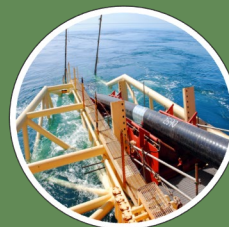


GREENLINK MARINE ENVIRONMENTAL STATEMENT- WALES

APPENDIX K

Intertidal Habitat Survey Report

P1975_R4484_RevF1
June 2019



Greenlink Interconnector
- connecting the power markets
in Ireland and Great Britain

Greenlink
INTERCONNECTOR



MarineSpace

Making Sense of the Marine Environment™



Greenlink Interconnector Cable Landfall Locations (Wales and Ireland) - Intertidal Walkover Survey Report 2018



Document Ref: J/7/67/17	Originator: OEL/MarineSpace
Date: 03/10/2018	Circulation: Closed

Greenlink Interconnector Cable Landfall Locations (Wales and Ireland) - Intertidal Walkover Survey Report 2018

Prepared by:

MarineSpace Ltd



**MarineSpace Ltd
Ocean Village Innovation Centre
Ocean Way
Southampton
SO14 3JZ**

Prepared for:



**Intertek
Energy & Water Consultancy
Services
Exchange House
Station Road
Liphook
Hampshire
GU30 7DW**

Date	Originator	Version	Action	Signature
01/10/2018	Shona Guinan	v0.2	Internal Draft	
03/10/2018	Jonny Lewis	v1.0	Director Sign-off / External Document	
05/10/2018	Jonny Lewis	v1.1	Internal Draft - Addressing Client / Regulator Comments	
			Choose an item.	

Any reproduction must include acknowledgement of the source of the material. This report should be cited as:

MarineSpace Ltd, 2018. *Greenlink Interconnector Cable Landfall Locations (Wales and Ireland) - Intertidal Walkover Survey Report 2018.*

Executive Summary

This report presents the findings of intertidal surveys conducted at Freshwater West, Pembrokeshire, and Baginbun Beach, Wexford, aimed at establishing the main habitats present in the general vicinity of two proposed landfall locations for the Greenlink Interconnector cable. The surveys involved Phase I walkover surveying to map the habitats present accompanied by soft and hard substrate quadrat sampling to gather detailed information on the benthic communities present for biotope mapping purposes.

Freshwater West was found to be mostly characterised by impoverished sandy shores. The lack of benthic organisms in these sediments can be explained by the highly mobile nature of sediments in this area due to its exposed location and lack of shelter from prevailing southwesterly winds and Atlantic swell.

Baginbun Beach was found to be a complex mosaic of rock platforms and sand filled gullies supporting a variety of biotopes and aggregations of honeycomb worm tubes. Rockpools were highly abundant across the Baginbun site as well as across an area of rocky shore at Freshwater West. However, it was not possible to map the distribution and assess the high number of pools present without returning to the sites over multiple low tide periods.

All littoral rock biotopes encountered during both surveys correlate to Annex I reef habitat while the sandy biotopes (A2.21 and A2.23) correlate to the Annex I habitat 'mudflats and sandflats not covered by seawater at low tide'. As such the littoral rock habitat encountered at the Freshwater West landfall site is representative of the Annex I reef habitats that are a primary reason for the selection of the Pembrokeshire Marine SAC. The sandy shore biotopes are also representative of the Annex I 'mudflats and sandflats not covered by seawater at low tide' habitat that qualifies as a feature but is not a primary reason for the selection of the site.

Other than the habitats described above, no rare or important species and/or habitats were recorded during the survey.

Contents

1.	Introduction	1-1
1.1.	Area of Study	1-1
1.1.1.	Freshwater West	1-1
1.1.2.	Baginbun Beach	1-1
2.	Methodology	2-1
2.1.	Survey Design	2-1
2.2.	Survey Methods	2-1
2.2.1.	Phase I Walkover Survey	2-1
2.2.2.	Quadrat Sampling	2-1
2.2.3.	Target Notes	2-2
2.3.	Analysis	2-3
2.3.1.	Biotope Monitoring	2-3
3.	Results	3-1
3.1.	Survey Progress	3-1
3.2.	Freshwater West	3-2
3.2.1.	Biotopes	3-2
3.2.2.	Features of Interest	3-3
3.3.	Baginbun Beach	3-3
3.3.1.	Biotopes	3-3
3.3.2.	Features of Interest	3-4
4.	Discussion	4-1
5.	References	5-1

List of Figures

Figure 1.1: Survey areas for the Proposed Greenlink Interconnector Cable Landfall Locations (Wales and Ireland) intertidal walkover survey (Source: Greenlink).	1-2
Figure 1.2: Extent of the intertidal survey area at Freshwater West, Pembrokeshire, Wales (Source: MarineSpace).	1-3
Figure 1.3: Extent of the intertidal survey area at Baginbun Beach, Wexford, Ireland (Source: MarineSpace)	1-4
Figure 2.1: Top left: Hard substrate 0.5 m ² quadrat sampling. Top right: 0.25 m ² quadrat soft substrate sampling. Bottom left: Sieving sediment sample through 0.5 mm mesh sieve on the lower shore. Bottom right: sieved sediment sample residue.	2-2
Figure 3.1: Top: View looking north west across the survey area at Freshwater West. Bottom: View looking south-east across the southern portion of the survey area at Baginbun Beach.....	3-1
Figure 3.2: Left: Shallow upper shore rock pool feature. Right: <i>S. alveolata</i> tube aggregation in a gully on the mid-shore.....	3-5
Figure 3.3: EUNIS biotope mapping and sampling locations visited during the intertidal survey of the proposed landfall at Freshwater West, Pembrokeshire.	3-7
Figure 3.4: EUNIS biotope mapping and sampling locations visited during the intertidal survey of the proposed landfall at Baginbun Beach, Wexford.	3-8

List of Tables

Table 1. Summary of sampling undertaken, and information collected during the intertidal surveys at Freshwater West and Baginbun Beach.	3-1
Table 2. Key biotopes recorded during the intertidal survey of the proposed landfall location at Freshwater West.	3-2
Table 3. Key biotopes recorded during the intertidal survey of the proposed landfall location at Baginbun Beach.....	3-4

1. Introduction

The proposed Greenlink Interconnector cable will link the existing electricity grids in the UK and Ireland and will have key strategic importance providing significant additional interconnection between Ireland, the UK and onwards to mainland Europe. The 'Greenlink' project will consist of two converter stations, one close to the existing substation at Great Island in County Wexford (Ireland) and one close to the existing substation at Pembroke in Pembrokeshire (Wales).

Greenlink Interconnector Limited, trading as Greenlink, was awarded an Interconnector Licence in Great Britain, by Ofgem, on 10th February 2015 and an Initial Project Assessment (IPA) Status under Ofgem's Cap and Floor Regime, on 30th September 2015. Greenlink is designated as a European Union Project of Common Interest (PCI project number 1.9.1) under the provisions of European Union Regulation No. 347/2013 on guidelines for Trans-European Network for Energy (TEN-E Regulations) and has successfully applied for funding under the Connecting Europe Facility (CEF).

This document provides an overview of the intertidal Phase I walkover surveys of the two proposed landfalls of the Greenlink Interconnector cable, with identification of the main habitats present (in the form of biotope mapping) and features of conservation importance. The proposed landfalls are located at Freshwater West, Pembrokeshire, Wales and Baginbun Beach, Wexford, Ireland (Figure 1.1).

1.1. Area of Study

1.1.1. Freshwater West

Freshwater West is a large south-west facing sandy beach backed by an extensive system of sand dunes and forms part of the 'large shallow inlets and bays' feature of the Pembrokeshire Marine Special Area of Conservation (SAC), illustrated within Figure 1.2. Existing information available, including biotope mapping from EMODnet¹, suggests that the survey area is largely characterised by gently sloping fine sand shores lined by shingle on the upper shore and exposed rock shore grading into steep red sandstone cliffs in the north of the survey area.

1.1.2. Baginbun Beach

Baginbun Beach is located within an exposed easterly facing bay (Baginbun Bay) on the Hook Peninsula, Wexford, Ireland (Figure 1.3). Existing information available on EMODnet suggests that the survey area is mostly characterised by furoid dominated littoral rock habitat backed by a sandy beach and steep cliffs in the south of the bay.

¹ <http://www.emodnet.eu/>

Figure 1.1: Survey areas for the Proposed Greenlink Interconnector Cable Landfall Locations (Wales and Ireland) intertidal walkover survey (Source: Greenlink).

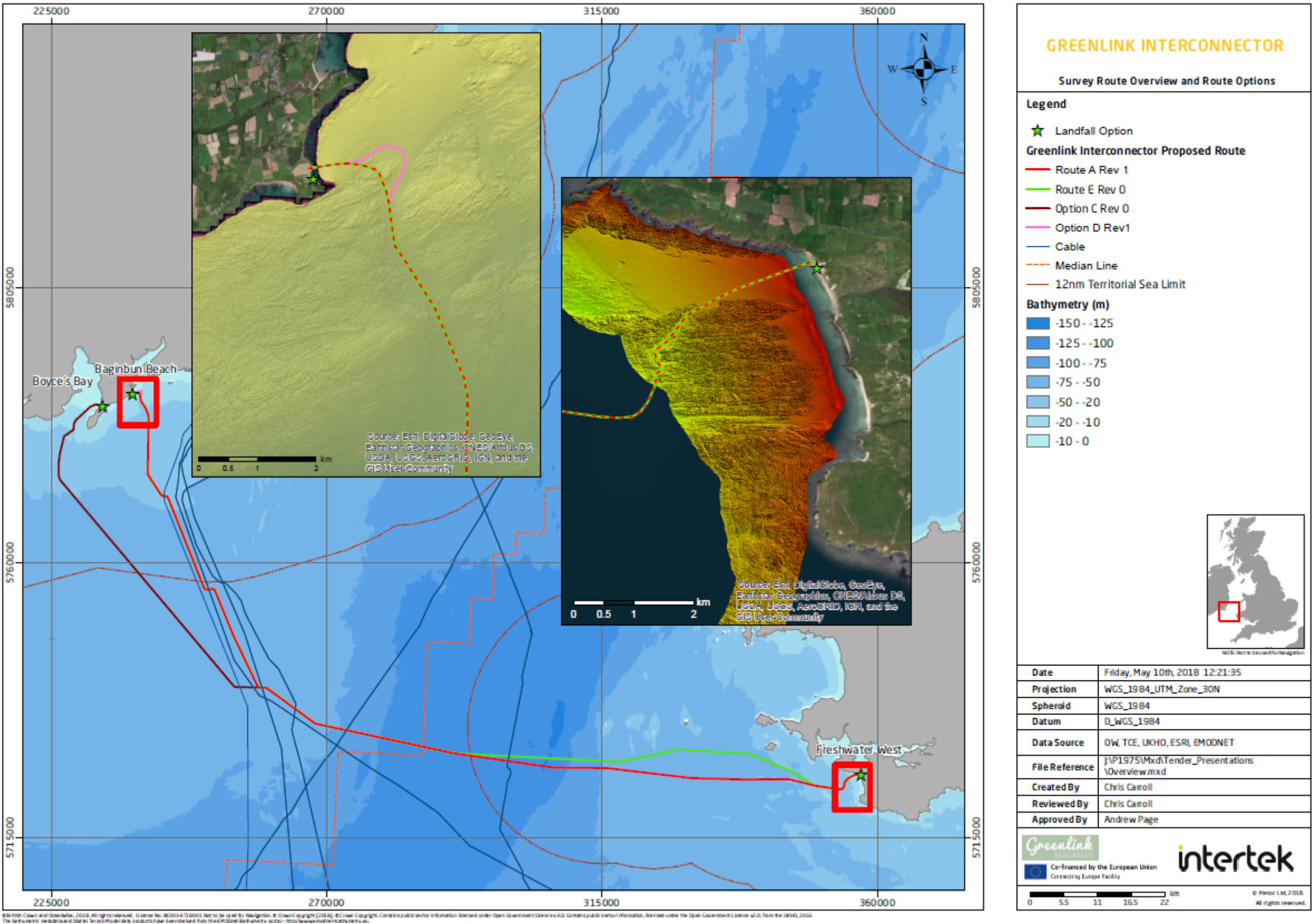


Figure 1.2: Extent of the intertidal survey area at Freshwater West, Pembrokeshire, Wales (Source: MarineSpace).

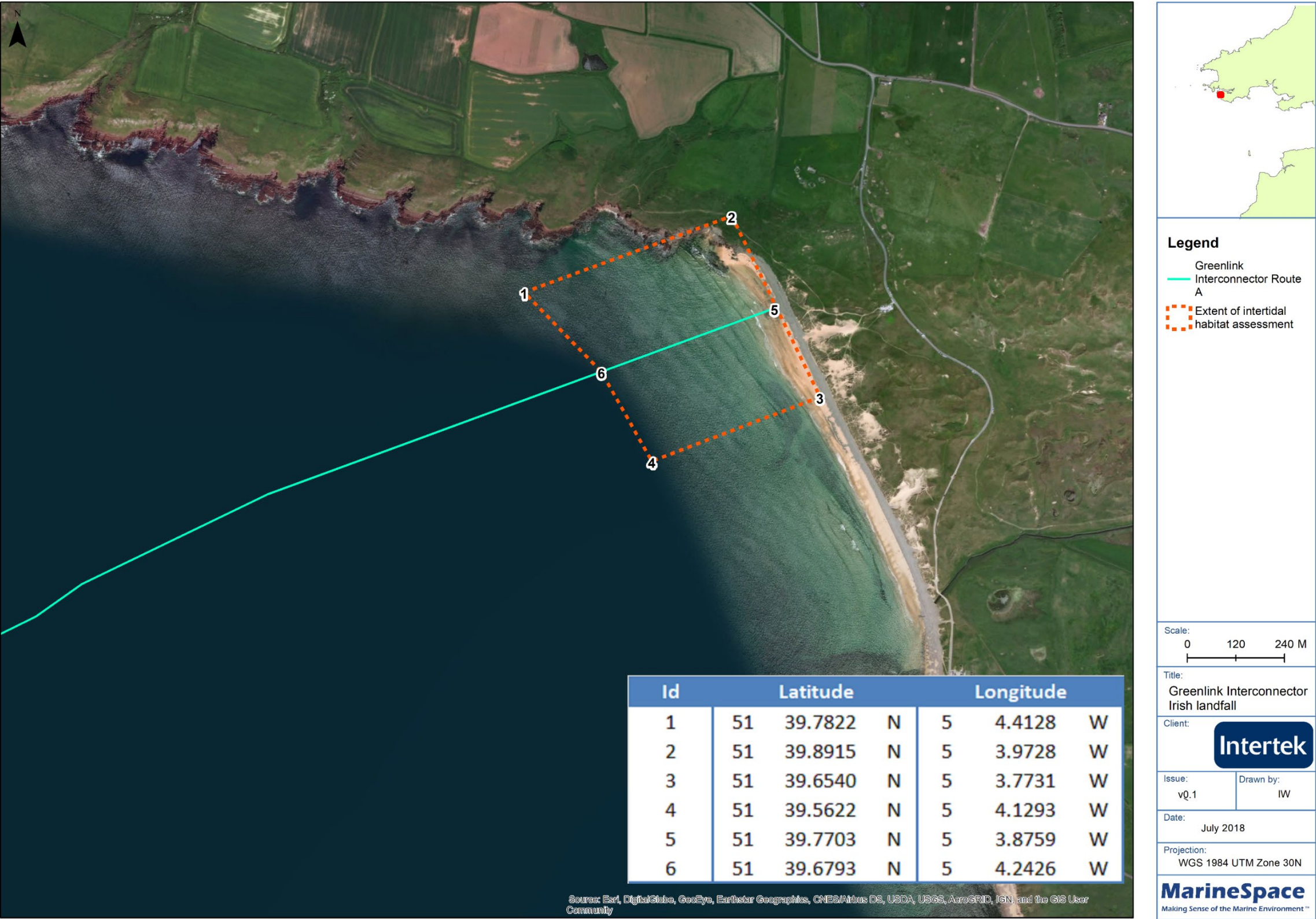
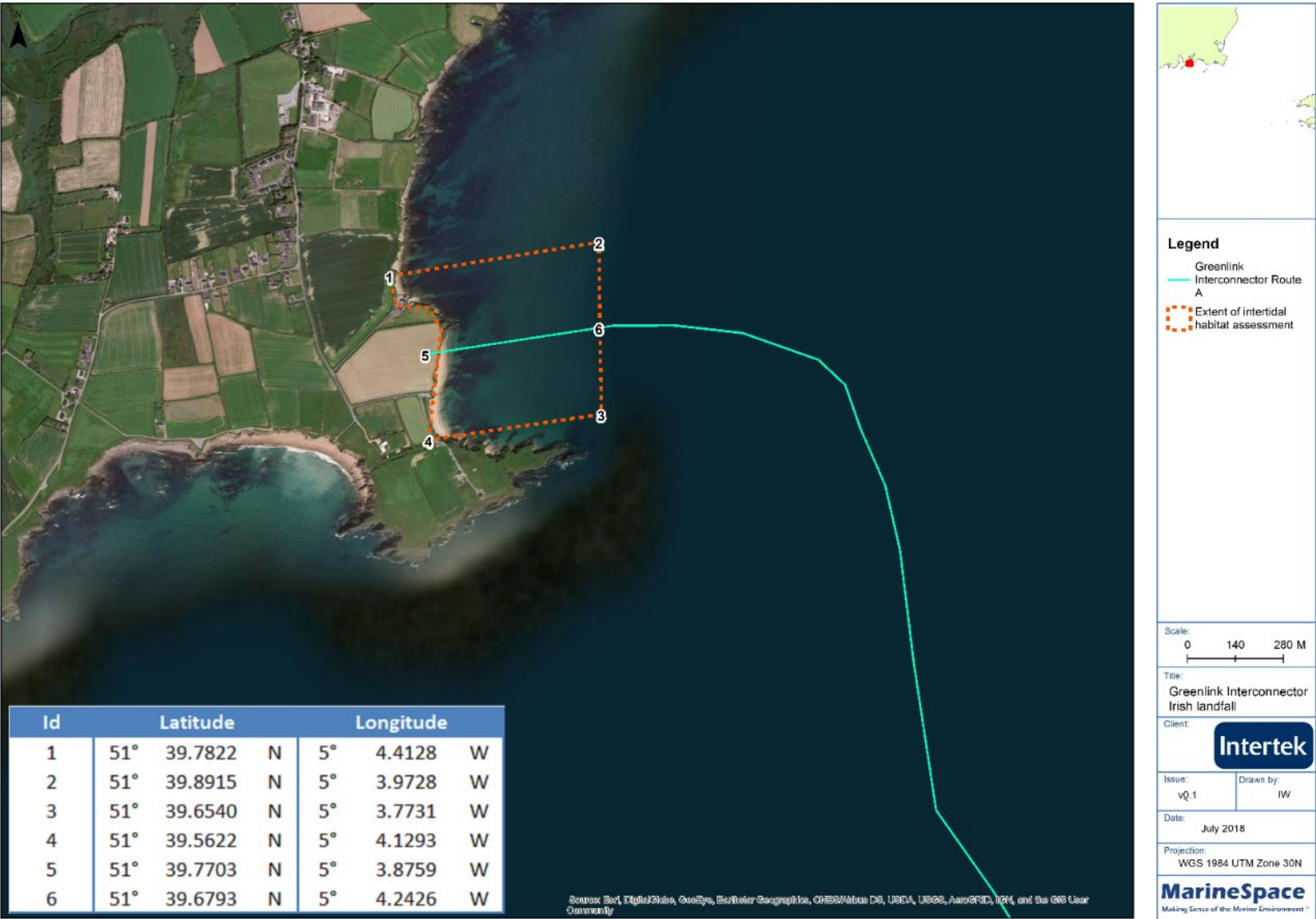


Figure 1.3: Extent of the intertidal survey area at Baginbun Beach, Wexford, Ireland (Source: MarineSpace)



2. Methodology

2.1. Survey Design

The Phase I survey was carried out across 500 m wide cable landfall corridors extending across intertidal areas at Freshwater West and Baginbun Beach. A series of locations were also sampled in areas of both soft sediment and hard substrates to further inform detailed biotope mapping.

2.2. Survey Methods

2.2.1. Phase I Walkover Survey

The intertidal surveys were undertaken during spring tides in line with guidance in the Marine Monitoring Handbook (Davies *et al.*, 2001) and Countryside Council for Wales (CCW) Handbook for Marine Intertidal Phase I Survey and Mapping (Wyn *et al.*, 2006). During the walkover survey, biotopes were identified according to the European Nature Information System (EUNIS) classification in line with relevant guidance (Parry, 2015) (and correlated to the Marine Nature Conservation Recorder (MNCR) biotopes). Where possible, boundaries of biotopes were tracked using handheld Garmin E-Trex 10 GPS devices and the Phase One Habitat Survey Tool Kit application (v1.4.0).

The distribution of any features of conservation interest were recorded using photographs and GPS fixes where encountered. Other information recorded included general site conditions, sediment surface features, sediment type and characteristics, topography and anthropogenic pressures.

2.2.2. Quadrat Sampling

Areas representative of each key soft sediment habitat at different tidal heights were assessed by sampling the upper 10 cm of a 0.04 m² (0.2 m x 0.2 m) quadrat using a spade and screened on a 0.5 mm sieve. Any macrobenthos retained on the sieve was identified to species level where possible in the field. The quadrats were then dug to ~ 30 cm depth to check for the presence of larger, burrowing species.

Any soft sediment samples were subject to a visual inspection and observations of colour, smell, Redox Potential Discontinuity (RDP) depth layer, texture and presence of surface features (accretions, algae, fauna, etc.) recorded.

Two high-resolution photographs were taken of the sediment for future reference. The first was taken from a 'cross section' looking across the substrate and the second taken directly above the quadrat (in plan view). A further four photographs were also taken in a north, east, south and west orientation. The location of all samples were recorded using a Garmin E-Trex 10 GPS device.

Areas representative of each key hard substrate habitat at different tidal heights were assessed by recording the epibiotal taxa present in randomly placed 0.04 m² (0.2 m x 0.2 m) quadrats. Identification was taken to species level where possible and undertaken in the field.

2.2.3. Target Notes

Target notes were taken when notable features were encountered, e.g. *Sabellaria alveolata* aggregations. These were accompanied by GPS fixes and close up photographs of each feature along with general site photographs (Figure 2.1).

Figure 2.1: Top left: Hard substrate 0.5 m² quadrat sampling. Top right: 0.25 m² quadrat soft substrate sampling. Bottom left: Sieving sediment sample through 0.5 mm mesh sieve on the lower shore. Bottom right: sieved sediment sample residue.



2.3. Analysis

2.3.1. Biotope Monitoring

EUNIS biotopes were identified in line with Joint Nature Conservancy Council (JNCC) guidance on assigning benthic biotopes (Parry, 2015) to allow the communities to be mapped and allow comparison with existing data. All biotope determination was undertaken through consideration of each of the following information:

- Existing biotope mapping (EMODnet);
- Quadrat sediment/substrate descriptions for determination of Broad Scale Habitat (BSH); and
- Species information from quadrat sampling for assigning EUNIS Level 4 biotopes and above.

3. Results

3.1. Survey Progress

The intertidal surveys were undertaken during spring tides on 11th September (Freshwater West) and 12th September (Baginbun Beach) 2018. Table 1 provides a summary of the sampling undertaken and information collected during the two surveys. Figure 3.1 provides an overview of the shore at both survey locations.

Table 1. Summary of sampling undertaken, and information collected during the intertidal surveys at Freshwater West and Baginbun Beach.

	Freshwater West	Baginbun Beach
Soft-Sediment Quadrats	12	16
Hard Substrate Quadrats	7	14
Target Notes	11	54
Photographs	185	375

Figure 3.1: Top: View looking north west across the survey area at Freshwater West. Bottom: View looking south-east across the southern portion of the survey area at Baginbun Beach.



3.2. Freshwater West

3.2.1. Biotopes

The majority of the survey area at the proposed Freshwater West landfall site was characterised by barren littoral coarse sand (EUNIS biotope A2.111), as illustrated within Table 2. This dominant biotope was fringed by barren littoral shingle (A2.111) along the upper shore overlain by a narrow strandline biotope constituted by decomposing seaweed supporting sandhopper (Talitrid amphipods) communities (A2.211). The lower extent of the dominant A2.111 biotope was fringed by littoral medium-fine sand supporting amphipods and the polychaete worms *Scolecopsis* spp. (A2.223). The north of the survey area extended across a complex mosaic of littoral rock biotopes spanning the full range of the typical zonation expected on an exposed rocky coastline. This included lichen and barnacle dominated biotopes in the supralittoral (B3.111 and B3.1132) and upper shore zones (A1.112, A1.1121, A1.1122) and the typical furoid dominated biotopes in mid-lower shore areas (A1.212, A1.213 and A1.3141) interspersed with coralline crust-dominated (A1.411) and green and red seaweed dominated (A1.421 and A1.452) rock pools. A summary of these biotopes is presented within Table 2, and illustrated within Figure 3.3.

Table 2. Key biotopes recorded during the intertidal survey of the proposed landfall location at Freshwater West.

Habitat	EUNIS Code	EUNIS Description
A1 - Littoral Rock and other hard substrata	A1.112	<i>Chthamalus</i> spp. on exposed upper eulittoral rock
	A1.1121	<i>Chthamalus montagui</i> and <i>Chthamalus stellatus</i> on exposed upper eulittoral rock
	A1.1122	<i>Chthamalus</i> spp. and <i>Lichina pygmaea</i> on steep exposed upper eulittoral rock
	A1.211	<i>Pelvetia canaliculata</i> and barnacles on moderately exposed littoral fringe rock
	A1.212	<i>Fucus spiralis</i> on full salinity exposed to moderately exposed upper eulittoral rock
	A1.213	<i>Fucus vesiculosus</i> and barnacle mosaics on moderately exposed mid eulittoral rock
	A1.3141	<i>Ascophyllum nodosum</i> on full salinity mid eulittoral rock
	A1.411	Coralline crust-dominated shallow eulittoral rockpools
	A1.421	Green seaweeds <i>Enteromorpha</i> spp. and <i>Cladophora</i> spp. in shallow upper shore rockpools

	A1.452	<i>Porphyra purpurea</i> or <i>Enteromorpha</i> spp. on sand-scoured mid or lower eulittoral rock
A2 - Littoral sediment	A2.111	Barren littoral shingle
	A2.211	Talitrids on the upper shore and strandline
	A2.223	Amphipods and <i>Scolecopsis</i> spp. in littoral medium-fine sand
	A2.23	Polychaete/amphipod-dominated fine sand shores
B3 - Rock cliffs, ledges and shores, including the supralittoral	B3.111	Yellow and grey lichens on supralittoral rock
	B3.1132	<i>Verrucaria maura</i> on very exposed to very sheltered upper littoral fringe rock

3.2.2. Features of Interest

A large number of littoral rock pools were noted across the rocky shore in the north of the survey area. Due to their ubiquitous nature and the limited time available during a single low tide period, it was only possible to map and assess a small number of rock pools within the survey area. In general, the pools were deemed to be representative of the biotopes A1.411 and A1.421.

3.3. Baginbun Beach

3.3.1. Biotopes

Baginbun Beach was found to be a complex mosaic of littoral rock platforms and sand filled gullies representative of a variety of littoral rock and soft sediment EUNIS biotopes (Table 3). To the south, the upper shore was dominated by barren littoral coarse sand (A2.221) with a narrow overlying strandline biotope constituted by decomposing seaweed supporting sandhopper (Talitrid amphipods) communities (A2.211). Fingers of sandy sediment extended down the shore filling tide swept gullies formed by furoid dominated rocky outcrops (A1.214) from the mid to the lower shore along which aggregations of *Sabellaria alveolata* tubes were noted.

To the north of the survey area, the band of barren upper shore sand was narrower and was fringed by barnacle dominated littoral rock (A1.112 / A1.113) quickly grading into furoid dominated mid-shore rocky outcrops (A1.313 / A1.3141) that extended into a rocky platform dominated by *Fucus serratus* (A1.214) and *Laminaria digitata* along the sublittoral fringe. Details of these biotopes are presented within Table 3, and illustrated within Figure 3.4.

Table 3. Key biotopes recorded during the intertidal survey of the proposed landfall location at Baginbun Beach.

Habitat	EUNIS Code	EUNIS Description
A1 - Littoral Rock and other hard substrata	A1.113	<i>Semibalanus balanoides</i> on exposed to moderately exposed or vertical sheltered eulittoral rock
	A1.214	<i>Fucus serratus</i> on moderately exposed lower eulittoral rock
	A1.2141	<i>Fucus serratus</i> and red seaweeds on moderately exposed lower eulittoral rock
	A1.311	<i>Pelvetia canaliculata</i> on sheltered littoral fringe rock
	A1.312	<i>Fucus spiralis</i> on sheltered upper eulittoral rock
	A1.313	<i>Fucus vesiculosus</i> on moderately exposed to sheltered mid eulittoral rock
	A1.3141	<i>Ascophyllum nodosum</i> on full salinity mid eulittoral rock
	A1.421	Green seaweeds (<i>Enteromorpha</i> spp. and <i>Cladophora</i> spp.) in shallow upper shore rockpools
	A1.412	Fucoids and kelp in deep eulittoral rockpools
	A1.413	Seaweeds in sediment-floored eulittoral rockpools
A2 - Littoral sediment	A2.111	Barren littoral shingle
	A2.211	Talitrids on the upper shore and strandline
	A2.221	Barren littoral coarse sand
	A2.23	Polychaete/amphipod-dominated fine sand shores

3.3.2. Features of Interest

A large number of littoral rock pools were noted to be interspersed across the entire mid-lower rocky shore area. Due to the sheer number and limited time available during a single low tide period, it was only possible to map and assess a small number of rock pools within the survey area. In general, the pools were deemed to be representative of the biotope A1.421 (Figure 3.2) in the upper shore areas and A1.412 and A1.413 further down the shore.

Significant portions of the lower shore fucoid dominated rock found in the southern end of the survey area was colonised by low lying veneers of *S. alveolata* tube aggregations (Figure 3.2).

Discrete clumps were also noted on the vertical faces of the sand-filled gullies formed by the rocky outcrops along the majority of the survey area. Given their low-lying nature (< 2 cm) and limited extent, these aggregations were not thought to be representative of the larger reef structures that are afforded protection as Annex I biogenic reef habitats under the European Union Habitats Directive.

Figure 3.2: Left: Shallow upper shore rock pool feature. Right: *S. alveolata* tube aggregation in a gully on the mid-shore.



Figure 3.3: EUNIS biotope mapping and sampling locations visited during the intertidal survey of the proposed landfall at Freshwater West, Pembrokeshire.

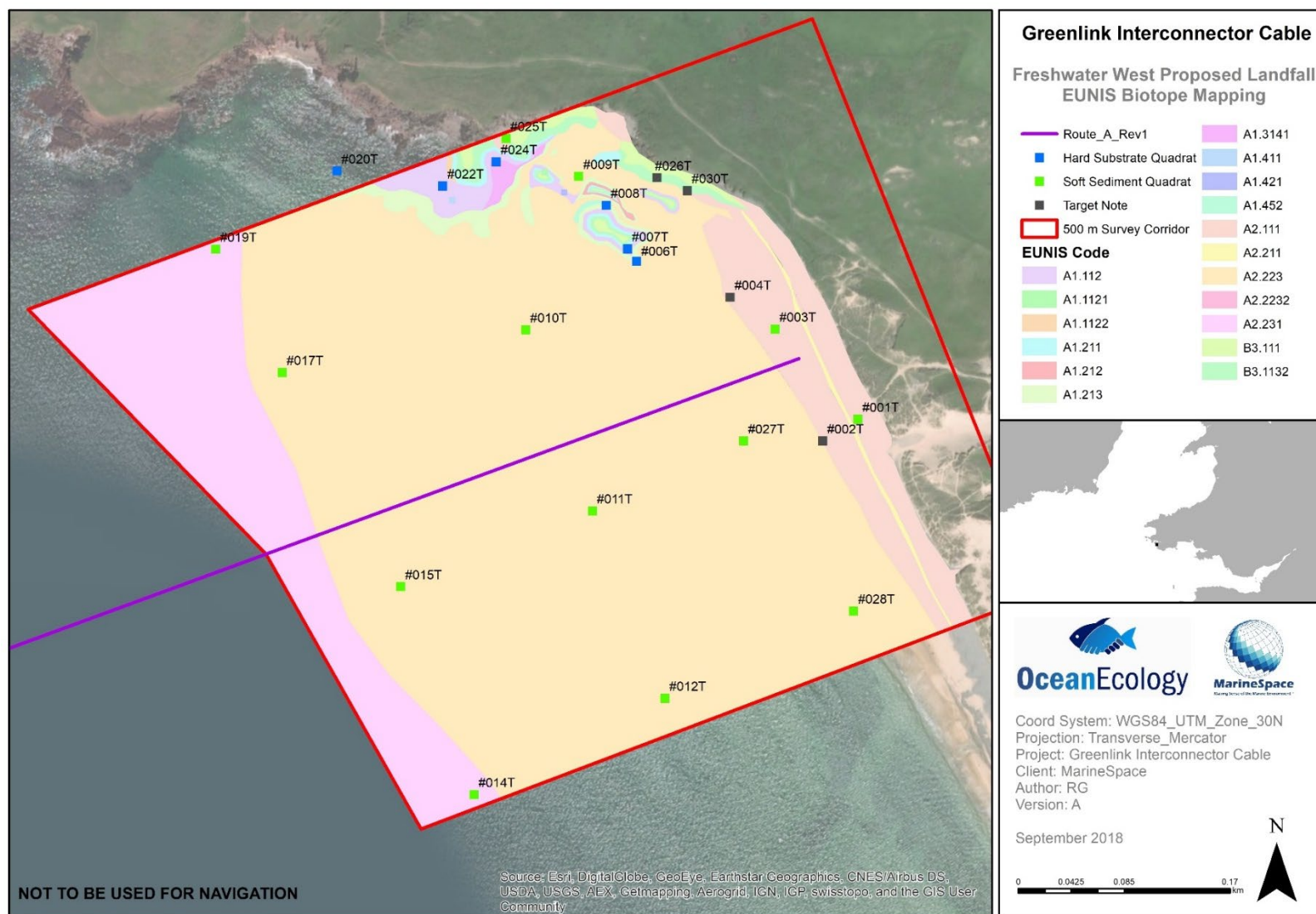
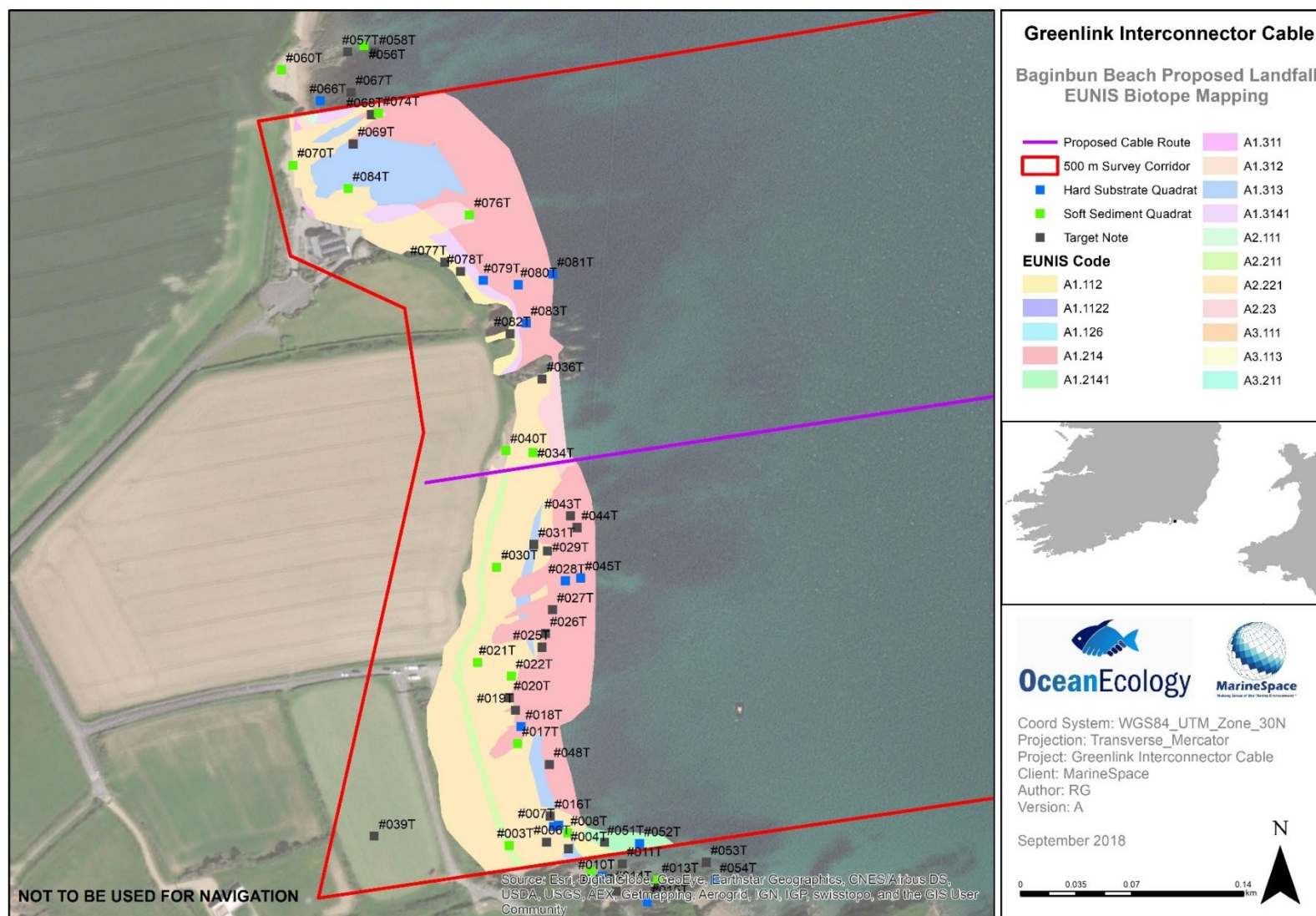


Figure 3.4: EUNIS biotope mapping and sampling locations visited during the intertidal survey of the proposed landfall at Baginbun Beach, Wexford.



4. Discussion

This report presents the findings of intertidal surveys conducted at Freshwater West, Pembrokeshire, and Baginbun Beach, Wexford, aimed at establishing the main habitats present in the general vicinity of two proposed landfall locations for the Greenlink Interconnector cable. The surveys involved Phase I walkover surveying to map the habitats present accompanied by soft and hard substrate quadrat sampling to gather more detailed information on the benthic communities present for biotope mapping purposes.

Freshwater West was found to be mostly characterised by impoverished sandy shores. The paucity of benthic organisms in these sediments can be explained by the highly mobile nature of sediments in this area due to its exposed location and lack of shelter from prevailing southwesterly winds and swell. Baginbun Beach was found to be a complex mosaic of littoral rock platforms and sand filled gullies supporting a variety of biotopes and aggregations of honeycomb worm (*S. alveolata*) tubes. Rockpools were ubiquitous across the site as well as across an area of rocky shore at Freshwater West however it was not possible to map the distribution and assess the high number of pools present without returning to the sites over multiple low tide periods.

It should be noted that all littoral rock biotopes encountered during both surveys correlate to Annex I reef habitat while the sandy biotopes (A2.21 and A2.23) correlate to the Annex I habitat 'mudflats and sandflats not covered by seawater at low tide'. As such the littoral rock habitat encountered at the Freshwater West landfall site is representative of the Annex I reef habitats that are a primary reason for the selection of the Pembrokeshire Marine SAC. The sandy shore biotopes are also representative of the Annex I 'mudflats and sandflats not covered by seawater at low tide' habitat that qualifies as a feature but is not a primary reason for the selection of the site.

Other than the habitats described above, no rare or important species and/or habitats were recorded during the survey.

It should be noted that the collection of aerial imagery through the use of Unmanned Aerial Vehicles (UAV) is now becoming standard practice for intertidal habitat mapping surveys facilitating higher accuracy biotope and feature mapping than can be achieved by walkover surveying. Given the minimal additional cost and reduced health and safety risks, it is recommended that any future intertidal surveys at these sites are supported by UAV mapping methodologies.

5. References

Davies J, Baxter J, Bradley M, Connor D, Khan J, Murray E, Sanderson W, Turnbull C, Vincent M (2001) Marine Monitoring Handbook March 2001.

Great Britain. Parliament (1974) Health and Safety at Work etc. Act 1974. London: HSMO.

Parry ME V (2015) Guidance on Assigning Benthic Biotopes using EUNIS or the Marine Habitat Classification of Britain and Ireland.

Wyn G, Brazier P, Birch K., Bunker A, Cooke A, Jones M, Lough N (2006) CCW Handbook for Marine Intertidal Phase 1 Biotope Mapping Survey.