Liverpool Bay CCS Ltd

HYNET CARBON DIOXIDE TRANSPORTATION AND STORAGE PROJECT

TCPA & MARINE LICENCE APPLICATION

Environmental Statement
Volume 3, appendix I2: Marine Biodiversity Intertidal Survey Report

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Liverpool Bay CCS Limited
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Intertidal Survey Report

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HYNET NORTH WEST CARBON DIOXIDE PIPELINE TRANSPORT AND STORAGE

TCPA & MARINE LICENCE APPLICATION

Intertidal Survey Report

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1 INTRODUCTION

Eni UK Limited (hereafter referred to as 'Eni') is a leading partner of a consortium delivering the HyNet North West Project (hereafter referred to as the 'Project'), which is aimed to reduce carbon dioxide (CO_2) emissions from industry, homes and transport and support economic growth in the North West of England and North Wales (Figure 1.1). The Project will include infrastructure to produce and distribute low carbon hydrogen. The hydrogen is produced using natural gas, with the resultant CO_2 emissions captured and stored in depleted hydrocarbon reservoirs offshore, in addition to the CO_2 emissions which will be captured from existing industrial sources.

Specifically, Eni will deliver the CO_2 transport and storage elements (hereafter referred to as the "Eni Proposed Development" of the Project, which include the carbon dioxide (CO_2) onshore pipeline network, the repurposing of PoA Terminal for CO_2 service, the CO_2 storage offshore and associated transportation and injection facilities (Figure 1.2).

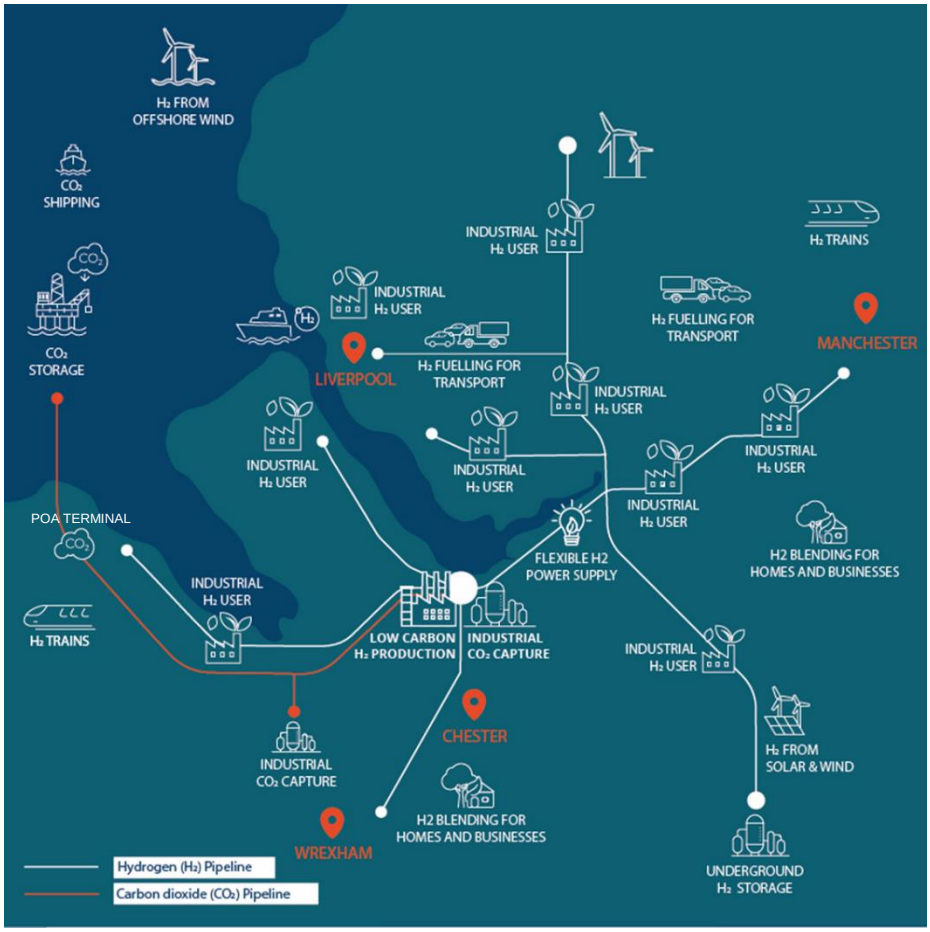

Figure 1.1: Illustrates Eni carbon dioxide (CO_2) transport and storage elements within the Hynet Project vision

Power supply from the onshore grid and upgraded telecommunications will be required at the offshore platforms once they have been re-purposed to receive and distribute CO_2 for storage in the Liverpool Bay offshore fields. This would require new underground electrical and fibre optic cables to be installed from the PoA Terminal to the Douglas platform, as part of the Eni Proposed Development .

This Phase 1 Intertidal Walkover Survey Report provides a characterisation of the intertidal benthic baseline environment from Mean High Water Springs (MHWS) to Mean Low Water Springs (MLWS), and identifies sensitive ecological receptors present at the location of the proposed new cables route.

The results of this survey will inform the marine Ecological Impact Assessment (EcIA) being undertaken for the cable installation works at the intertidal area to support both the onshore (TCPA) and the offshore (Marine Licence) planning applications, as the Eni Proposed Development overall is an EIA.

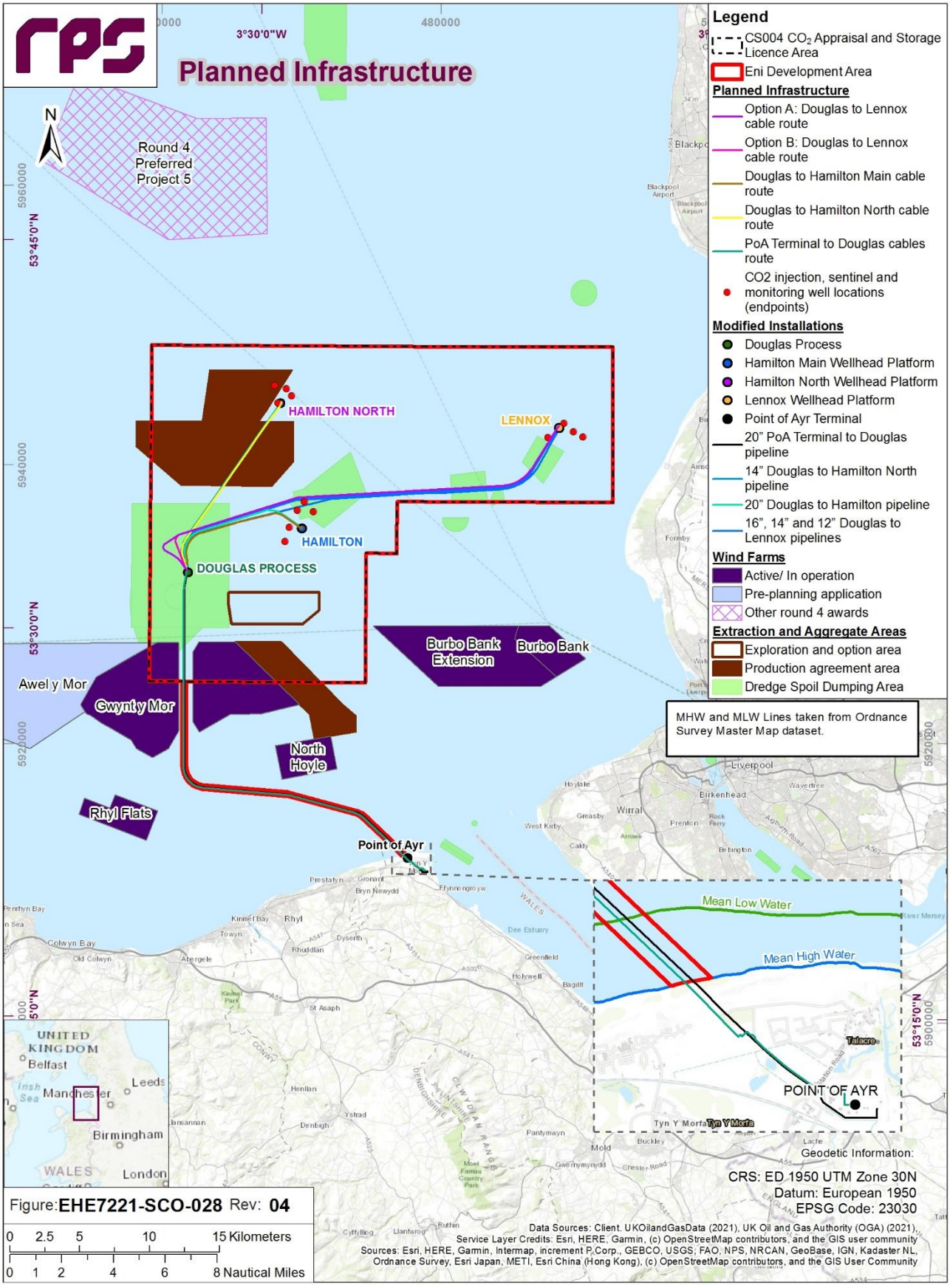

Figure 1.2: Illustrates the intertidal survey area location within Eni Proposed Development (offshore elements)

2 INTERTIDAL SURVEY

2.1 Methodology

A Phase 1 intertidal walkover survey was undertaken on the 2nd and 3rd of April 2022 near Prestatyn, North Wales. The survey was carried out on a spring tide cycle and focussed on intertidal biotopes from MHWS to approximately MLWS. Tide heights during the surveys are presented in Table 2.1. The route line of the existing 20" natural gas pipeline connecting PoA Terminal to Douglas platform to be re-purposed for carbon dioxide service and a 500 m buffer zone at either side was surveyed.

The route of the new electrical and fibre optic cables would follow the alignment of the existing pipeline (whilst keeping a safe proximity from it) so as to seek to contain the new cables within areas of land which would have been previously disturbed during installation of the pipeline (Figure 2.1)

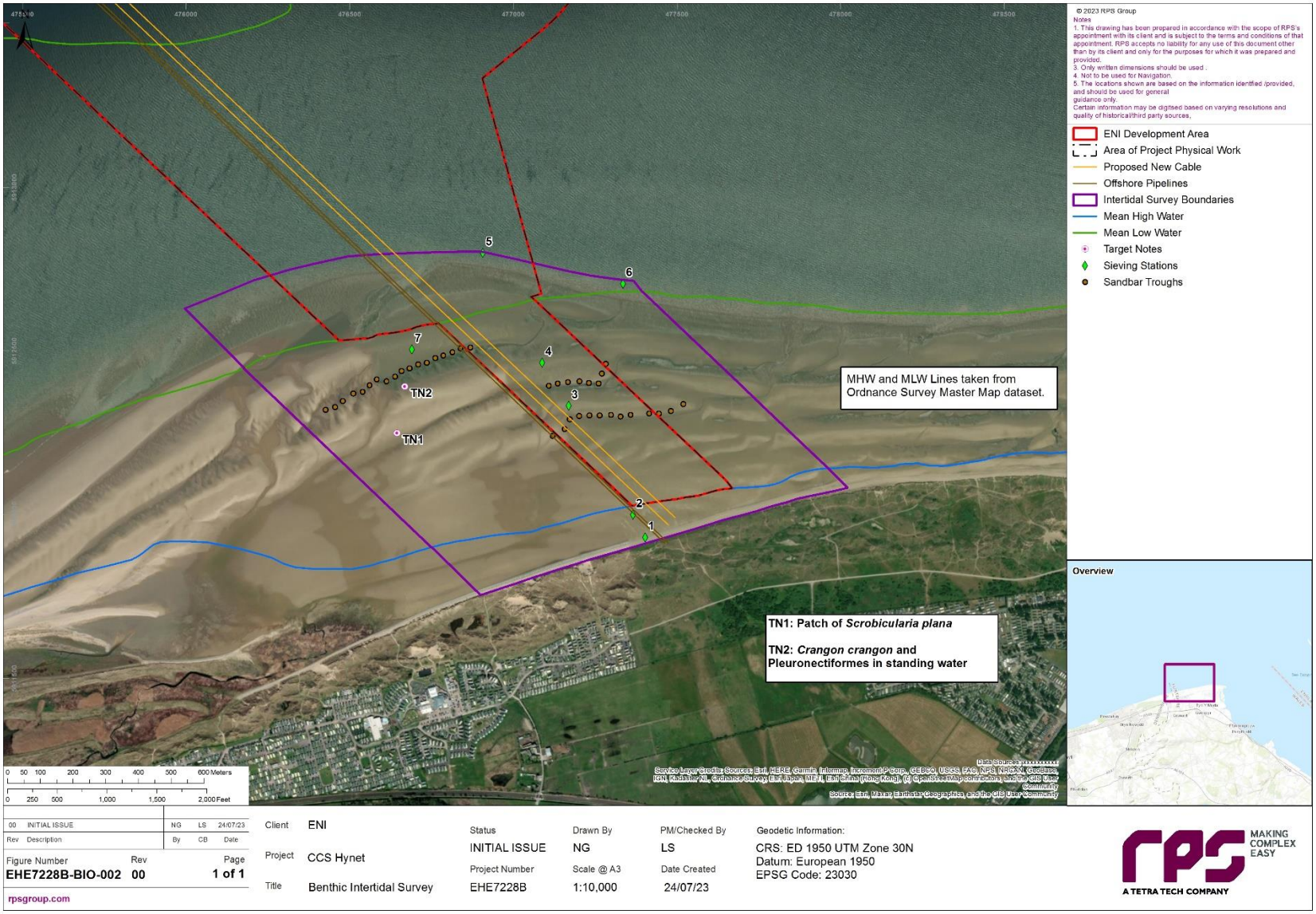

Figure 2.1: Intertidal Survey Area location map

The survey was undertaken with reference to standard intertidal survey methodologies as outlined in the Joint Nature Conservation Committee (JNCC) Marine Monitoring Handbook (Davies *et al.,* 2001), Procedural Guidance No 3-1 In situ intertidal biotope recording (Wyn and Brazier, 2001 and Wyn *et al.,* 2000), and The Handbook for Marine Intertidal Phase 1 Biotope Mapping Survey (Wyn *et al.,* 2006).

The survey was carried out by an experienced marine biotope and coastal habitat surveyor (Max Carstairs) with survey assistance and a health and safety presence from ecologist (Richard Cutts).

During the walkover survey, notes were made on the shore type, wave exposure, sediments/substrates present and descriptions of species/biotopes present (JNCC, 2015). The spatial relationships between these features were observed and waypoints were recorded by a hand-held global positioning system (GPS) device, in conjunction with hand-written descriptions and photographs. All biotopes present were identified, and their extents mapped with the aid of aerial photographs and a hand-held GPS recorder. Biotope mosaics have been mapped where biotopes occur intricately together. Any other features within the intertidal zone were also noted including any habitats/species of conservation importance. Where present, these features were target noted in the intertidal biotope map (Figure 3.1).

On-site exploratory digging for sub-surface fauna occurred at various locations, on an ad hoc basis, across the beach. In addition, on-site sieving of sediments was undertaken in different biotopes at seven sampling stations (Appendix B). The locations of sieving stations were determined in the field to include all of the biotopes identified by observation of surface features. The procedure involved the collection of four spade-loads (approximately 0.02 m^2) of sediment dug to a depth of 20-25 cm, which were then sieved through a series of stacked sieves, the finest of which was 0.5 mm mesh. All macrofauna species present were identified to the highest taxonomic level possible in the field and also enumerated on site. Field notes were also taken on the physical characteristics including sediment type (Wentworth, 1922) and presence of anoxic layers in the sediment.

2.1.1 Timing

The fieldwork was undertaken in April 2022 during the optimal period for intertidal biotope survey mapping namely April – October (Wyn *et al*., 2006). Due to occurrence of low tide close to sunrise, surveying was undertaken before and after low water. Approximate low tide times and heights for the survey are presented in Table 2.1.

Table 2.1: Survey Times, Tide Times and Daylight Hours for Intertidal Survey (based on times for Mostyn Docks). Tide Heights in Meters above Chart Datum, Times in BST

Date	Start	Finish	Low tide	Height	Sunrise
02/04/2022	07:00	12:00	07.00	0.9 m	06:45
03/04/2022	07:00	12:00	07:34	1.02 m	06:43

3 SURVEY RESULTS

3.1 Overview

The beach at Gronant, Prestatyn was mainly dissipative in terms of wave energy with some reflective characteristics. It was an exposed high energy system with a breaker zone and well developed surf and swash zones (Figure 3.1). The majority of the shore had a gentle slope with a narrow steep reflective foreshore at the top of the beach (Figure 3.2). A moderately sloping backshore was fringed by steep sand dunes built up by marram grass (*Ammophila arenaria*). The incoming tide predominantly flooded the beach from north-east to south-west and entered the surf zone up short sand bar cuts in this direction. Once through the cuts, the incoming tide flowed from east to west along long sandbar troughs. Drainage for the most part occurred in the opposite direction.

The upper swash zone of the beach was widest (~400 m) in the west of the study area though was virtually absent at the eastern end of the site. Sands in this location were fine, low lying and permanently waterlogged due to groundwater seepage which effectively extended the area which bivalves can inhabit right up to the foreshore. An anoxic layer was patchily distributed.

The mid-section of the beach was dominated by wide mobile sandbars comprised mainly of fine to medium grained sand, with small amounts of large shell fragments and gravels. An anoxic layer was not present. The sand here was elevated, mobile, free draining and consequently supported a low density of life. Typically, three large parallel sandbars occurred at any transect line down the intertidal zone, comprising a surf zone spanning a distance of approximately 400 m. Narrow waterlogged depressions (troughs) lay between sandbars and contained a finer grained sand with a slightly higher mud content. These areas contained a moderate density of fauna.

The lowest part of the shore was comprised predominantly of fine to medium sand and although the mud content was relatively low it was highest in this location. An anoxic layer was generally present though was often only faintly visible in the top 25 cm of sediment. This layer occurred at variable depths below the surface across the lower shore and appeared absent in places. Very high densities of invertebrates were present at the lowest part of the shore.

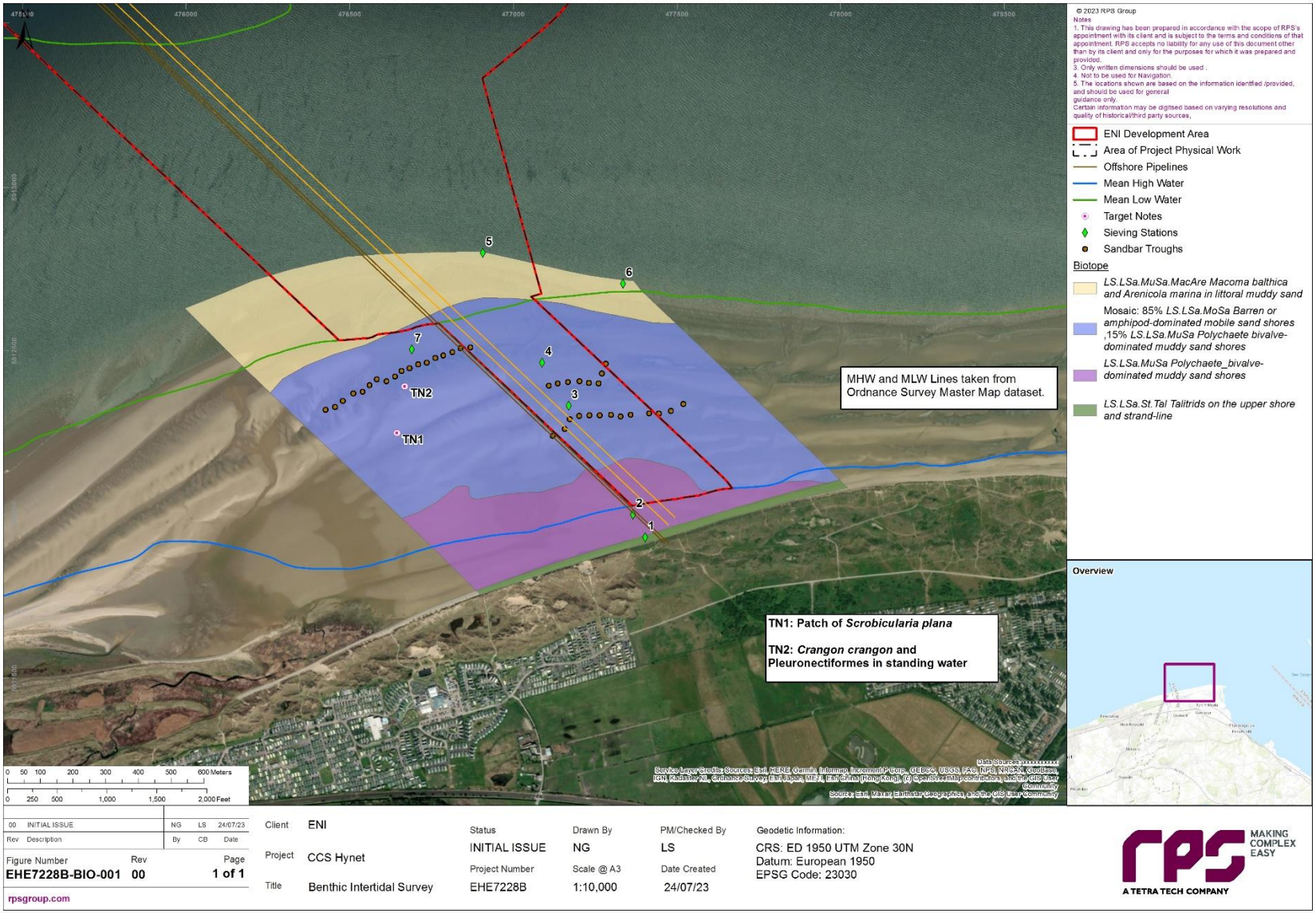

Figure 3.1: Biotope Map of the Survey Area

3.2 Biotopes

3.2.1 Upper shore

A narrow strip of medium to coarse sands and pebbles (Figure 3.3) was present at the top of the beach with moderately abundant populations of amphipods under vascular plant-based detritus along the strandline. These areas are characteristic of the biotope ***LS.LSa.St.Tal Talitrids on upper shore and strand-line*** (Figure 3.2).

Figure 3.2: Foreshore, Berm, Backshore and Strandline in the Upper Beach Section Containing LS.LSa.St.Tal Talitrids on the Upper Shore and Strand-line

Figure 3.3: Sampling the Upper Shore at Sieving Station 1

3.2.2 Mid shore

The biotope ***LS.LSa.MuSa Polychaete/bivalve-dominated muddy sand shores*** occurred near the upper shore and in mid-shore areas in narrow low-lying troughs at the base of sandbars (Figure 3.4). The lugworm *Arenicola marina* occurred in moderate to low densities of approximately 0.2 per m^2 and was accompanied by occasional specimens of the bivalves *Macoma balthica* and *Macomangulus tenuis*.

Figure 3.4: LS.LSa.MuSa Polychaete/bivalve-dominated Muddy Sand Shores in the Mid-beach Section

A few specimens of the cockle *Cerastoderma edule* were encountered during dig over sampling. A single specimen of the mussel *Mytilus edulis* was found in a trough feature attached to a cobble present just under the sandy surface. The crab *Carcinus maenas* and the gastropod *Littorina littorea* were encountered rarely. A single live necklace shell *Polinices catenus* was found at the edge of a trough (Figure 3.5) and similarly three individuals of the bivalve mollusc *Scrobicularia plana* (Figure 3.6) were located in the western part of the survey area (NGR SJ 10085 85296; see Target Note 1,Figure 3.1).

Figure 3.5: Live Specimen of *Polinices catenus* at the Interface Between the *LS.LSa.MoSa* and *LS.LSa.MuSa* Biotopes

Figure 3.6: Siphon Marks of *Scrobicularia plana*

The amount of waterlogging in troughs varied from damp sand to standing water up to 30 cm deep. The brown shrimp *Crangon crangon* and coin sized juvenile flounders *Platichthys flesus* were observed in standing water in the western part of the study area (NGR SJ 10111 85438; see Target Note 2,Figure 3.1).

The biotope ***LS.LSa.MoSa Barren or Amphipod dominated mobile sand community*** occurred on sandbars intersecting troughs in the mid shore (Figure 3.7). The elevated sandbars were the predominant mid-shore habitat and drained quickly so that the invertebrate density was very low (Figure 3.8). Two amphipods were observed over the entire site. A soft-shelled individual *Carcinus maenas,* likely seeking shelter from predators during the vulnerable process of ecdysis, was recorded during sieve sampling (Figure 3.9).

The intricate pattern of sandbars and troughs occurred over a wide area and in this setting the two habitats are mapped as a mosaic (Figure 3.1). The individual distributions of these features were not mappable in a timeous fashion particularly in the absence of recent aerial photography. Sandbars are mobile habitats and their positions change over time to varying extents on a daily, seasonal and annual basis. Maps of such habitats are therefore only accurate temporarily though may give a good indication of the seasonal distribution of sediments. The major sandbar troughs present during the survey are presented in Figure 3.1.

Figure 3.7: Large Mid-shore Sand Bank with LS.LSa.MoSa Barren or Amphipod Dominated Mobile Sand Community

Figure 3.8: Mid-shore Sieving Station in LS.LSa.MoSa Barren or Amphipod Dominated Mobile Sand Community

Figure 3.9: *Carcinus maenas* with Soft Shell Following Ecdysis

3.2.3 Lower shore

The biotope ***LS.LSa.MuSa.MacAre Macoma balthica and Arenicola marina in littoral muddy sand*** was present in the lower shore with *Arenicola marina* occasional and one individual of *Macoma balthica* obtained via sieve sampling.

The lowest strip of shore contained dense populations of invertebrates. The annelid worm *Lagis koreni* was particularly abundant (up to 900 per m^2) in patches in this location (Figure 3.10). *Arenicola marina* was largely displaced by *Arenicola defodiens* as noted in distribution of casts and confirmed via collection of a partial specimen of the latter during digging and sieving (Figure 3.11). Other species in this band included the polychaete worms *Owenia fusiformis, Lanice conchilega* and *Glycera sp.* which occurred occasionally, and molluscs *Macoma balthica* and *Cerastoderma edule,* a few specimens of which were obtained during exploratory digging and sieve sampling. This community is a variant of the *Macoma balthica-Arenicola marina* community though is not named or referred to within the Marine Habitat Classification for Britain and Ireland (JNCC, 2015).

Figure 3.10: Dense Population of *Lagis koreni* in Variant of Community LS.LSa.MuSa.MacAre *Macoma balthica* and *Arenicola marina* in Littoral Muddy Sand

Figure 3.11: Cast and Partial Specimen of *Arenicola defodiens* in a Variant of Community *LS.LSa.MuSa.MacAre.* Anoxic Sediments Visible in Cast

4 HABITATS OF CONSERVATION IMPORTANCE

4.1 Intertidal Sand and Mudflats

The survey area lies within the Dee Estuary Special Area of Conservation (SAC). A primary reason for the selection of this SAC was the Annex I Habitats Directive habitat *1140 Mudflats and sandflats not covered by seawater at low tide.* This habitat includes the following biotopes which were recorded in the survey area:

- LS.Lsa.St.Tal Talitrids on the upper shore and strand-line;
- LS.LSa.MuSa Polychaete/bivalve-dominated muddy sand shores;
- LS.LSa.MoSa Barren or amphipod-dominated mobile sand shores; and
- LS.LSa.MuSa.MacAre Macoma balthica and Arenicola marina in littoral muddy sand.

5 SUMMARY

A full list of the biotopes recorded in the intertidal survey area are listed in Appendix A. All are commonly occurring habitats around the UK with rapid recovery rates following physical disturbance of the sediments. The lugworm *Arenicola defodiens* is uncommon as are high densities of *Lagis koreni*. These species add interest to the site though none of the species encountered are considered rare at the national level. However, *Arenicola defodiens* may largely be restricted to British and Irish waters, though as a recently discovered species less is known about its wider distribution and it is also likely to be under-recorded by many workers.

6 REFERENCES

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Appendix A List of Biotopes in the Survey Area

Shore Position	Biotope/Phase 1 Code	Biotope Name	JNCC Biotope Description
Upper Shore	LS.LSa.St.Tal	Talitrids on the upper shore and strand-line	A community of sandhoppers (talitrid amphipods) may occur on any shore where driftlines of decomposing seaweed and other debris accumulate on the strandline. The biotope occurs most frequently on medium and fine sandy shores, but may also occur on a wide variety of sediment shores composed of muddy sediment, shingle and mixed substrata, or on rocky shores.
Mid shore	LS.LSa.MuSa	Polychaete/bivalve-dominated muddy sand shores	Muddy sand or fine sand, often occurring as extensive intertidal flats on open coasts and in marine inlets. The sediment generally remains water-saturated during low water. The habitat may be subject to variable salinity conditions in marine inlets. An anoxic layer may be present below 5cm of the sediment surface, sometimes seen in the worm casts on the surface. The infauna consists of a diverse range of amphipods, polychaetes, bivalves and gastropods.
Mid shore	LS.LSa.MoSa	Barren or amphipod-dominated mobile sand shores	Shores consisting of clean mobile sands (coarse, medium and some fine-grained), with little very fine sand, and no mud present. The sand may be duned or rippled as a result of wave action or tidal currents. The sands are non-cohesive, with low water retention, and thus subject to drying out between tides, especially on the upper shore and where the shore profile is steep. Most of these shores support a limited range of species, ranging from barren, highly mobile sands to more stable clean sands supporting communities of isopods, amphipods and a limited range of polychaetes.
Mid and lower shore	LS.LSa.MuSa.MacAre	*Macoma balthica* and *Arenicola marina* in littoral muddy sand	Muddy sand or fine sand, often occurring as extensive intertidal flats both on open coasts and in marine inlets. The sediment is often compacted, with a rippled surface, areas of standing water, and generally remains water-saturated during low water. An anoxic layer is usually present within 5 cm of the sediment surface and is often visible in worm casts. The species assemblage is characterised by the lugworm *Arenicola marina* and the Baltic tellin *Macoma balthica*.

Appendix B Sieving Station Locations and Photographs

No.	NGR	Notes
1	SJ 10839 84967	Medium to coarse sand dominant, plus shell fragments and pebbles. Amphipods under seaweed and pebbles.
2	SJ 10803 85037	Fine to medium sand.
3	SJ 10611 85372	Fine to medium sand and some (<5%) shell fragments.
4	SJ 10532 85505	Fine to medium sand and some (<5%) shell fragments and gravel.
5	SJ 10355 85843	Fine sand, some (<5%) mud, gravel, shell fragments. *Owenia fusiformis* *Glycera sp.*; *Lagis koreni* and *Macoma balthica* nearby.
6	SJ 10782 85743	Fine sand, gravel and empty shells. *Lagis koreni*, *Macoma balthica, Owenia fusiformis*
7	SJ 10134 85551	Fine to medium sand with *Carcinus maenas*, 1 amphipod.

Sieving Station 1 (Upper Shore)

Sieving Station 2 (Upper Shore)

Sieving Station 3 (Mid Shore)

Sieving Station 4 (Mid Shore)

Sieving Station 5 (Lower Shore)

Sieving Station 5 (Lower Shore)

Sieving Station 5 (Lower Shore) Showing *Macoma balthica* and *Lagis koreni*

Sieving Station 6 (Lower Shore) Showing *Lagis koreni*

Sieving Station 7 (Mid-Shore)

Sieving Station 7 (Mid-Shore) Showing *Carcinus maenas*