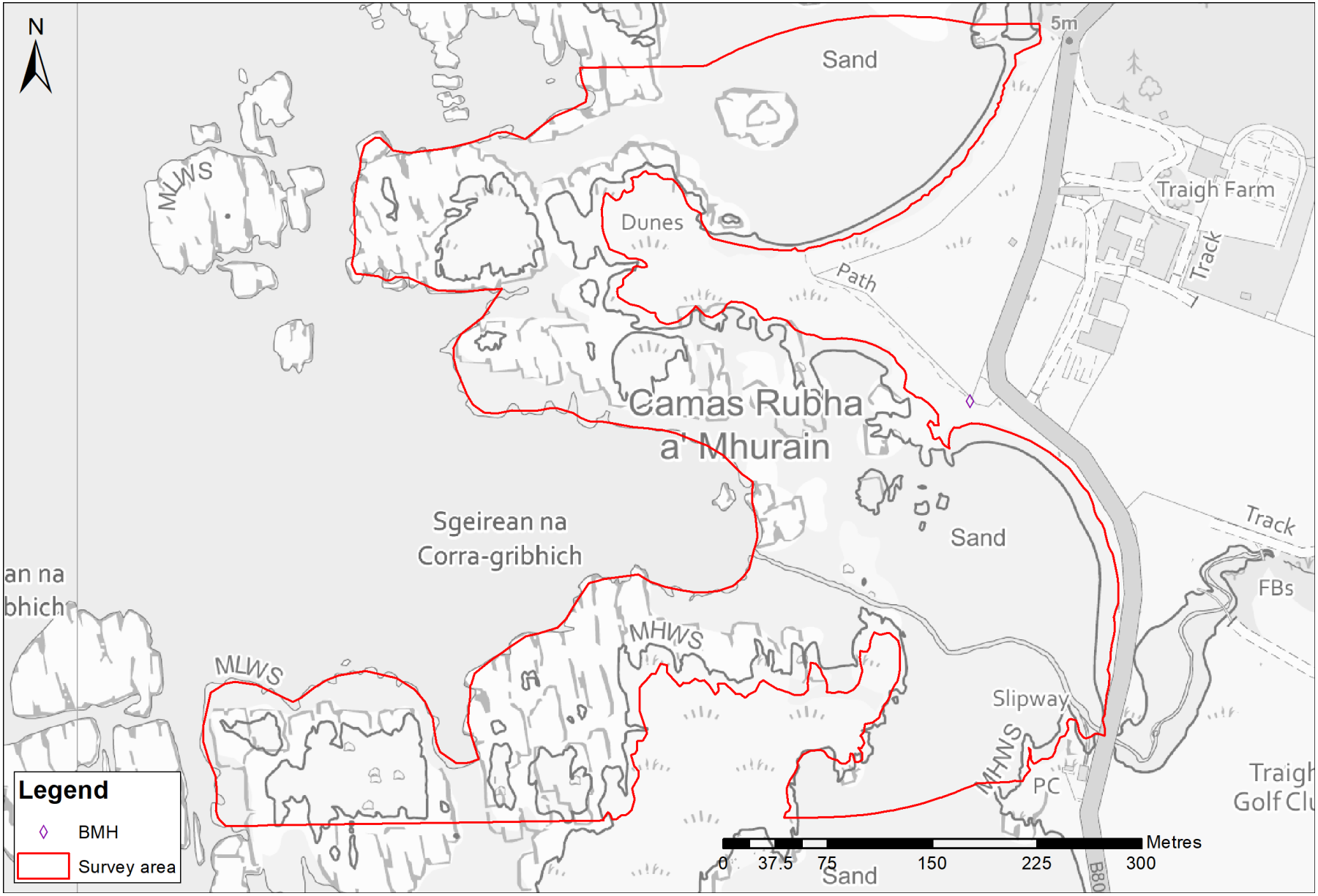

Figure 2.1 Survey area and proposed BMH location at Morar (© Crown copyright and database rights 2021 OS 0100040827)

2.2.3 Limitations of survey

Only one low tide window was available in which to complete the survey. However, it was possible to cover the entire survey area during the single survey period.

2.3 SURVEY FINDINGS

2.3.1 Site description

The proposed landfall at Silver Sands, Morar, is a west-facing sandy beach named Camas Rubha a' Mhurain by Traigh House, approximately 3km north of Arisaig. The sandy beach is bounded to the south by a line of large rocky outcrops extending out to sea, Sgeirean na Corra-gribbich, and to the north by a headland of grass, dunes and further rocky outcrops (Figure 2.1). The survey area extends around this headland into the un-named sandy bay to the north. This west-facing shore is sheltered from prevailing westerly and southwesterly winds by the Small Isles offshore, together with a series of small rocks and islets in the shallows. Overall, therefore, the survey area is moderately exposed. The sediments in the two bays consist mainly of clean fine to medium sand, inhabited by extensive populations of the lugworm *Arenicola marina* and the sand mason worm *Lanice conchilega*. A small burn, Allt an Dubh asaidh, drains grazing farmland behind the shore and exits to the sea across Camas Rubha a' Mhurain, and there are public toilets at the top of the shore where the burn enters the bay. These influences are perhaps responsible for much of the sand to either side of the burn being lightly overgrown by fine green algae. The survey area is backed by a small road that is busy in summer months, and beaches along the whole Silver Sands coast are used extensively by walkers, campers and holiday makers.

2.3.2 Biotopes

The tall and variable elevations of the intertidal rocky outcrops with steep or vertical rock faces, cut through with rocky or sand-floored channels, makes the normally straightforward biological zonation pattern quite complex. From a mapping perspective this results in the frequent close juxtaposition of many biotopes, and it is difficult to represent these individual habitats/communities clearly in plan view at an appropriate scale. It is only practical to map such shores as a mixture or mosaic of biotopes. The rocky intertidal biotopes here were divisible into two broad biotope mosaics: one covering the vertical zonation between the supralittoral and the upper shore (lichens and barnacles and limpets), and the second covering from the lower shore down into the sublittoral fringe (which remained mostly covered by the tide). A summary of these mosaics and their component biotopes is provided in Table 2.2 and Table 2.3 respectively, and a map of lifeforms is shown in Figure 2.2.

Table 2.2 Biotope mosaics found within the survey area

Mosaic no	Component biotopes	Occurrence on site
Mosaic 1:	LR.HLR.MusB.Cht LR.MLR.BF.PelB LR.MLR.BF.SpiB LR.FLR.Lic.YG LR.FLR.Lic.Ver	Supralittoral to upper shore zonation on steep or vertical bedrock. High rocky platforms topped with mix of grass and yellow, grey and black lichens high up in supralittoral; black lichen more prevalent in the upper shore. Grading down into a white band of sometimes dense barnacles and limpets mixed with *Pelvetia* (higher) and *Fucus spiralis* (lower). Barnacle components often dominant, especially on vertical faces.
Mosaic 2:	LR.LLR.F.Fserr IR.MIR.KR.Ldig	Lower shore brown fucoid seaweeds on upward-facing bedrock around the low water mark. Mostly still covered by the tide, along with the brown kelp *Laminaria digitata*.

Table 2.3 List of Biotopes found within the survey area

Biotope code	Biotope description	Occurrence on site	Typical species on site
LR.HLR.MusB.Cht	*Chthamalus* spp. on exposed upper eulittoral rock	Upper shore or upper mid shore, on upward-facing and vertical or steep bedrock	*Lichina pygmaea* *Semibalanus balanoides* *Chthamalus montagui* *Littorina saxatilis* *L. littorea* *Melarhaphe neritoides* *Anurida maritima*
LR.MLR.BF.PelB	*Pelvetia canaliculata* and barnacles on moderately exposed littoral fringe rock	In a thin band on upper shore bedrock, directly below upper shore black lichen zone.	*Pelvetia canaliculata* *Verrucaria maura* *Semibalanus balanoides* *Chthamalus montagui* *Littorina saxatilis*
LR.MLR.BF.FspiB	*Fucus spiralis* on full salinity exposed to moderately exposed upper eulittoral rock	In a thin band along upper shore bedrock, usually directly below PelB.	*Fucus spiralis* *Pelvetia canaliculata* *Ulva* sp. *Verrucaria maura* *V. mucosa* *Semibalanus balanoides* *Austrominius modestus* *Littorina saxatilis* *L. littorea*
LR.LLR.F.Asc	*Ascophyllum nodosum* on very sheltered mid eulittoral rock	In a wide band in the mid shore on bedrock and boulders around the whole survey area. Both *A. nodosum* and *Fucus vesiculosus* co-dominant.	*Chondrus crispus* *Vertebrata lanosa* *Osmundea* sp. *Fucus vesiculosus* *Ascophyllum nodosum* *Ulva* sp. *Verrucaria maura* *V. mucosa* *Actinia equina* Spirorbidae *Semibalanus balanoides* *Austrominius modestus* Amphipoda *Littorina littorea* *L. obtusata* *S. cineraria* *Patella* spp. *Nucella lapillus* *Anurida maritima*

Biotope code	Biotope description	Occurrence on site	Typical species on site
LR.LLR.F.Fserr	*Fucus serratus* on sheltered lower eulittoral rock	Forming a narrow band on bedrock in the lower shore along the whole survey area, but with lower edge covered by tide and merging into sublittoral kelps.	*Fucus serratus* *F. vesiculosus* *Ulva* sp *Semibalanus balanoides* *Carcinus maenas* *Patella* spp. *Nucella lapillus* *Littorina littorea* *L. obtusata* *Spirorbis* sp.
LR.FLR.Lic.YG	Yellow and grey lichens on supralittoral rock	In a supralittoral band along the uppermost edge of the survey area, particularly on bedrock outcrops.	*Caloplaca* sp. *Lecanora* sp. *Verrucaria maura* Grey lichens
LR.FLR.Lic.Ver	*Verrucaria maura* on littoral fringe rock	In supralittoral mixed with yellow and grey lichens, and patchy in upper shore	*Verrucaria maura* *V. mucosa* *Littorina saxatilis*
LS.LCS.Sh.BarSh	Barren littoral shingle	Stable shingle and sand in upper shore and supralittoral inlet on south side of main sandy bay.	No species seen
LS.LSa.MoSa.BarSa	Barren littoral coarse sand	Dry sand in upper shore and supralittoral around top edge of sandy bays.	No species seen
LS.LSa.FiSa.Po	Polychaetes in littoral fine sand	Fine to medium waterlogged sand with some shell gravel in mid and lower shore, in both sandy bays.	*Arenicola marina* *Lanice conchilega* *Macomangulus tenuis*
IR.MIR.KR.Ldig	*Laminaria digitata* on moderately exposed sublittoral fringe rock	Visible in shallow sublittoral around rocky parts of shoreline (not exposed and therefore not surveyed)	*Laminaria digitata*

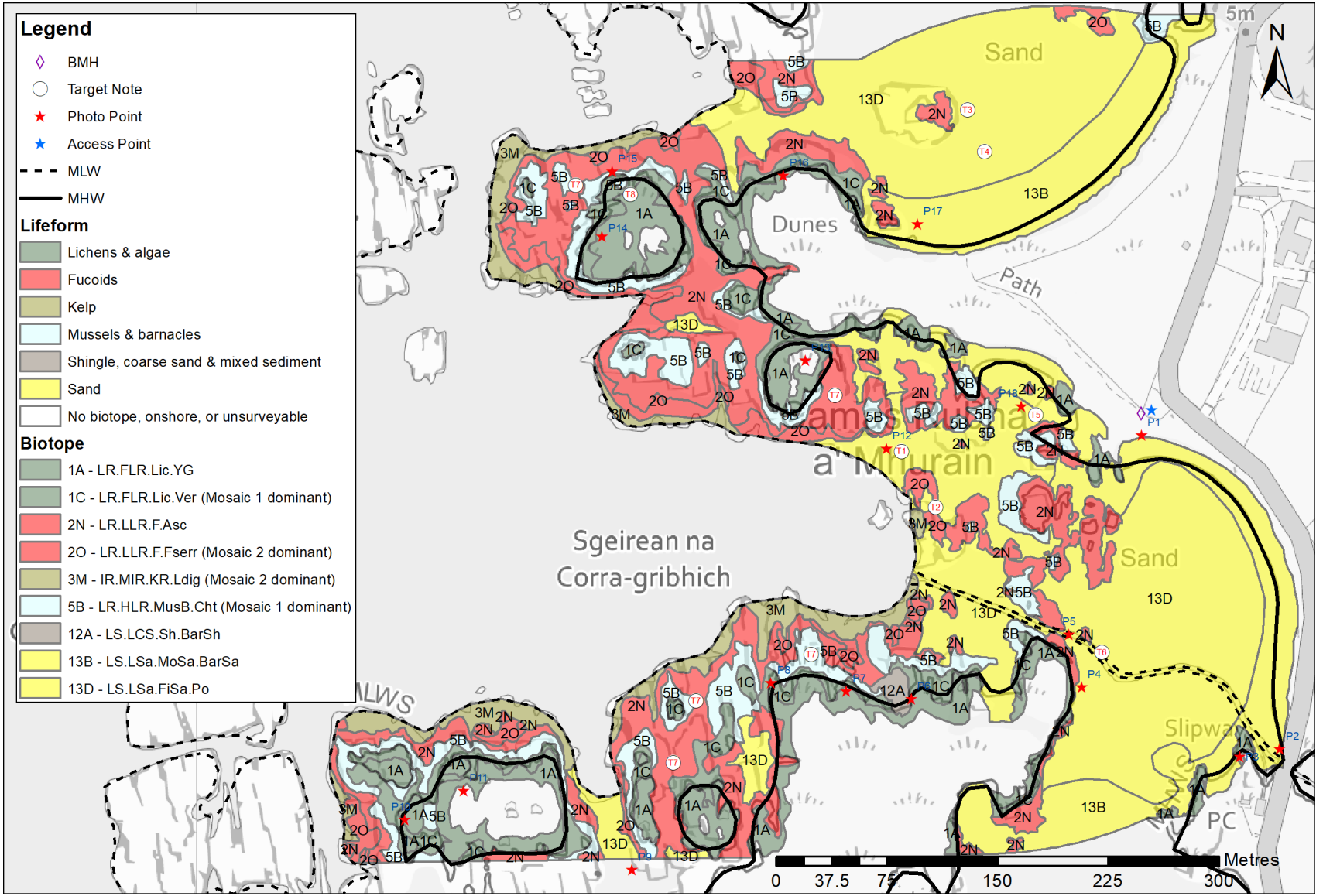

Figure 2.2 Lifeforms map of the Morar intertidal survey area (© Crown copyright and database rights 2021 OS 0100040827)

2.3.3 Target notes

Target Notes and corresponding photographs are shown in Table 2.4. The locations of each of the Target Notes is indicated on the lifeforms map (Figure 2.2). Figure 2.2 also shows the locations of additional photographs as shown in Section 2.7.

Table 2.4 Target notes

Target note No.	Description	Photograph
T1	View up shore along proposed new cable route from the water's edge	
T1	Sediment dig-over #1, lower mid shore on proposed new cable landfall. Fine gravelly sand with lugworm casts (*Arenicola marina*) and sand mason worm tubes (*Lanice conchilega*). Animals seen in sieves include the polychaete *Nephtys* sp.	

Target note No.	Description	Photograph
T2	Sediment dig-over #2, mid shore. Fine gravelly sand with lugworm casts (*Arenicola marina*) and sand mason worm tubes (*Lanice conchilega*). Animals seen in sieves include several *L. conchilega*.	
T3	Sediment dig-over #3, lower mid shore fine shell gravel sand. *Arenicola marina* casts and sand mason worm tubes (*Lanice conchilega*). No animals seen in sieves.	
T4	North sandy bay. Sediment dig-over #4, mid shore fine shell gravel sand. *Arenicola marina* casts and sand mason worm tubes (*Lanice conchilega*). *Scolelepis squamata* and another polychaete in sieve.	

Target note No.	Description	Photograph
T5	Sediment dig-over #5, northern end of main sandy bay Camas Rubha a' Mhurain by proposed cable route; mid shore fine shell gravel sand. *Arenicola marina* casts and sand mason worm tubes (*Lanice conchilega*). Bivalve mollusc *Macomangulus tenuis* seen in sieve.	
T6	Sediment dig-over #6 by burn crossing the bay; mid shore fine shell gravel sand. *Arenicola marina* casts and sand mason worm tubes (*Lanice conchilega*) together with organic debris. Sediment coloured pink, possibly by diatoms.	
	Organic debris and lugworm seen in sieve.	

Target note No.	Description	Photograph
T7	An example of a coralline rock pool.	
T8	An example of a green algal rock pool	

2.3.4 Importance of Biotope types

There were no biotopes of conservation importance found within the survey area. The dog whelk (*Nucella lapillus*) is highlighted by OSPAR as a threatened/declining species and was found occasionally on the intertidal rock. However, the dog whelk is a common species in the UK and is not protected under any other piece of legislation. No UK Biodiversity Action Plan (BAP) priority marine species, or species/habitats on the Scottish list of Priority Marine Features were recorded.

2.4 DISCUSSION

From a biological perspective, there are no reasons that would prevent the landing of a cable at the proposed location, or anywhere within the survey area. The shore is heavily used, particularly in summer months, by dog walkers, holiday makers and campers.

2.5 RECOMMENDATIONS

A further Phase 2 intertidal survey is not required at this site.

2.6 REFERENCES

Connor, D.W., Allen, J.H., Golding, N. Howell, K.L., Lieberknecht, L.M., Northen, K.O. and Reker, J.B. 2004. The Marine Habitat Classification for Britain and Ireland, Version 04.05. JNCC, Peterborough (internet version www.jncc.gov.uk/MarineHabitatClassification).

Hiscock, K. (ed). 1996. Marine Nature Conservation Review: rationale and methods. JNCC, Peterborough. (Coasts and seas of the United Kingdom. MNCR series).

Wyn, G., Brazier, P., Birch, K., Bunker, A., Cooke, A., Jones, M., Lough, N., McMath, A. and Roberts, S. 2000. Handbook for Marine Intertidal Phase 1 Biotope Mapping Survey. CCW, Bangor.

2.7 PHOTOGRAPHS

The locations of photo points are shown in Figure 2.2.

Photo 1a Overview of Camas Rubha a' Mhurain, the main sandy bay at the Morar site, from small car park

Photo 1b Overview of Camas Rubha a' Mhurain, the main sandy bay at the Morar site, from small car park

Photo 2 View west over main sandy bay, from the road bridge where the burn emerges onto the beach

Photo 3 View west from near road bridge, Sgeirean na Corra-gribhich, the rocky headland at the southern edge of the survey area

Photo 4 View to east up-river across main sandy bay back towards road bridge (dark patch to left of burn is drift algal debris)

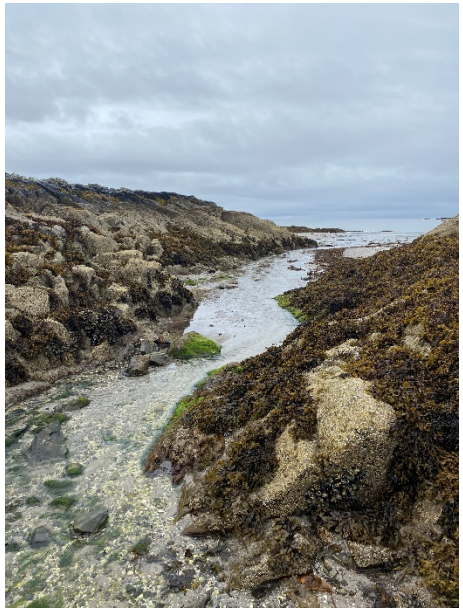

Photo 5 View west to sea from river; Sgeirean na Corra-gribhich to left and rocky outcrop in sand to right

Photo 6 View to northwest from small shingle beach on south side of Sgeirean na Corra-gribhich, over mid shore fucoids towards main bay in distance

Photo 7a View to northwest on Sgeirean na Corra-gribhich, over barnacle-dominated rocky plateau in upper shore (black lichens to left and mid shore fucoid cover to right)

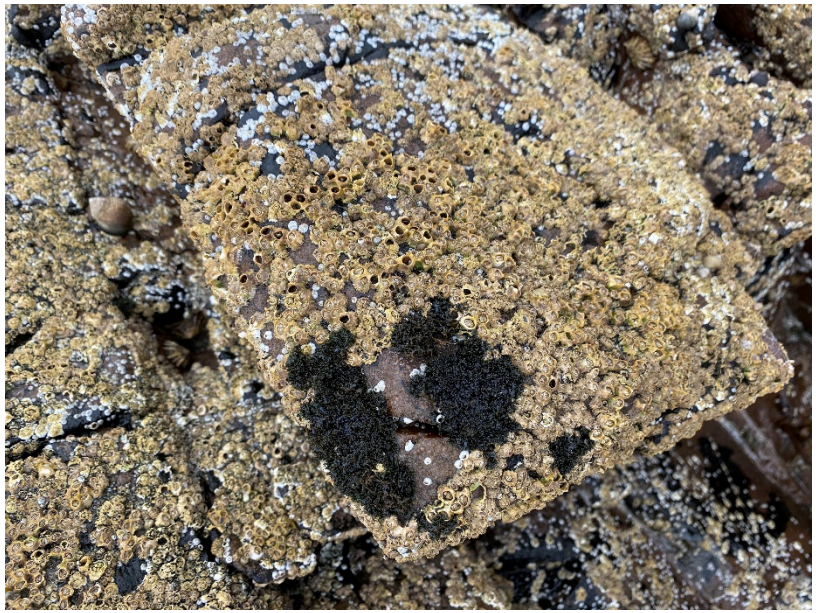

Photo 7b Upper shore white barnacle zone, dominated by *Chthamalus montagui*, *Semibalanus balanoides* and with small patches of leafy black lichen *Lichina pygmaea*

Photo 8 View of upper shore white barnacle zone grading down through mid shore to lower shore fucoid seaweed cover

Photo 9 Sandy channel with lugworm casts, through southern headland near southern boundary of survey area

Photo 10 Large rocky knoll at western tip of southern headland in survey area, and zonation from yellow and grey lichens at top down through black lichen band, narrow Pelvetia band to extensive upper shore barnacle and limpet zone on mostly steep rock faces

Photo 11 View from lichen-topped rocky knoll down through barnacle zone to mid and lower shore fucoid cover. Kelp *Laminaria digitata* is just emergent and visible in the sea around

Photo 12a View north along lower shore of main sandy bay Camas Rubha a' Mhurain, towards rocky headland

Photo 12b Water's edge at site of dig-over 1 (by proposed cable route); sediments full of lugworm casts and sand mason worm tubes

Photo 13a View over Camas Rubha a' Mhurain and proposed cable route, from headland to north

Photo 13b View to east over northern end of Camas Rubha a' Mhurain and rocky outcrops to north of proposed cable route, with mid shore fucoid cover and coralline rock pools

Photo 13c View to west along edge of rocky headland to north of Camas Rubha a' Mhurain

Photo 13d View to west down gully on rocky headland, filled with fucoid algae

Photo 14 Western end of rocky headland north side of Camas Rubha a' Mhurain; view north across upper shore and supralittoral lichen dominated tops

Photo 15a Western end of rocky headland north side of Camas Rubha a' Mhurain; view north across upper shore and supralittoral lichen dominated tops

Photo 15b Western end of rocky headland north side of Camas Rubha a' Mhurain; view north down over mid shore fucoids to lower shore and shallow sublittoral

Photo 15c Western end of rocky headland north side of Camas Rubha a' Mhurain; view east across supralittoral lichen dominated tops into northern sandy bay

Photo 16a View to northeast into northern sandy bay

Photo 16b View east into northern sandy bay

Photo 17 View northeast along strandline of northern bay to northern limit of survey area

Photo 18a Northern end of main sandy bay Camas Rubha a' Mhurain

Photo 18b Overview of Camas Rubha a' Mhurain, the main sandy bay at the Morar site

A.3 INTERTIDAL SURVEY REPORT FOR CABLE CORRIDOR 2.14 MAINLAND TO LISMORE: MAINLAND LANDING POINT

aquatera
environmental services and products

Phase 1 Intertidal Survey Report for Port Appin (Route 2.14)

Version 1

Report to Intertek

Issued by Aquatera Ltd

P961 – October 2021

ISO 9001 CERTIFIED
UKAS MANAGEMENT SYSTEMS
8289
British Assessment Bureau

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Members of:

OREF Orkney Renewable Energy Forum
ADEMAR
poet Pacific Ocean Energy Trust
APPA Asociación de Empresas de Energías Renovables
Scottish Hydrogen & Fuel Cell Association
Australian Ocean Energy Group

Contents

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List of Tables

1 INTRODUCTION

Aquatera has been commissioned to carry out a Phase 1 intertidal survey of the shore at Port Appin, situated in the Lynn of Lorn on the east coast of Loch Linnhe (Figure 1.1). The area has been identified as a suitable location for the onshore landfall and onward connection for fibre optic cables as part of network improvements to connect a number of remote locations on the Scottish west coast.

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; and
- Provide target notes to describe key features of the shore

The survey was carried out by Dr Iain Dixon contracted to Aquatera Ltd, a marine biologist experienced in intertidal biological survey and mapping. Iain was accompanied by a second biologist, Alison Skene of Aquatera Ltd, to assist with species identification and recording of notes.

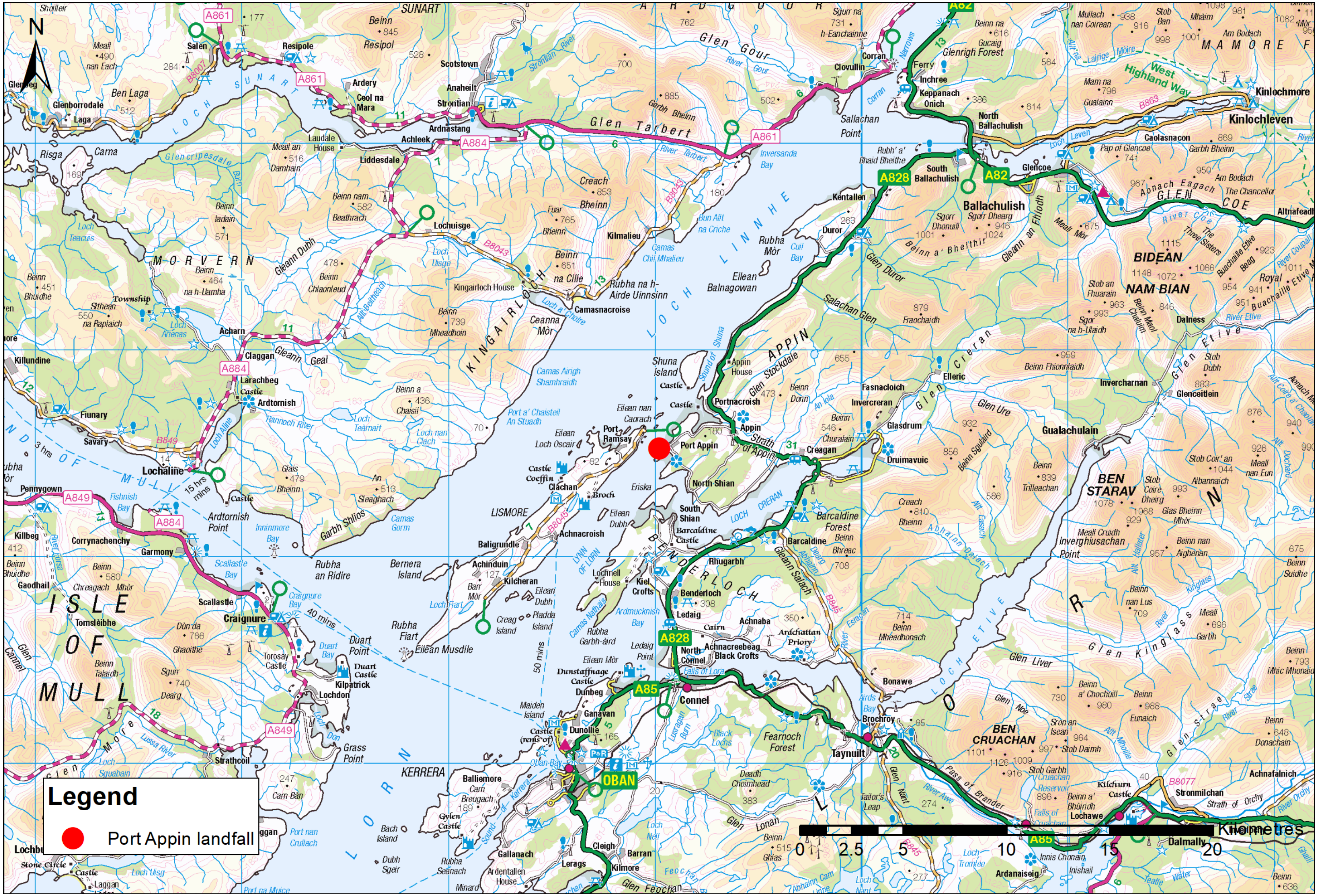

Figure 1.1 Location of the Port Appin survey site (© Crown copyright and database rights 2021 OS 0100040827)

2 PHASE 1 INTERTIDAL SURVEY

2.1 INTRODUCTION

The survey took place on 11 September 2021, during low spring tides. The survey took place either side of low tide. Table 2.1 below outlines the survey conditions.

Table 2.1 Survey details

Date	11 September 2021
Time at start	11:55
Time at finish	15:20
Low tide (hours)	15:08 BST
Tide height (m)	0.7
Lowest Astronomical Tide (m)	0.1
Mean Low Water Springs (m)	0.8
Type of access	Foot
Sea condition	Calm
Weather condition	NW2; bright; dry

2.2 METHODOLOGY

2.2.1 Phase 1 survey method

The survey was carried out on foot using a variety of survey techniques that are described in the Countryside Council for Wales (CCW) report 'Handbook for Marine Intertidal Phase 1 Biotope Mapping Survey' (Wyn *et al.*, 2000) and the 'Marine Nature Conservation Review Rationale and Methods' (Hiscock, 1996).

Prior to commencing the survey in the field, a wireframe map (a basic outline drawing of obvious features and/or changes in habitat was produced to aid with the recording of biotopes.

Areas of sediment were dug and sampled at various intervals at the upper mid shore, mid shore, and lower shore. All samples were filtered through a 5 mm and 0.5 mm sieve. For both the sediment and rock areas, target notes and photographs were taken when there was a change in biotope type or zonation. An iPhone equipped with the ArcGIS app "Field Maps" was used to mark target points and tracks. All information was digitised to GIS using ArcMap 10, post survey. Maps were created using the guidance laid out in the CCW methodology.

Biotopes were assigned and described with reference to The Marine Habitat Classification for Britain and Ireland (v04.05) (Connor *et al.*, 2004) and the Joint Nature Conservation Committee (JNCC) website's online search facility.

All species names were taken from The World Register of Marine Species (WoRMS) website.

2.2.2 Survey area

The proposed survey area comprised an approximate 570 m corridor. This was based on the provided areas of search for the proposed cable route with an additional 25 m added on to the east and west edges to allow for any movement

of the beach manhole (BMH) and cable within this corridor. The survey area extended from the splash zone down to the Lowest Astronomical Tide (LAT) (Figure 2.1)

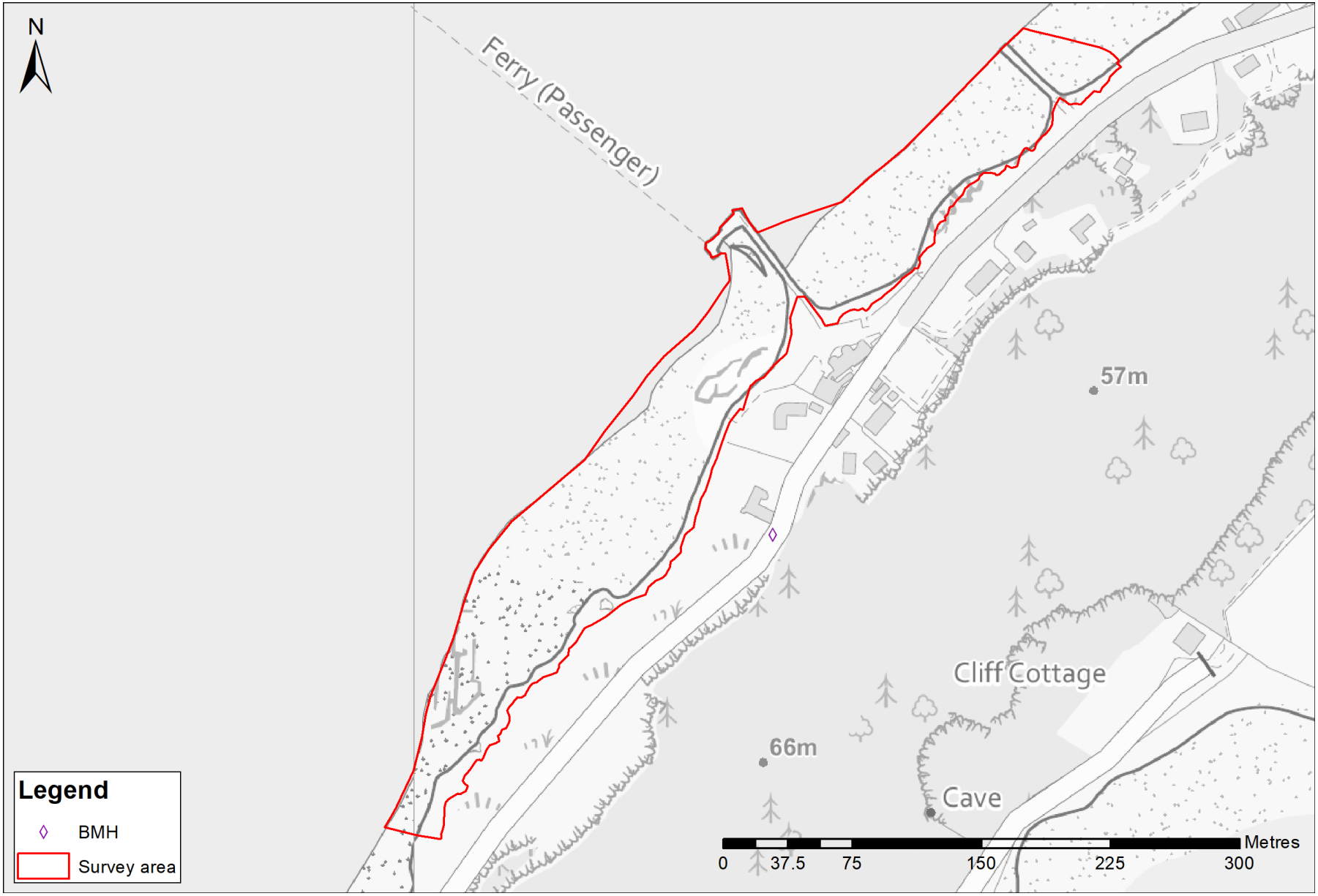

Figure 2.1 Survey area and proposed BMH location at Port Appin (© Crown copyright and database rights 2021 OS 0100040827)

2.2.3 Limitations of survey

Only one low tide window was available in which to complete the survey. However, it was possible to cover the entire survey area during the single survey period.

2.3 SURVEY FINDINGS

2.3.1 Site description

The proposed landfall in the Port Appin is situated in the Lynn of Lorn on the east mainland coast of Loch Linnhe (Figure 2.1). This northwest-facing coast is sheltered from prevailing westerly and southwesterly winds and sea conditions by the island of Lismore 1 km offshore. The proposed cable makes landfall on the stony beach approximately 75m south of the main stone jetty at Port Appin. The shore here mostly consists of cobbles and pebbles with some boulders, but has occasional bedrock outcrops along the upper shore and supralittoral. The beach survey area is also crossed at its midpoint by a stone jetty, used by the Lismore ferry, and towards its northern end by another smaller stone-built slipway. North of the main jetty, the beach is backed by a small road and is used to launch small boats. Above the shore behind the jetty there is a hotel, car parking area and several houses, while to the south the beach is backed mainly by low woodland and bushes.

2.3.2 Biotopes

A summary of biotopes recorded within the survey area is provided in Table 2.2, and a map of lifeforms is shown in Figure 2.2.

Table 2.2 List of Biotopes found within the survey area

Biotope code	Biotope description	Occurrence on site	Typical species on site
LR.HLR.MusB.Cht	*Chthamalus* spp. on exposed upper eulittoral rock	On a restricted area of steep or vertical rock in the sheltered upper shore at the southern edge of the survey area. Co-occurring in a thin band at top of lower/mid shore fucoid zone (LR.LLR.F.Fserr.X)	*Fucus vesiculosus* *Semibalanus balanoides* *Chthamalus montagui* *Littorina saxatilis*
LR.LLR.F.Pel	*Pelvetia canaliculata* on sheltered littoral fringe rock	In a thin band in the upper shore on small boulders flanking the south end of the beach and survey area (shelter provided by south headland of bay). Co-occurring in mosaic within a thin band at top of fucoid zone with LR.LLR.F.Spi.X).	*Fucus spiralis* *Pelvetia canaliculata* *Hildenbrandia rubra* *Ulva* sp. *Verrucaria maura* *Semibalanus balanoides* *Chthamalus montagui* *Littorina saxatilis* *Anurida maritima*

Biotope code	Biotope description	Occurrence on site	Typical species on site
LR.LLR.F.Fspi.X	*Fucus spiralis* on full salinity upper eulittoral mixed substrata	In a thin band in the upper shore on small boulders flanking the south end of the beach and survey area (shelter provided by south headland of bay). Co-occurring in mosaic within a thin band at top of fucoid zone with LR.LLR.F.Pel.	*Fucus spiralis* *Pelvetia canaliculata* *Verrucaria maura* *Littorina saxatilis* *Semibalanus balanoides* *Chthamalus montagui*
LR.LLR.F.Asc.X	*Fucus vesiculosus* on mid eulittoral mixed substrata	In a wide band in the mid shore on small boulders and cobbles along the whole survey area.	*Fucus vesiculosus* *Ascophyllum nodosum* Pink coralline algal crusts *Cladophora rupestris* *Chondrus crispus* *Mastocarpus stellatus* *Vertebrata lanosa* (epiphytic on *A. nodosum*) *Halichondria panicea* *Spirobranchus triqueter* Spirorbidae *Littorina littorea* *L. obtusata* *L. saxatilis* *Steromphala umbilicalis* *S. cineraria* *Patella* spp. *Nucella lapillus* *Semibalanus balanoides* *Chthamalus montagui* *Carcinus maenas* *Anurida maritima*

Biotope code	Biotope description	Occurrence on site	Typical species on site
LR.LLR.F.Fserr.X	*Fucus serratus* on full salinity lower eulittoral mixed substrata	Forming a wide band in the lower mid- to lower shore along the whole survey area.	*Fucus serratus* *F. vesiculosus* *Desmarestia aculeata* *Desmarestia* sp. *Cladophora rupestris* *Ulva* sp Pink coralline algal crusts *Hildenbrandia rubra* *Mastocarpus stellatus* *Asparagopsis/Bonnemaisonia* sp. *Leathesia difformis* *Patella* spp. *Nucella lapillus* *Carcinus maenas* *Littorina littorea* *L. obtusata* *Steromphala umbilicalis* *Anemonia viridis* *Halichondria panicea* *Spirorbis* sp. *Spirobranchus triqueter* *Semibalanus balanoides*
LR.FLR.Lic.YG	Yellow and grey lichens on supralittoral rock	In a supralittoral band along the uppermost edge of the survey area, particularly on bedrock outcrops.	*Caloplaca* sp. *Lecanora* sp. *Ramalina* sp. *Verrucaria maura* Grey lichens
LR.FLR.Rkp.G	Green seaweeds (*Enteromorpha* spp. and *Cladophora* spp.) in shallow upper shore rockpools	A small number of pools with green algae in the upper shore bedrock at the southern end of the survey area.	*Fucus vesiculosus* *Cladophora* sp. *Ulva* sp. *Littorina littorea* *Patella* sp. *Semibalanus balanoides*
LS.LCS.Sh.BarSh	Barren littoral shingle	Mostly stable band of cobbles along the strandline in the upper shore and supralittoral.	Strandline algal and other debris with flies and talitrid amphipods
IR.MIR.KR.Ldig	*Laminaria digitata* on moderately exposed sublittoral fringe rock	Forming a band in the sublittoral fringe below the fucoid zones along most of the survey area south of the main jetty. Not fully exposed or accessible and therefore not surveyed.	*Laminaria digitata*

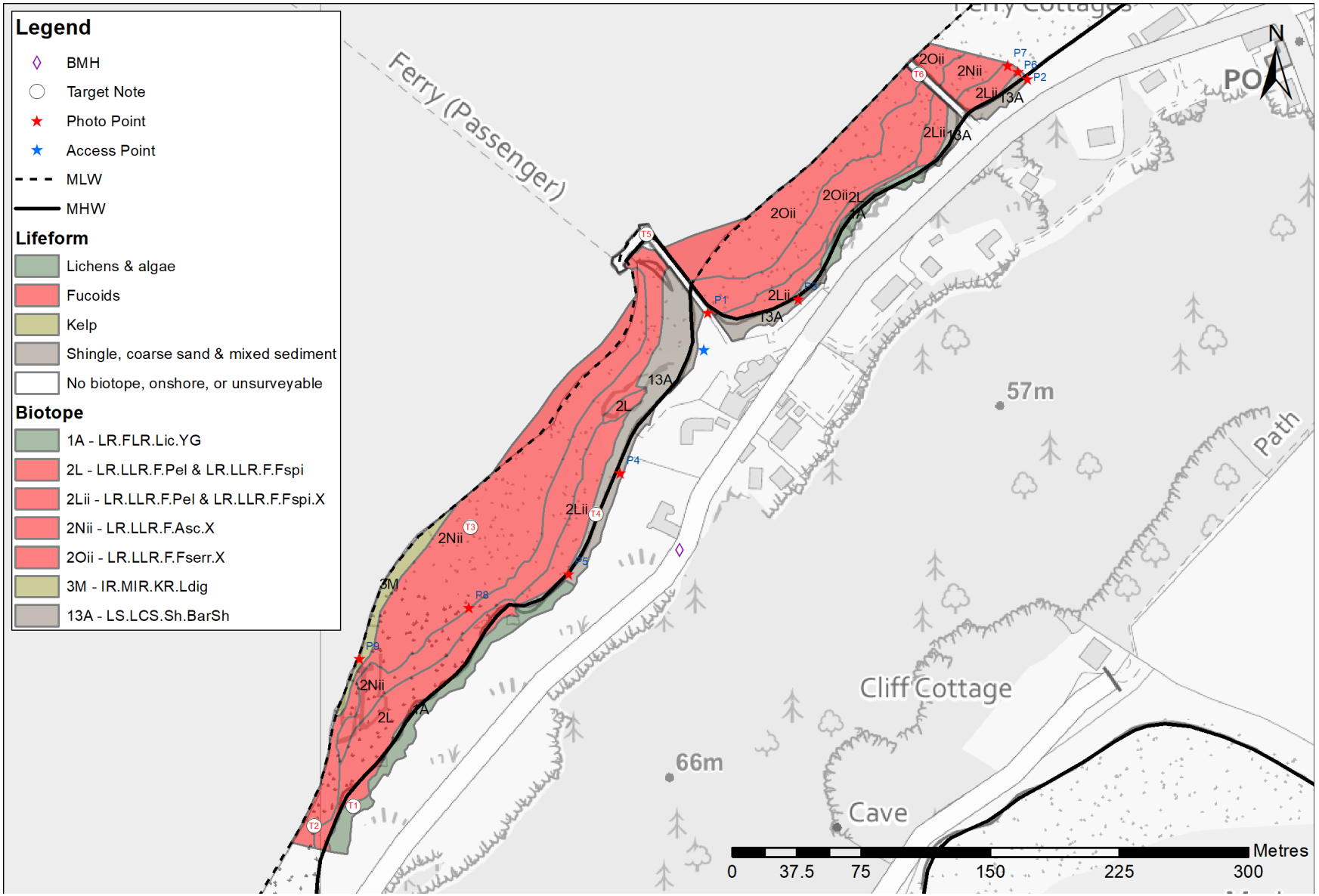

Figure 2.2 Lifeforms map of the Port Appin intertidal survey area (© Crown copyright and database rights 2021 OS 0100040827)

2.3.3 Target notes

Target Notes and corresponding photographs are shown in Table 2.3. The locations of each of the Target Notes is indicated on the lifeforms map (Figure 2.2). Figure 2.2 also shows the locations of additional photographs as shown in Section 2.7.

Table 2.3 Target notes

Target note No.	Description	Photograph
T1	Rockpools with green seaweeds in supralittoral (just above MHWS) at south end of survey area.	

Target note No.	Description	Photograph
T2	Biotope LR.HLR.MusB.Cht *Chthamalus* spp. on exposed upper eulittoral rock. On a restricted area of steep or vertical rock in the sheltered upper shore at the southernmost edge of the survey area.	
T3	Patches of gravelly sand in mid to lower shore fucoid-dominated zone, with evidence of infauna including the lugworm *Arenicola marina* and the razor shell *Ensis ensis*.	

Target note No.	Description	Photograph
T4	Small cable emerging from burial at top edge of beach	
T5	Main jetty at Port Appin	

Target note No.	Description	Photograph
T6	Small stone jetty/slipway near north end of survey area	

2.3.4 Importance of Biotope types

There were no biotopes of conservation importance found within the survey area. The dog whelk (*Nucella lapillus*) is highlighted by OSPAR as a threatened/declining species and was found occasionally on the intertidal rock. However, the dog whelk is a common species in the UK and is not protected under any other piece of legislation. No UK Biodiversity Action Plan (BAP) priority marine species, or species/habitats on the Scottish list of Priority Marine Features were recorded.

2.4 DISCUSSION

From a biological perspective, there are no reasons that would prevent the landing of a cable at the proposed location, or anywhere within the survey area. However, the shore is well used by visitors and dog walkers and the area immediately to the north of the main jetty is used for launching and recovering small boats.

2.5 RECOMMENDATIONS

A further Phase 2 intertidal survey is not required at this site.

2.6 REFERENCES

Connor, D.W., Allen, J.H., Golding, N. Howell, K.L., Lieberknecht, L.M., Northen, K.O. and Reker, J.B. 2004. The Marine Habitat Classification for Britain and Ireland, Version 04.05. JNCC, Peterborough (internet version www.jncc.gov.uk/MarineHabitatClassification).

Hiscock, K. (ed). 1996. Marine Nature Conservation Review: rationale and methods. JNCC, Peterborough. (Coasts and seas of the United Kingdom. MNCR series).

Wyn, G., Brazier, P., Birch, K., Bunker, A., Cooke, A., Jones, M., Lough, N., McMath, A. and Roberts, S. 2000. Handbook for Marine Intertidal Phase 1 Biotope Mapping Survey. CCW, Bangor.

2.7 PHOTOGRAPHS

The locations of photo points are shown in Figure 2.2.

Photo 1a Overview of shore to south from Port Appin main jetty at low water

Photo 1b Overview of shore to north from Port Appin main jetty at low water

Photo 2a View south along shore from northern end of survey area (main jetty visible in distance)

Photo 3a View down shore from strandline immediately to north of main Port Appin jetty

Photo 1a View down shore from strandline over approximate line of cable landfall

Photo 2b View down shore from strandline at northern end of survey area

Photo 3b View north along shore from strandline immediately to north of main Port Appin jetty

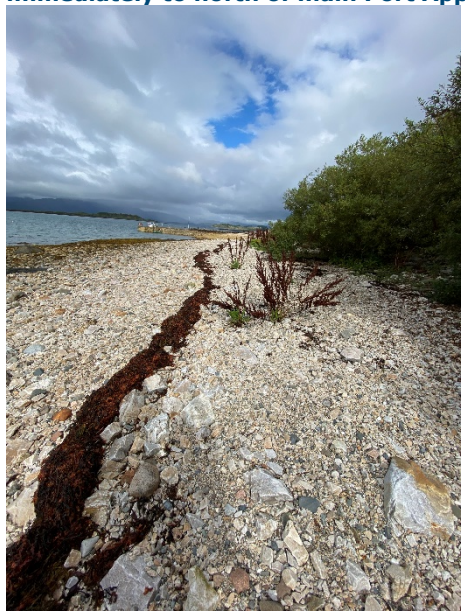

Photo 4b View north along top of shore from strandline at approximate line of cable landfall (main Port Appin jetty visible in distance)

Photo 4c View south along top of shore from strandline at approximate line of cable landfall

Photo 5a View down shore from strandline approximately 50m south of proposed cable landfall

Photo 5b View north along top of shore from strandline approximately 50m south of proposed cable landfall

Photo 5c View south along top of shore from strandline approximately 50m south of proposed cable landfall

Photo 6a Example image of biotope LR.LLR.F.Pel and LR.LLR.F.Fspi.X (channelled wrack *Pelvetia canaliculata* and spiralled wrack *Fucus spiralis*) on upper shore cobbles

Photo 6b Example image of channelled wrack *Pelvetia canaliculata* and spiralled wrack *Fucus spiralis*on upper shore cobbles

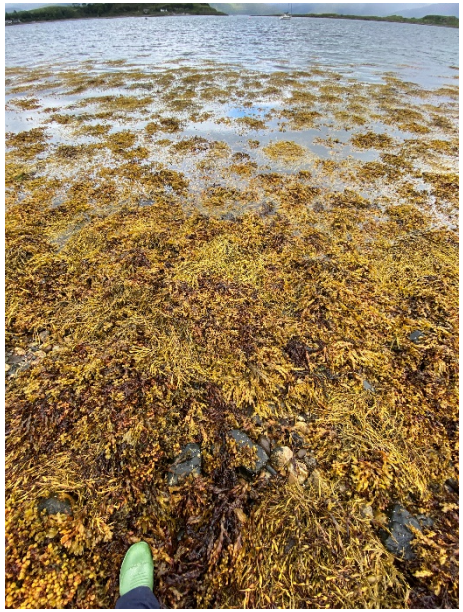

Photo 7a Example image of biotope LR.LLR.F.Asc.X (egg wrack *Ascophyllum nodosum* and bladder wrack *Fucus vesiculosus*) on mid shore cobbles

Photo 7b Example image of egg wrack *Ascophyllum nodosum* and bladder wrack *Fucus vesiculosus* on mid shore cobbles

Photo 8a Example image of biotope LR.LLR.F.Fserr.X (serrated wrack *Fucus serratus*) on mid to lower shore cobbles

Photo 8b Example image of serrated wrack *Fucus serratus* on mid to lower shore cobbles

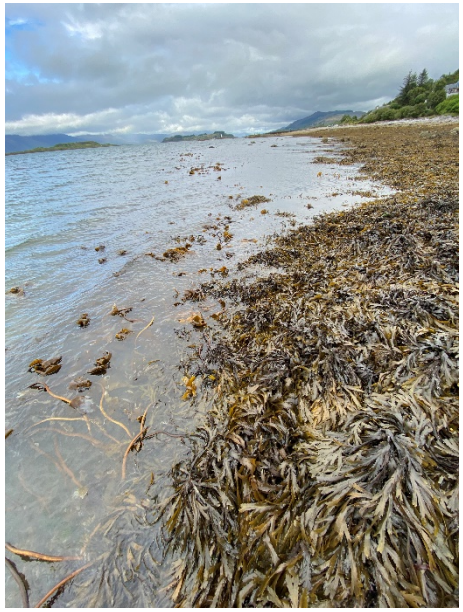

Photo 9a Example image of biotope IR.MIR.KR.Ldig (oar weed *Laminaria digitata*) in the sublittoral fringe

Photo 9b Example image of oar weed *Laminaria digitata* in the sublittoral fringe

A.4 INTERTIDAL SURVEY REPORT FOR CABLE CORRIDOR 2.14 MAINLAND TO LISMORE: LISMORE LANDING POINT

Phase 1 Intertidal Survey Report for Lismore (Route 2.14)

Version 1

Report to Intertek

Issued by Aquatera Ltd

P961 – October 2021

This study was completed for:

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Version	Date	Details
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Members of:

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Scottish Hydrogen & Fuel Cell Association
AUSTRALIAN OCEAN ENERGY GROUP

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1 INTRODUCTION

Aquatera has been commissioned to carry out a Phase 1 intertidal survey of a shore at the northeastern end of Lismore, overlooking the Lynn of Lorn to Port Appin (Figure 1.1). The area has been identified as a suitable location for the onshore landfall and onward connection for fibre optic cables as part of network improvements to connect a number of remote locations on the Scottish west coast.

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; and
- Provide target notes to describe key features of the shore

The survey was carried out by Dr Iain Dixon contracted to Aquatera Ltd, a marine biologist experienced in intertidal biological survey and mapping. Iain was accompanied by a second biologist, Alison Skene of Aquatera Ltd, to assist with species identification and recording of notes.

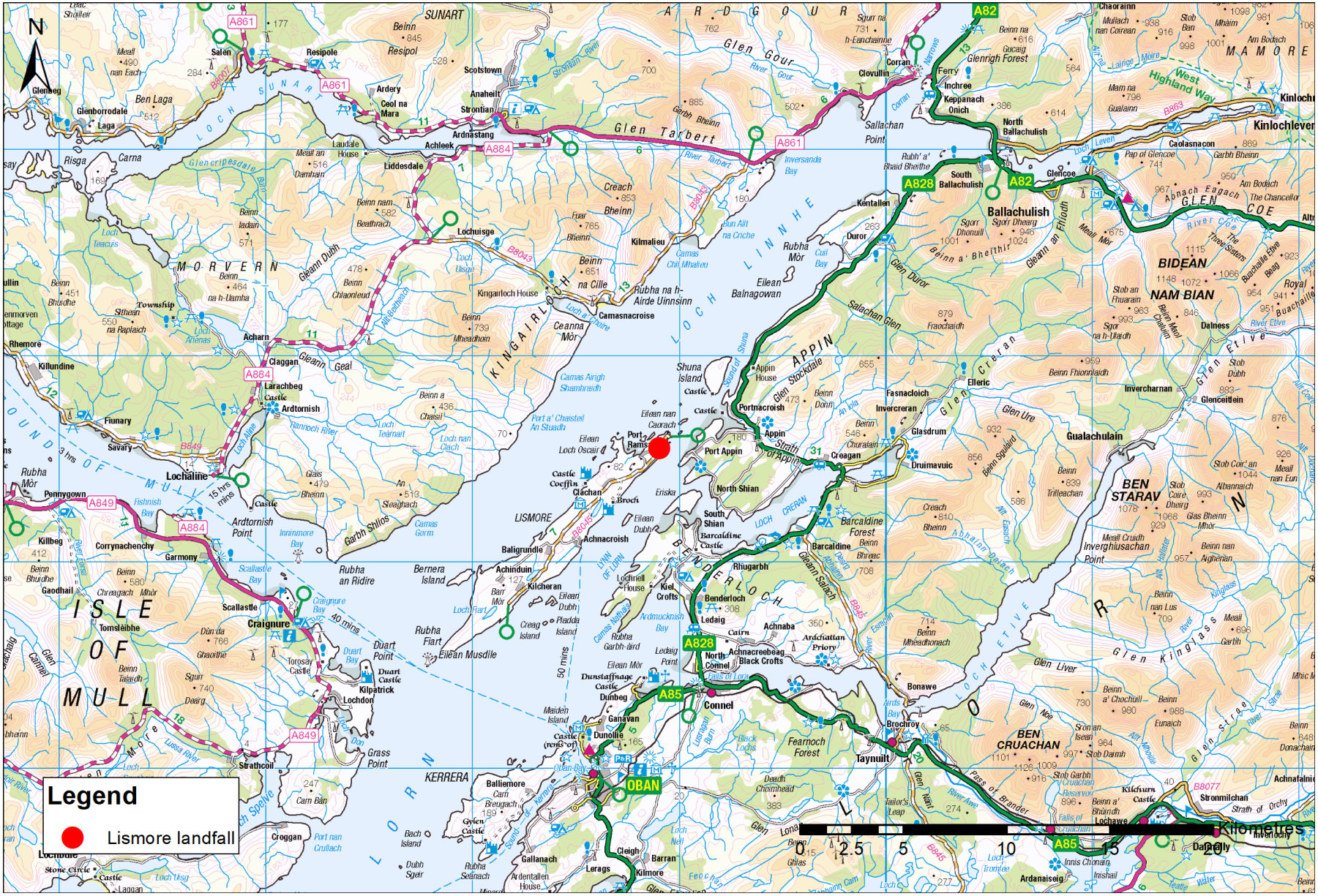

Figure 1.1 Location of the Lismore survey site (© Crown copyright and database rights 2021 OS 0100040827)

2 PHASE 1 INTERTIDAL SURVEY

2.1 INTRODUCTION

The survey took place on 5 September 2021, during low spring tides. The survey took place either side of low tide. Table 2.1 below outlines the survey conditions.

Table 2.1 Survey details

Date	5 September 2021
Time at start	09:30
Time at finish	13:40
Low tide (hours)	11:34 BST
Tide height (m)	1.2
Lowest Astronomical Tide (m)	0.1
Mean Low Water Springs (m)	0.8
Type of access	Foot
Sea condition	Calm
Weather condition	SSW2-3; dry; occasional sunshine

2.2 METHODOLOGY

2.2.1 Phase 1 survey method

The survey was carried out on foot using a variety of survey techniques that are described in the Countryside Council for Wales (CCW) report 'Handbook for Marine Intertidal Phase 1 Biotope Mapping Survey' (Wyn *et al.*, 2000) and the 'Marine Nature Conservation Review Rationale and Methods' (Hiscock, 1996).

Prior to commencing the survey in the field, a wireframe map (a basic outline drawing of obvious features and/or changes in habitat was produced to aid with the recording of biotopes.

Areas of sediment were dug and sampled at various intervals at the upper mid shore, mid shore, and lower shore. All samples were filtered through a 5 mm and 0.5 mm sieve. For both the sediment and rock areas, target notes and photographs were taken when there was a change in biotope type or zonation. An iPhone equipped with the ArcGIS app "Field Maps" was used to mark target points and tracks. All information was digitised to GIS using ArcMap 10, post survey. Maps were created using the guidance laid out in the CCW methodology.

Biotopes were assigned and described with reference to The Marine Habitat Classification for Britain and Ireland (v04.05) (Connor *et al.*, 2004) and the Joint Nature Conservation Committee (JNCC) website's online search facility.

All species names were taken from The World Register of Marine Species (WoRMS) website.

2.2.2 Survey area

The proposed survey area comprised an approximate 570 m corridor. This was based on the provided areas of search for the proposed cable route with an additional 25 m added on to the east and west edges to allow for any movement

of the beach manhole (BMH) and cable within this corridor. The survey area extended from the splash zone down to the Lowest Astronomical Tide (LAT) (Figure 2.1)

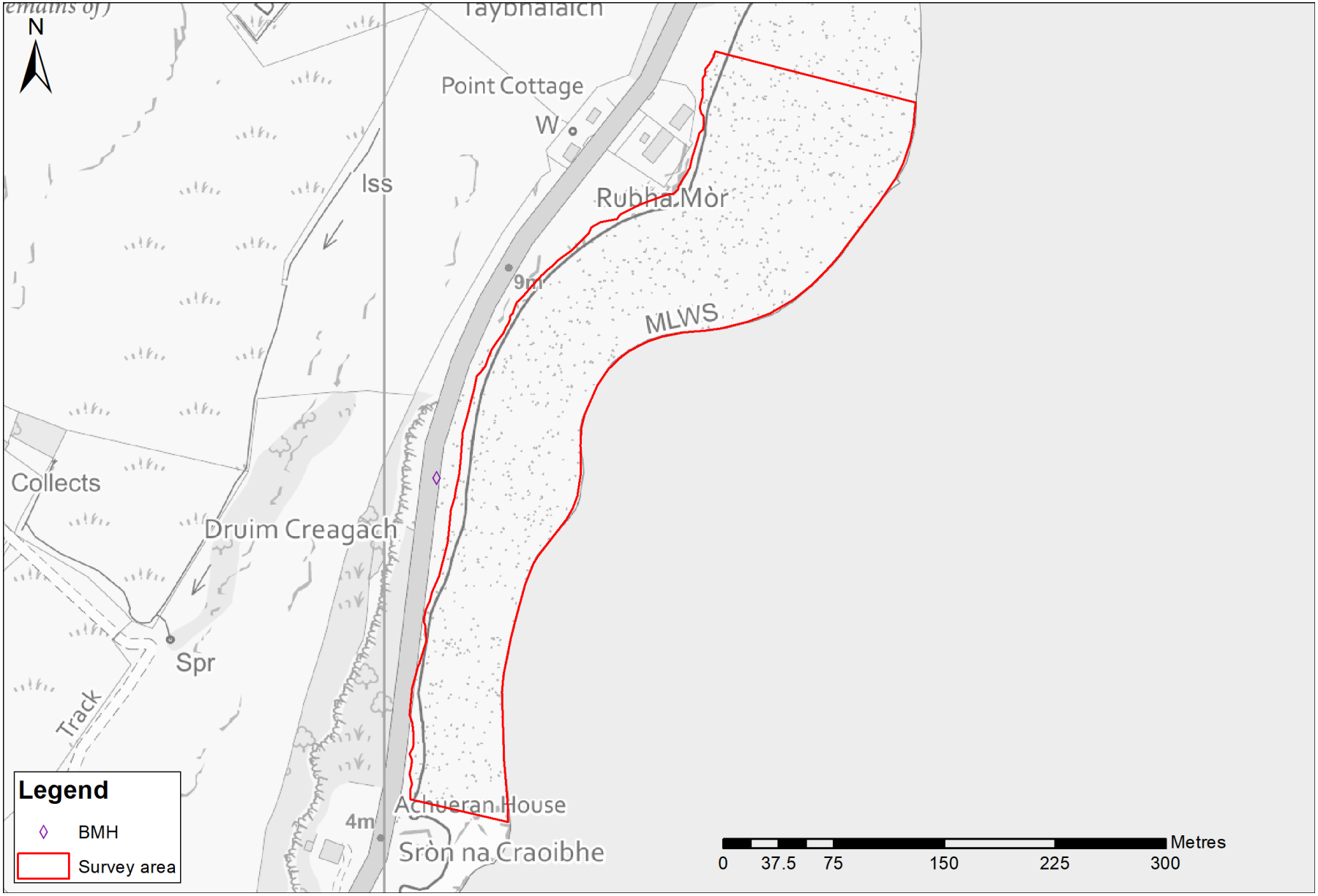

Figure 2.1 Survey area and proposed BMH location at Lismore (© Crown copyright and database rights 2021 OS 0100040827)

2.2.3 Limitations of survey

Only one low tide window was available in which to complete the survey. However, it was possible to cover the entire survey area during the single survey period.

2.3 SURVEY FINDINGS

2.3.1 Site description

The proposed landfall on the northeastern end of Lismore is an un-named sand and cobble beach approximately 0.5km south of The Point where the ferry service from Port Appin lands. The beach is bounded at each end by a small headland: Rubha Mòr to the north and Sròn na Craoibhe to the south (Figure 2.1). This southeast-facing shore is sheltered from prevailing westerly and southwesterly winds and sea conditions, and the proposed cable makes landfall approximately half way along. The shore here mostly consists of gravelly fine to medium sand overlain by cobbles and pebbles with occasional small boulders. There is one bedrock outcrop along the upper shore and supralittoral at Rubha Mòr near the north end of the survey area. The beach is used on an occasional basis to launch small boats, is backed by a small road to access dwellings, and is also backed by a high rocky ridge named Druim Creagach.

2.3.2 Biotopes

Although the biological zonation on this shore is straightforward, from a mapping perspective it is difficult to represent the individual habitats/communities clearly in plan view at an appropriate scale. It is only practical to map such shores as a mixture or mosaic of biotopes. The intertidal biotopes here were divisible into two broad biotope mosaics: one covering the vertical zonation between the upper shore down to the lower mid shore, and the second covering the lower mid shore down to the sublittoral fringe (which remained mostly covered by the tide). A summary of these mosaics and their component biotopes is provided in Table 2.2 and Table 2.3 respectively, and a map of lifeforms is shown in Figure 2.2.

Table 2.2 Biotope mosaics found within the survey area

Mosaic no	Component biotopes	Occurrence on site
Mosaic 1:	LR.LLR.F.Pel LR.LLR.F.FSpi.X LR.LLR.F.Asc.X LS.LSa.FiSa.Po	Upper to lower mid shore zonation on cobbles and small boulders overlying fine to medium sand throughout survey area. The *Pelvetia* and *Fucus spiralis* biotopes together form a very thin band fringing the lower edge of upper shore bare cobbles and the top of the mid shore *Ascophyllum nodosum* and *Fucus vesiculosus* on cobbles and small boulders. The latter biotope is spatially dominant in this mosaic.
Mosaic 2:	LR.LLR.F.Fserr.X LS.LSa.FiSa.Po	Lower mid and lower shore biotopes on cobbles and small boulders overlying fine to medium sand over the full length of the survey area. The fine to medium sand with *Arenicola marina* (and *Lanice conchilega* in places also) covers the most area in the mid to lower shore over the whole survey area, though *Fucus serratus* on cobbles and boulders can be dominant in some areas.

Table 2.3 List of Biotopes found within the survey area

Biotope code	Biotope description	Occurrence on site	Typical species on site
LR.LLR.F.Pel	*Pelvetia canaliculata* on sheltered littoral fringe rock	In a thin band in the upper shore on small boulders flanking the south end of the beach and survey area (shelter provided by south headland of bay). Co-occurring in mosaic within a thin band at top of fucoid zone with LR.LLR.F.Spi.X).	*Pelvetia canaliculata* *Ulva* sp. *Verrucaria maura* *Semibalanus balanoides* *Austrominius modestus* *Littorina saxatilis*
LR.LLR.F.Fspi.X	*Fucus spiralis* on full salinity upper eulittoral mixed substrata	In a thin band in the upper shore on small boulders flanking the south end of the beach and survey area (shelter provided by south headland of bay). Co-occurring in mosaic within a thin band at top of fucoid zone with LR.LLR.F.Pel.	*Fucus spiralis* *Pelvetia canaliculata* *Hildenbrandia rubra* *Ulva* sp. *Verrucaria maura* *V. mucosa* *Littorina saxatilis* *L. littorea* *Semibalanus balanoides*
LR.LLR.F.Asc.X	*Ascophyllum nodosum* on mid eulittoral mixed substrata	In a wide band in the mid shore on small boulders and cobbles along the whole survey area. Both *A. nodosum* and *Fucus vesiculosus* co-dominant.	*Fucus vesiculosus* *Ascophyllum nodosum* *Hildenbrandia rubra* *Asparagopsis/Bonnemaisonia* sp. *Ulva* sp. *Verrucaria maura* *V. mucosa* *Actinia equina* Spirorbidae *Semibalanus balanoides* Amphipoda Crangon crangon *Littorina littorea* *L. obtusata* *S. cineraria* *Patella* spp. *Nucella lapillus* *Anurida maritima*

Biotope code	Biotope description	Occurrence on site	Typical species on site
LR.LLR.F.Fserr.X	*Fucus serratus* on full salinity lower eulittoral mixed substrata	Forming a wide band in the lower mid- to lower shore along the whole survey area.	*Fucus serratus* *F. vesiculosus* *Ulva* sp *Asparagopsis/Bonnemaisonia* sp. *Semibalanus balanoides* *Carcinus maenas* *Patella* spp. *Nucella lapillus* *Littorina littorea* *L. obtusata* *Spirorbis* sp.
LR.FLR.Lic.YG	Yellow and grey lichens on supralittoral rock	In a supralittoral band along the uppermost edge of the survey area, particularly on bedrock outcrops.	*Caloplaca* sp. *Lecanora* sp. *Verrucaria maura* Grey lichens
LS.LCS.Sh.BarSh	Barren littoral shingle	Mostly stable band of cobbles along the strandline in the upper shore and supralittoral.	Strandline algal and other debris with flies and talitrid amphipods
LS.LSa.FiSa.Po	Polychaetes in littoral fine sand	Fine to medium sand with some shell gravel in mid and lower shore, co-occurring with mid and lower shore fucoid seaweed cover.	*Nephtyid* sp. *Arenicola marina* ?Spionid tubes *Lanice conchilega* *Crangon crangon* *Clausinella fasciata* *Macomangulus tenuis*

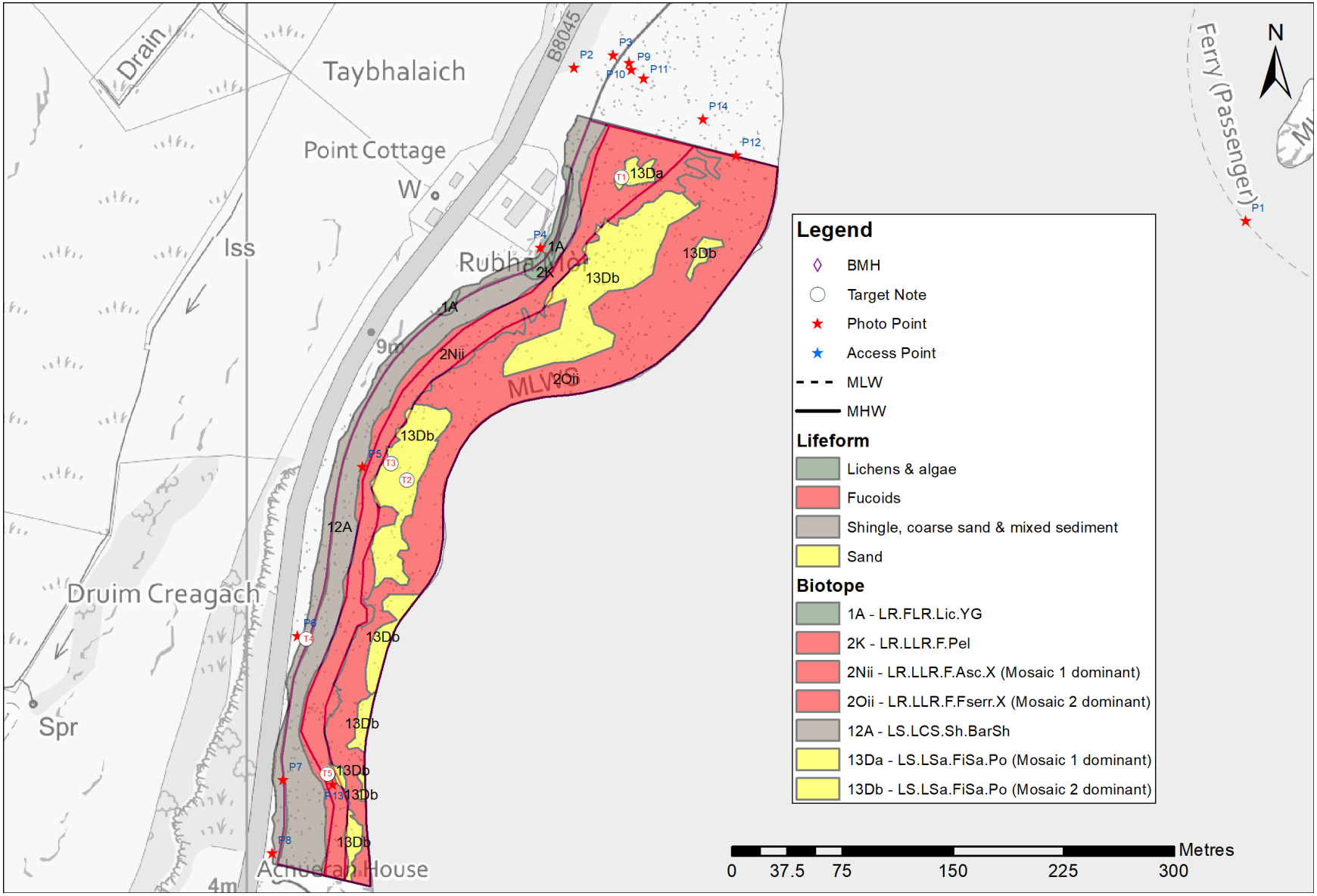

Figure 2.2 Lifeforms map of the Lismore intertidal survey area (© Crown copyright and database rights 2021 OS 0100040827)

2.3.3 Target notes

Target Notes and corresponding photographs are shown in Table 2.4. The locations of each of the Target Notes is indicated on the lifeforms map (Figure 2.2). Figure 2.2 also shows the locations of additional photographs as shown in Section 2.7.

Table 2.4 Target notes

Target note No.	Description	Photograph
T1	Sediment dig-over #1, upper mid shore near north end of survey area. Fine gravelly sand with lugworm casts (*Arenicola marina*). Animals seen in sieves include ?spionid polychaete tubes and 1x brown shrimp *Crangon crangon*.	
T2	Sediment dig-over #2, lower mid shore in centre of survey area on proposed new cable landfall. Fine gravelly sand with lugworm casts (*Arenicola marina*) and sand mason worm tubes (*Lanice conchilega*). Animals seen in sieves include several *L. conchilega*, ?spionid polychaete tubes, and the bivalve molluscs *Clausinella fasciata* and *Macomangulus tenuis*.	

Target note No.	Description	Photograph
T3	Sediment dig-over #3, upper mid shore on route of proposed new cable landfall. Animals seen in sieves include several *L. conchilega*, ?spionid polychaete tubes, a fragment of Nephtyid polychaete and several unidentified amphipod crustaceans.	
T4	Two rusty old cables emerging from burial at top edge of beach, by telegraph cable marker approximately 120m south of proposed new cable landfall.	
		

Target note No.	Description	Photograph
T5	Large area of green algae in mid shore towards south end of survey area.	

2.3.4 Importance of Biotope types

There were no biotopes of conservation importance found within the survey area. The dog whelk (*Nucella lapillus*) is highlighted by OSPAR as a threatened/declining species and was found occasionally on the intertidal rock. However, the dog whelk is a common species in the UK and is not protected under any other piece of legislation. No UK Biodiversity Action Plan (BAP) priority marine species, or species/habitats on the Scottish list of Priority Marine Features were recorded.

2.4 DISCUSSION

From a biological perspective, there are no reasons that would prevent the landing of a cable at the proposed location, or anywhere within the survey area. The shore is occasionally used by visitors and dog walkers, recreational boat users and small-scale fishing for prawns and winkles.

2.5 RECOMMENDATIONS

A further Phase 2 intertidal survey is not required at this site.

2.6 REFERENCES

Connor, D.W., Allen, J.H., Golding, N. Howell, K.L., Lieberknecht, L.M., Northen, K.O. and Reker, J.B. 2004. The Marine Habitat Classification for Britain and Ireland, Version 04.05. JNCC, Peterborough (internet version www.jncc.gov.uk/MarineHabitatClassification).

Hiscock, K. (ed). 1996. Marine Nature Conservation Review: rationale and methods. JNCC, Peterborough. (Coasts and seas of the United Kingdom. MNCR series).

Wyn, G., Brazier, P., Birch, K., Bunker, A., Cooke, A., Jones, M., Lough, N., McMath, A. and Roberts, S. 2000. Handbook for Marine Intertidal Phase 1 Biotope Mapping Survey. CCW, Bangor.

2.7 PHOTOGRAPHS

The locations of photo points are shown in Figure 2.2.

Photo 1 Overview of Lismore survey area taken from ferry

Photo 2 Overview of shore at northern end of Lismore survey area