



Ocean Ecology

Marine Surveys, Analysis & Consultancy

Holyhead Waterfront Regeneration Scheme Drop Down Video Survey 2020

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Abbreviations

DDV	Drop Down Video
DPA	Detailed Planning Application
EC	European Community
EIA	Environmental Impact Assessment
EOL	End of Line
ES	Environmental Statement
EUNIS	European Nature Information System
FOCI	Features of Conservation Interest
GPS	Global Positioning System
HD	High Definition
HRO	Harbour Revision Order
INNS	Invasive Non-Native Species
IoACC	Isle of Anglesey County Council
JNCC	Joint Nature Conservation Committee
MHWS	Mean High Water Springs
MLWS	Mean Low Water
MP	Megapixel
NRW	Natural Resources Wales
OEL	Ocean Ecology Ltd
OPP	Outline Planning Permission
OSPAR	Oslo-Paris Convention
PMF	Priority Marine Features
RHDHV	Royal Haskoning DHV
RIB	Rigid Inflatable Boat
RLB	Red Line Boundary
SOL	Start of Line
UK	United Kingdom
UTM	Universal Transverse Mercator
WG	Welsh Government
WGS	World Geographic System

Executive Summary

Ocean Ecology Limited (OEL) was commissioned by Royal Haskoning DHV (RHDHV) to undertake a Drop-Down Video (DDV) survey within Holyhead Harbour, Holy Island as part of an ongoing Environmental Impact Assessment (EIA) process for the proposed Holyhead Waterfront Regeneration Scheme (the Proposed Development).

The purpose of the DDV survey was primarily to confirm the presence / absence of Sublittoral Rock Habitat and identify other notable features such as sensitive habitats and species (e.g. *Virgularia mirabilis*) including Invasive Non-Native Species (e.g. *Didemnum vexillum*) within the project Red Line Boundary (RLB). A total of 22 target DDV transects were identified to provide adequate coverage of the Proposed Development footprint within the wider project RLB. The survey involved the collection of high-resolution seabed video and stills along transects using a bespoke DDV camera system in Holyhead Harbour. Following data collection, all images were analysed and assessed to determine the presence / absence of notable features.

Sublittoral rock habitats, representative of Annex I 'Reefs' habitat were recorded only in the nearshore, shallow water areas of the survey area, adjacent to Newry Beach, on the sublittoral fringe. Silt tolerant algal communities dominated these rock habitats whilst faunal communities were depauperate.

The slender seapen, *V. mirabilis*, a characteristic species of the OSPAR habitat 'Seapens and burrowing megafauna communities' was recorded, although not in significant numbers in infralittoral mud habitats which were widespread across the survey area. *V. mirabilis* was often recorded in association with observations of the head-shield slugs, *Philine aperta* and / or *Haminoea* sp. and given the shallow nature of the areas surveyed, deemed characteristic of the biotope '*Philine aperta* and *Virgularia mirabilis* in soft stable infralittoral mud'.

There were no records of the INNS, *D. vexillum* on review of seabed imagery however, interaction with mooring infrastructure upon which *D. vexillum* is known to be attached, was actively avoided for safety.

1. Introduction

1.1. Holyhead Waterfront Development

The Holyhead Waterfront Regeneration Scheme (the Proposed Development) being proposed by Conygar Holyhead Ltd is located on Holy Island (Ynys Gybi) within Holyhead Harbour and adjacent to the Great Breakwater (Figure 1). The Proposed Development is for a mixed-use regeneration scheme which would include a new 250-berth marina, reclamation of land from the sea, new residential developments, together with commercial, leisure and retail areas with associated infrastructure.

1.2. Background Information

An Environmental Statement (ES) for the Proposed Development was submitted to the Isle of Anglesey County Council (IoACC) in 2010 (the '2010 ES') in support of an Outline Planning Permission (OPP) (with All Matters Reserved). Following a period of project dormancy since the original ES was submitted in 2010, an updated ES (the '2020 ES') was submitted in support of a Section 73 (s73) application¹ that updated the 2010 ES to take account of new baseline information and changes to legislation since the 2010 ES was produced.

However, in May 2020, the IoACC determined that due to changes to the Proposed Development, they would not be able to accept applications for Reserved Matters pursuant to the OPP and recommended a Detailed Planning Application (DPA) for the Proposed Development be sought. Therefore, in order to permit the construction and operation of the Proposed Development the project required the following consents in order:

- Detailed Planning Permission from the IoACC for all works above Mean Low Water (MLW);
- A Marine Licence from Natural Resources Wales (NRW) for all works below Mean High Water Springs (MHWS); and
- A Harbour Revision Order (HRO) from the Welsh Government (WG).

A number of surveys were undertaken to inform the 2010 ES, including:

- An intertidal habitat mapping undertaken in October 2009;
- An intertidal infauna invertebrate sampling; undertaken in September to October 2009; and,
- A sublittoral habitat and biotope survey undertaken in September to October 2009.

¹ A Section 73 (s73) application was submitted to the IoACC in March 2020 (ref. VAR/2020/20/EIA) in order, principally, to extend the period of time within which Reserved Matters applications can be submitted and also extend the time period for the development being implemented.

As such, a similar programme of marine ecology survey work was deemed essential to update the findings of the previous 2009 survey programme and to inform the latest ES in support of a new application for OPP.

1.3. Survey Objectives

As part of this survey programme, Ocean Ecology Ltd (OEL) were commissioned to undertake a subtidal Drop Down Video (DDV) survey of the Proposed Development area to a) establish the main benthic habitats present b) characterise the associated marine biological communities and c) confirm the presence / absence of notable features including Annex I habitat and Invasive Non-Native Species (INNS) (e.g. *Didemnum vexillum*). The survey area stretched from Soldiers Point at the most southerly end of Holyhead breakwater in the west to the small craft moorings in the east (Figure 2). This report provides a summary of the survey methodologies employed, a description of the habitats encountered and a summary of notable features identified during the survey.

1.4. Features of Interest

Several important and sensitive habitats are known to occur within Holyhead Harbour and have the potential to occur within the Proposed Development survey area. These include subtidal rock habitats representative of Annex I 'Reef' habitats (both bedrock and stony)² and subtidal mud habitats representative of the OSPAR habitat 'Seapens and burrowing megafauna communities'. The invasive carpet sea squirt (*Didemnum vexillum*) is also known to occur across the survey area.

1.4.1. Sublittoral Rock Habitats

Sublittoral rock habitats are highly diverse and widespread around the UK. The sublittoral area can be separated into two zones based on the dominant biological assemblage; the infralittoral (algal dominated) and the circalittoral (animal dominated). Subtidal rock habitats comprise bedrock, boulders and cobbles and faunal communities are strongly affected by the availability of light with shallow areas, as present within Holyhead Harbour, typically supporting various algae communities, predominantly kelp species and erect seaweeds with associated understory fauna.

1.4.1.1. Infralittoral rock and other hard substrata

Infralittoral sublittoral rock habitats, defined within the European Nature Information System (EUNIS) as those areas between the MLW line and the maximum depth at which 1% light attenuation reaches the seabed. The upper limit is marked by the top of the kelp zone whilst the lower limit is marked by the lower limit of kelp growth or the lower limit of dense seaweed growth. In exposed conditions the kelp is *Laminaria hyperborea* whilst in more sheltered habitats it is usually *Saccharina latissima*; other kelp species may dominate under certain conditions. On the

² It should be noted that the 'reef' habitats referred to throughout this report are not protected as designated features of a Natura 2000 site under the EC Habitats Directive but are referred to as 'Annex I habitat' in recognition of their contribution in achieving Favourable Conservation Status of Annex I reef habitat across the SAC network.

extreme lower shore and in the very shallow subtidal (sublittoral fringe) there is usually a narrow band of dabberlocks, *Alaria esculenta* (exposed coasts) or the kelps *Laminaria digitata* (moderately exposed) or *S. latissima* (very sheltered). Areas of mixed ground, lacking stable rock, may lack kelps but support seaweed communities.

1.4.1.2. Bedrock Reef (Annex I)

Annex I 'bedrock reef' habitat occurs where hard bedrock arises from the surrounding seabed, providing a stable habitat for attachment for a diverse range of epibiota. Bedrock reefs and associated biological communities can be highly variable due to the diverse nature of these habitats in terms of topography, structural complexity and exposure to tidal streams. In the photic zone communities associated with bedrock reefs are often dominated by attached algae, and often support various invertebrate species such as corals, sponges and sea squirts. These epibiotic communities further increase structural complexity and represent key prey items that in turn attract more mobile and commercially valuable species of fish and crustaceans.

1.4.1.3. Stony Reef (Annex I)

Stony reef habitats occur when stable hard substrata, namely cobbles and boulders > 64 mm in diameter, arise from the surrounding habitat creating a habitat colonised by a variety of fauna and flora. Numerous sites have been designated in UK waters to protect stony reef habitats and associated communities. Such communities can be highly diverse, supporting assemblages of various coral, sponges, ascidians, fish and crustaceans. These associated communities vary dramatically according to environmental variables and may incorporate species that occupy a range of trophic levels. The complexity of habitat created by stony reefs often supports a higher abundance of mobile fauna such as echinoderms and various crabs, hermit crabs, and squat lobsters, as well as fish species for which these species represent key prey items. To be regarded as Annex I stony reef under the EC Habitats directive, areas of cobble/boulder substrate must meet a number of qualifying criteria as defined by Irving (2009) (Table 1). This guidance also suggests that "When determining whether an area of the seabed should be considered as Annex I stony reef, if a 'low' is scored in any of the four characteristics (composition, elevation, extent or biota), then a strong justification would be required for this area to be considered as contributing to the Marine Natura site network of qualifying reefs in terms of the EU Habitats Directive".

Table 1 Characteristics of Annex I 'stony reef' (from Irving (2009)).

Characteristic	Not a Reef	Low	Medium	High
Composition (proportion of boulders/cobbles (> 64 mm))	< 10 %	10-40 % matrix supported	40-95 %	> 95 % clast supported
Elevation	Flat seabed	< 64 mm	64 mm – 5 m	> 5 m
Extent	< 25 m ²	> 25 m ²		
Biota	Dominated by infaunal species			> 80 % of species present composed of epibiotal species

1.4.2. Sublittoral Sediment Habitats

1.4.2.1. Kelp and Seaweed Communities on Sublittoral Sediment

Shallow sublittoral sediments which support seaweed communities typically include the sugar kelp *S. latissima*, the bootlace weed *Chorda filum* and various red and brown seaweeds, particularly filamentous types. EUNIS Level 4 biotope 'A5.52 – Kelp and seaweed communities on sublittoral sediment', a Scottish PMF is generally observed in sheltered waters, typical of the Proposed Development, enabling seaweeds to grow on shells and small stones which lie on the sediment surface. A diverse range of fauna may be associated with these kelp and seaweed dominated habitats such as burrowing polychaete worms and bivalves, scavenging hermit crabs, crabs, starfish, fish and grazing top shells.

These habitats are generally found in shallow water (max. 20 m depth), on a wide variety of substrates (muddy sands and gravels through to cobbles and boulders) and in various environmental conditions. The generally sheltered nature of these habitats enables seaweeds to grow on shells and small stones which lie on the sediment surface; some communities develop as loose-lying mats on the sediment surface.

1.4.2.2. Seapens (*Virgularia mirabilis*)

V. mirabilis is a long and slender seapen, growing up to 60 cm in length and usually off-white to yellow in colour. This sea pen is the most abundant and widespread of the British sea pen species, due partly to its tolerance of a wide range of sediments, salinities and temperatures (Jones et al., 2000). This species of sea pen has a highly muscular peduncle allowing it to burrow and retract completely into the sediment therefore thought likely to be less susceptible to damage from physical disturbance (Greathead et al., 2007).

V. mirabilis is a characteristic species of the 'Mud habitats in deep water' listed as a Habitat of Principal Importance' under Section 7 of the Environment (Wales) Act 2016, the OSPAR habitat 'Sea-pen and burrowing megafauna communities' and the shallow water variant EUNIS biotope

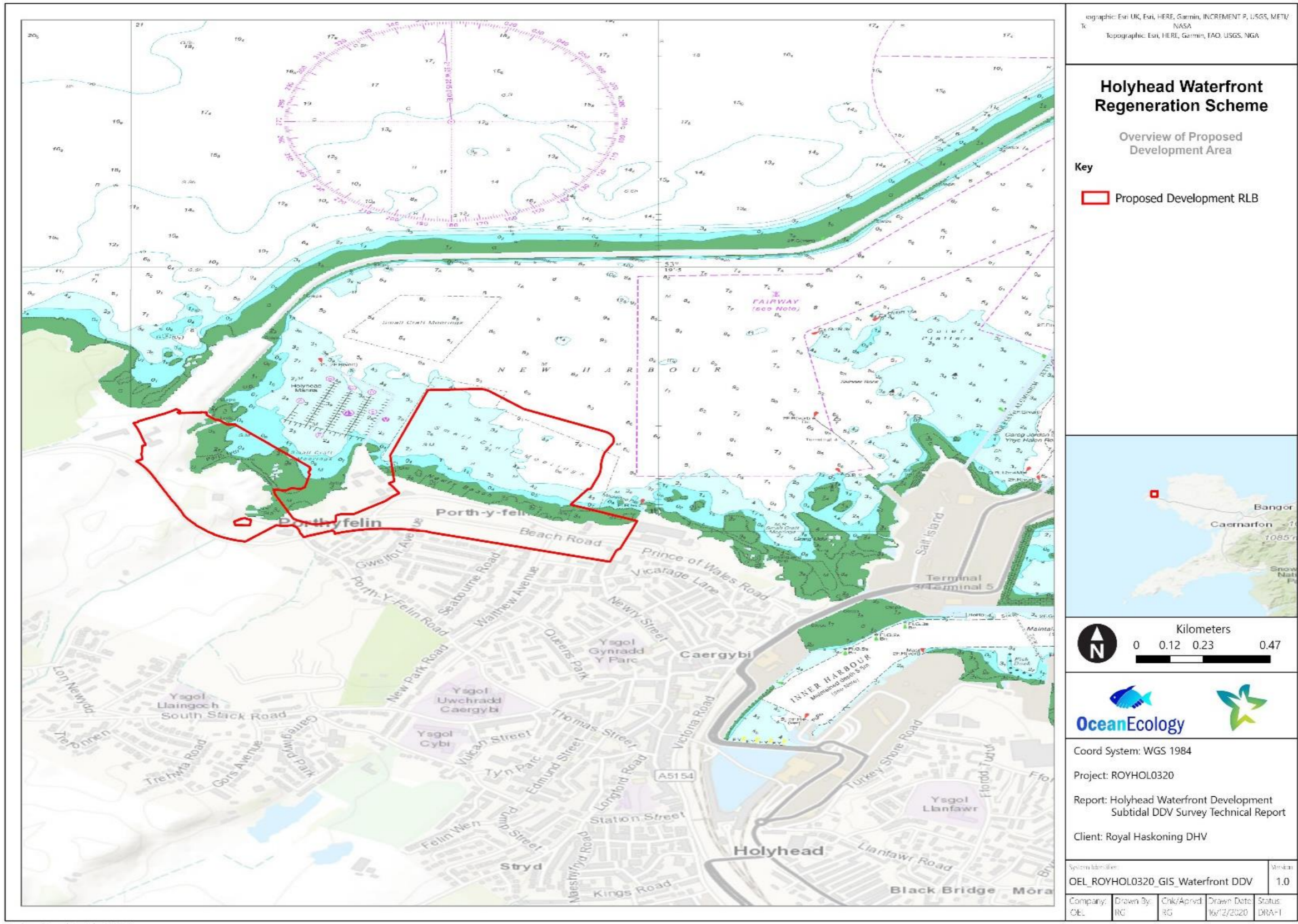
'A5.343 - *Philine aperta* and *Virgularia mirabilis*' in soft stable infralittoral mud'. *V. mirabilis* has been recorded on numerous occasions previously in Holyhead Harbour and is thought to persist in the soft mud habitats within the Proposed Development footprint. The soft mud habitat that is present in Holyhead Harbour and within the Proposed Development footprint has been shown to have very little obvious epifauna and flora apart from scavenging hermit crabs *Pagurus bernhardus*, sparse scallops *Pecten maximus* and epipelagic diatoms (Mercer, 2009).

Greathead et al., 2007 noted that sea pen populations in Holyhead harbour are present but show a patchy distribution, probably related to larval settlement (Hoare, R & Wilson, 1977). Following review of the updated project ES (the '2020 ES'), Natural Resources Wales (NRW) issued a Scoping Opinion for the project (SCO/2020/4 – November 2020) which outlined that NRW do not consider that the mud habitat present in this area is a true representation of the Section 7 Habitat of Principal Importance due partly to the anthropogenic nature of its presence and the habitat description and components of the habitat not being consistent with other naturally occurring forms. Given the relative resilience of this species to smothering, it is considered that this habitat will likely persist in the area despite proposed construction activities however seabed imagery will be reviewed to determine the presence / absence of *V. mirabilis*.

1.4.3. Invasive Non-Native Species (*Didemnum vexillum*)

D. vexillum is an invasive colonial ascidian that has become established world-wide in temperate waters having originated in Japan (Stefaniak et al., 2012). It is now regarded as a nuisance species in North America, northern Europe, and New Zealand, following a global expansion since the 1970's (Griffith et al., 2009). *D. vexillum* colonises a variety of firm substrates and is particularly prevalent on coastal structures such as docks, pilings, marina pontoons and aquaculture equipment. It also colonises natural seabed habitat including rocks, cobbles and gravel, but is unable to establish colonies on mud, mobile sand, or other unstable substrates (Coutts, 2005; Valentine et al., 2007). It can also colonise other benthic organisms including other ascidians, algae and seagrasses forming sheet-like colonies and is capable of smothering large areas, posing a threat to native marine ecosystems (Veatch, 2009). Holyhead Harbour represents an active hub for both commercial and pleasure craft, providing numerous potential vectors to *D. vexillum*. In December 2008 (Griffith et al., 2009) examined the extent of *D. vexillum* within Holyhead Marina and the surrounding harbour area and found that *D. vexillum* formed dispersed colonies throughout the marina. Following storm Emma in March 2018, there remains concern that *D. vexillum* may have dispersed within the Holyhead Harbour area.

As such, the seabed imagery collected during this survey underwent detailed review to determine the presence / absence of *D. vexillum* within the Proposed Development footprint.



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Figure 1. Holyhead Waterfront Regeneration Scheme – Proposed Development Area within Holyhead Harbour, Holy Island.

2. Methods

2.1. Sampling Rationale

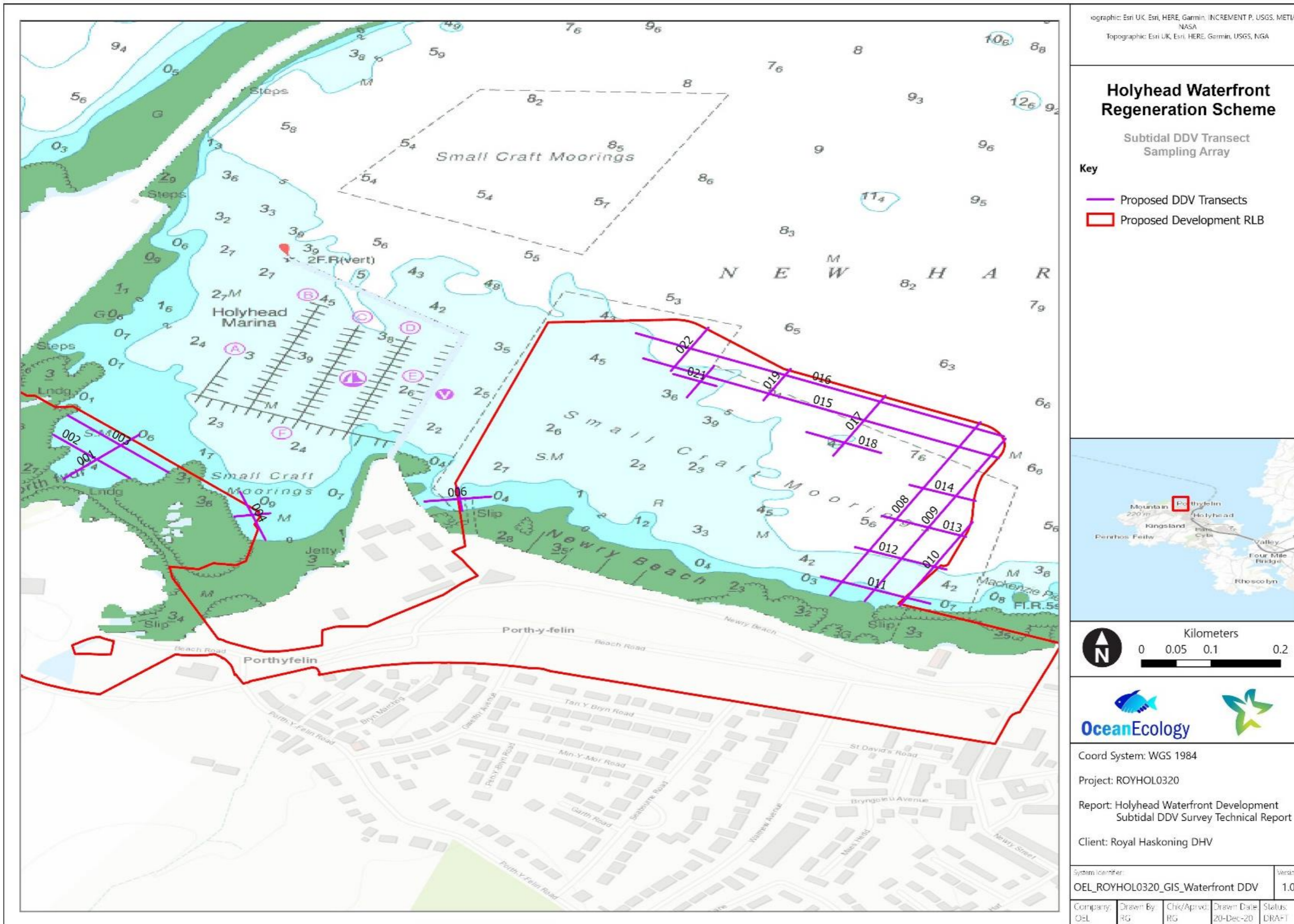
A total of 22 DDV transects were targeted within the Proposed Development survey area, predominantly focused around the small craft moorings to the east in front of Newry Beach (Figure 2). Target DDV transect locations are presented in Figure 2.

2.2. Geodetic Parameters

All coordinates were based on World Geodetic System 1984 (WGS 1984) with projected grid coordinates based on Universal Transverse Mercator (UTM) zone 30N with a Central Meridian of 03°E. A summary of geodetic and projection parameters is provided in Table 2.

Table 2 Details of geodetic datum parameters used for the Holyhead Waterfront Regeneration Scheme DDV survey, 2020.

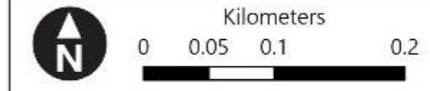
Local geodetic Datum Parameters	
Datum	World Geodetic System 1984 (WGS 1984)
Spheroid	WGS 1984
Project Projection Parameters	
Grid Projection	Universal Transverse Mercator, Northern Hemisphere
UTM Zone	30 N
Central Meridian	03° 00' 00" East
Latitude of Origin	00° 00' 00" North
False Easting	500000.0 m
False Northing	0 m
Scale factor on Central Meridian	0.9996
Units	Metres



ographic: Esri UK, Esri, HERE, Garmin, INCREMENT P, USGS, METV, NASA
Topographic: Esri UK, Esri, HERE, Garmin, USGS, NGA

Holyhead Waterfront Regeneration Scheme
Subtidal DDV Transect Sampling Array

- Key**
- Proposed DDV Transects
 - Proposed Development RLB



Coord System: WGS 1984
Project: ROYHOL0320
Report: Holyhead Waterfront Development Subtidal DDV Survey Technical Report
Client: Royal Haskoning DHV

System Identifier:		Version:	
OEL_ROYHOL0320_GIS_Waterfront DDV		1.0	
Company:	Drawn By:	Chk/Approved:	Drawn Date:
OEL	RG	RG	20-Dec-20
Status:		DRAFT	

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Figure 2 Target DDV transects within the Proposed Development survey area.

2.3. Field Methods

2.3.1. Survey Vessel

Seabed imagery was collected aboard the 5.4m Avon Searider RIB, *DeeBuoys II* provided by National Marine (Plate 1). The vessel was equipped with twin Suzuki DF40 outboard motors, shallow draft of <0.5m for shallow water work in the marina providing a safe and stable platform with sufficient space for three surveyors and equipment. A small volume of seabed imagery was collected during initial survey operations undertaken on the 8m Humber RIB, *Interceptor*, provided by SBS Rib Charter.



Plate 1 Survey vessel *DeeBuoys II* being launched at Holyhead Marina to complete the Holyhead Waterfront Regeneration Scheme DDV survey, 2020.

2.3.2. Survey Equipment

Seabed imagery was collected using OEL's ROVTech subsea camera system which obtained 1080p High Definition (HD) video and 20 Megapixel (MP) still images, mounted in a bespoke deployment frame for use onboard the *Deebuys II*. A data umbilical was used for both deployment of the frame and live video feed to topside camera unit which could be viewed by an experienced marine ecologist for real-time review of video imagery, image capture and assessment of the seabed. Positioning was undertaken using ESRI ArcCollector on a Bad Elf GPS & GLONASS enabled tablet device along with a Garmin Etrex 10 GPS Unit for verification of positioning.

2.4. Drop-Down Camera Sampling

All camera stations and transects were sampled in consideration of the Joint Nature Conservation Committee (JNCC) epibiota remote monitoring operational guidelines (Hitchin, Turner, & Verling, 2015). Images were taken at targeted 5-10 m intervals, at the interface between different habitats and of any notable features along the transects. All video footage was reviewed live, *in situ* by the lead marine ecologist.

The camera system was deployed as follows:

- Vessel approached target location and survey personnel alerted to prepare camera and umbilical.
- Sea fastening on camera frame was released to allow deployment from the vessel.
- Camera lifted onto tubing ready for deployment and station ID picture taken.
- Video recording then lowered into the water on clearance from the skipper.
- Camera then lowered into the water column and to the seabed whilst vessel held on start position. Fix position taken on the seabed.
- The ecologist then waited for any suspended sediments in the field of view to disperse before taking an image and confirming with the skipper to move on.
- The camera was then raised from the seabed and the vessel moved along the transect at approximately < 1 knot collecting imagery and holding the vessel stationary on position every 5-10m. Where possible the seabed was always maintained in view.
- Following the capture of the final image, fix taken and the camera was lifted, video recording was stopped, and the camera was retrieved to the surface.
- Both surveyors then retrieved the camera to the water surface so visible using the umbilical.
- Once the camera was at the surface, the vessel was positioned to minimise pitch and roll (e.g. into wind / tide).
- The vessel skipper then confirmed sea conditions were suitable for retrieval and the camera system was recovered aboard with both surveyors lifting frame onto the tubes first before securing on the deck of the boat.
- Vessel manoeuvred to next transect location.

2.4.1. Seabed Imagery Analysis

All seabed imagery analysis was undertaken in line with JNCC epibiota remote monitoring interpretation guidelines (Turner et al., 2016) and biotopes were assigned in line with the most recent JNCC guidance on assigning benthic biotopes (Parry, 2019).

Each video tow was scanned initially by eye rapidly (at approximately 4 x normal speed) to identify the main habitats prior to a thorough review to identify any notable features of interest, not captured by the still image samples. Analysis of still images was undertaken in two stages.

The first stage, "Tier 1", consisted of assigning substrate / sediment type to the whole image. Determination of sediment type, such as coarse, mixed, sand etc. was facilitated using the adapted Folk sediment trigon (Long, 2006) incorporated into a sediment category correlation table. Percentage gravel (defined as boulders, cobbles, shells, granules, dead / live maerl), sand and mud were used to determine and assign EUNIS broad scale habitats.

"Tier 2" used to identify the presence of notable taxa or features, evidence of burrowing, bioturbation or faunal tracks and other notable features such as anthropogenic impact (e.g. fishing gear / litter) or INNS.

3. Results

3.1. Survey Progress

The survey was completed over two separate survey events due to difficulties sampling in the area because of high volumes of mooring infrastructure and persistent adverse weather in the autumn. Seabed imagery was collected at transects 001, 003, 004 & 005 in the west of the survey area on the 6th August 2020 and all other transects 006 – 022 were sampled on the 29th November 2020. It was not possible to acquire all proposed imagery in the westernmost area, adjacent to Soldiers Point due to dense mooring buoys, debris from storm Emma and unmarked fishing gear. Transect 002 was abandoned without attempt due to intense mooring equipment and debris whilst transect 001 had to be abandoned with less than 50% of the target transect surveyed.

3.2. Seabed Imagery

A total of 21 of the proposed 22 transects were sampled which resulted in the collection of 192 minutes of video footage and 279 corresponding stills. Video and still imagery logs are provided in Appendix I and II.

3.3. EUNIS Habitats

A total of eight EUNIS habitats and biotopes were observed during the survey (Table 4 and Plate 2). The most frequently observed biotope was EUNIS Level 4 'A5.34 - Infralittoral fine mud', which was present across large parts of the survey area with the EUNIS Level 5 biotope 'A5.343 - *Philine aperta* and *Virgularia mirabilis* in soft stable infralittoral mud' often recorded within these areas. The EUNIS Level 5 biotope was assigned only when there was *V. mirabilis* and / or *P. aperta* observed or where there was notable burrowing in the sediment. Other sediment habitats recorded were 'A5.13 – Infralittoral coarse sediment' and 'A5.43 – Infralittoral mixed sediments' including 'A5.521 - *Laminaria saccharina*³ and red seaweeds on infralittoral sediments' - the dominant biotope recorded at the transition zone from mud habitat to rock habitat out from Newry Beach.

Rock habitats were restricted to the southern extent of transects on the sublittoral / littoral fringe zone of Newry Beach. Habitats noted included 'A3.3 - Atlantic and Mediterranean low energy infralittoral rock', 'A1.31 – Fucoids on sheltered marine shores' and the most commonly recorded 'A3.31 – Silted kelp on low energy infralittoral rock with full salinity'.

Fauna were relatively sparse within the soft sediment areas. Brittlestars (*Ophiuroid* sp.), gobies (*Pomatoschistus* sp.), hermit crabs (*Paguridae*) and small aggregations of the ascidian, *Asciella aspersa* were recorded. Mud habitats were also characterised by the presence of burrows and evidence of bioturbation and faunal tracks. Biological communities on hard

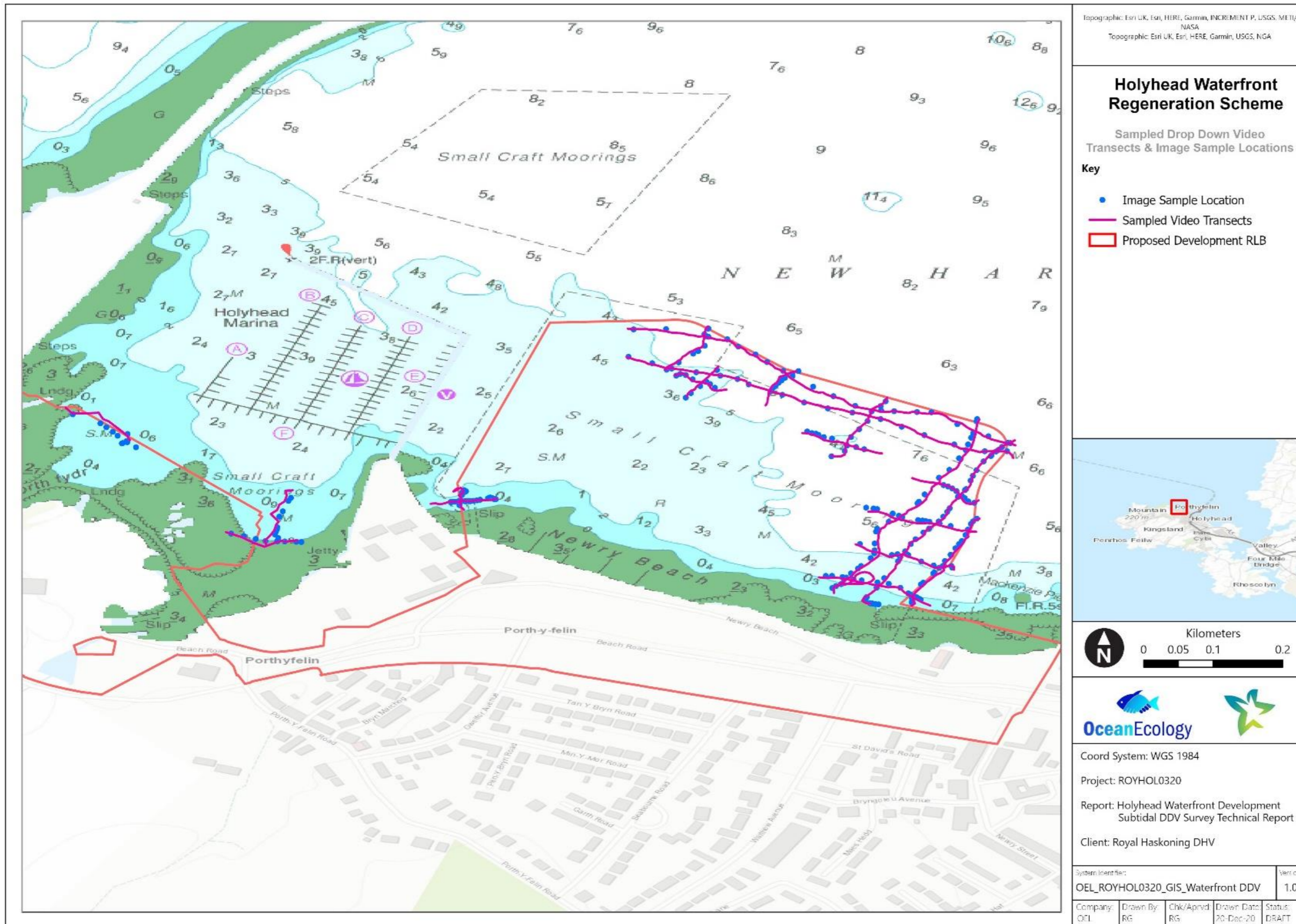
³ *Saccharina latissima* previously known as *Laminaria saccharina*.

substrate / rock habitats were dominated by algae and kelp species including *S. latissima*, filamentous and foliose red seaweeds with occasional patches of the green algae (*Ulva* sp.). Some areas in the shallowest sections of Transect 006 and 007, considered to extend into the intertidal were dominated by the furoid, *F. serratus*. The grazing gastropod (*Gibbula* sp.) and the spirorbid worms (Spirorbidae) were often recorded on kelp fronds.

Observed habitats and biotopes are presented in Table 3 and Plate 2 and summary DDV transect descriptions with EUNIS classifications is provided in Table 4. Distribution and classification of EUNIS habitats and biotopes are presented spatially in Figure 4 and Figure 5.

Table 3 Summary of the EUNIS classifications assigned during the Holyhead Waterfront Regeneration Scheme DDV survey, 2020.

BSH	EUNIS Classification
A1.3	A1.31 - Furoids on sheltered marine shores
A3.3	A3.3 - Atlantic and Mediterranean low energy infralittoral rock A3.31 - Silted kelp on low energy infralittoral rock with full salinity
A5.1	A5.13 - Infralittoral coarse sediment
A5.3	A5.34 - Infralittoral fine mud A5.343 - <i>Philine aperta</i> and <i>Virgularia mirabilis</i> in soft stable infralittoral mud
A5.4	A5.43 - Infralittoral mixed sediments
A5.5	A5.521 - <i>Laminaria saccharina</i> and red seaweeds on infralittoral sediments



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Figure 3 Sampled DDV transects and still sample locations within the Proposed Development survey area.

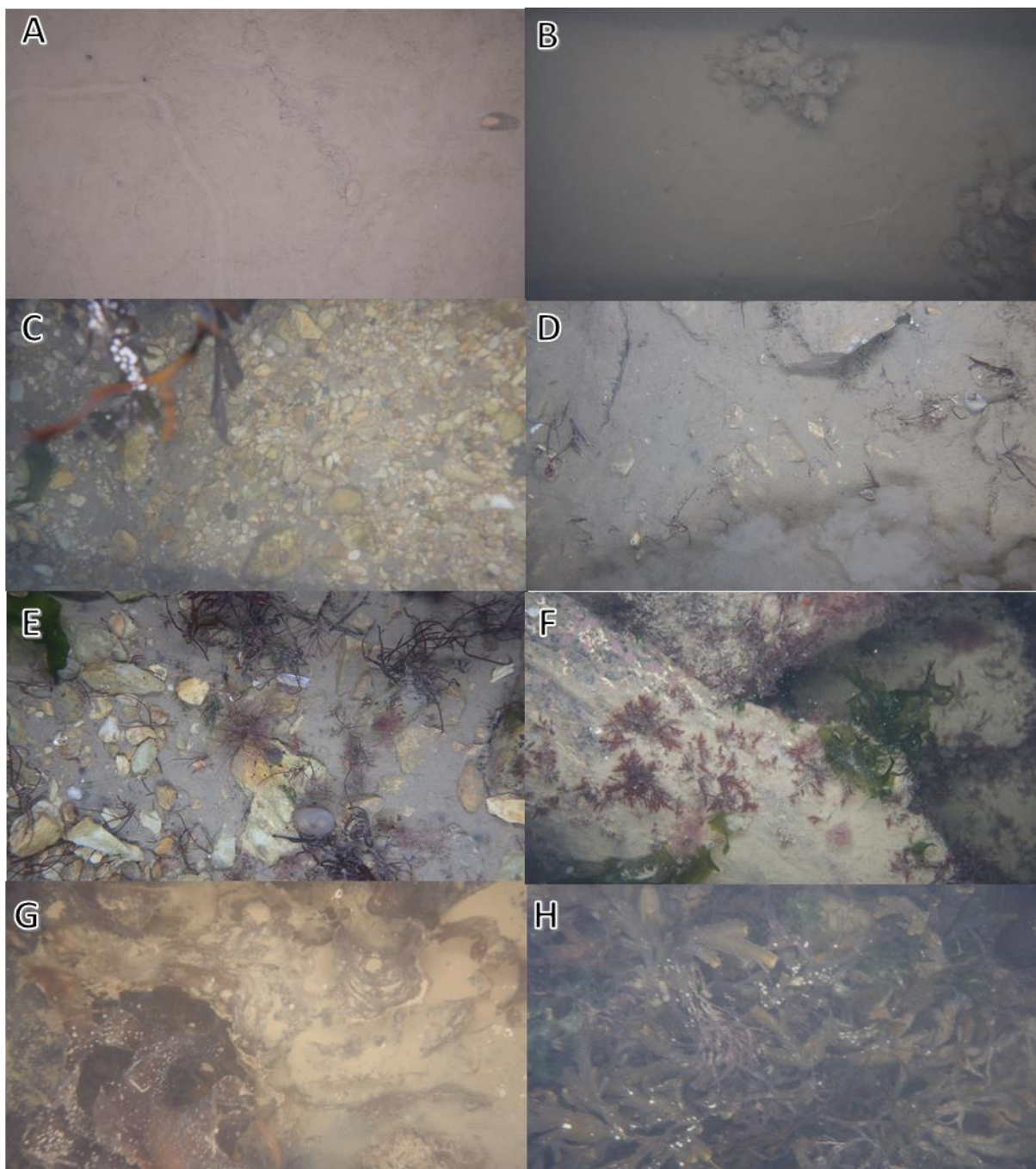


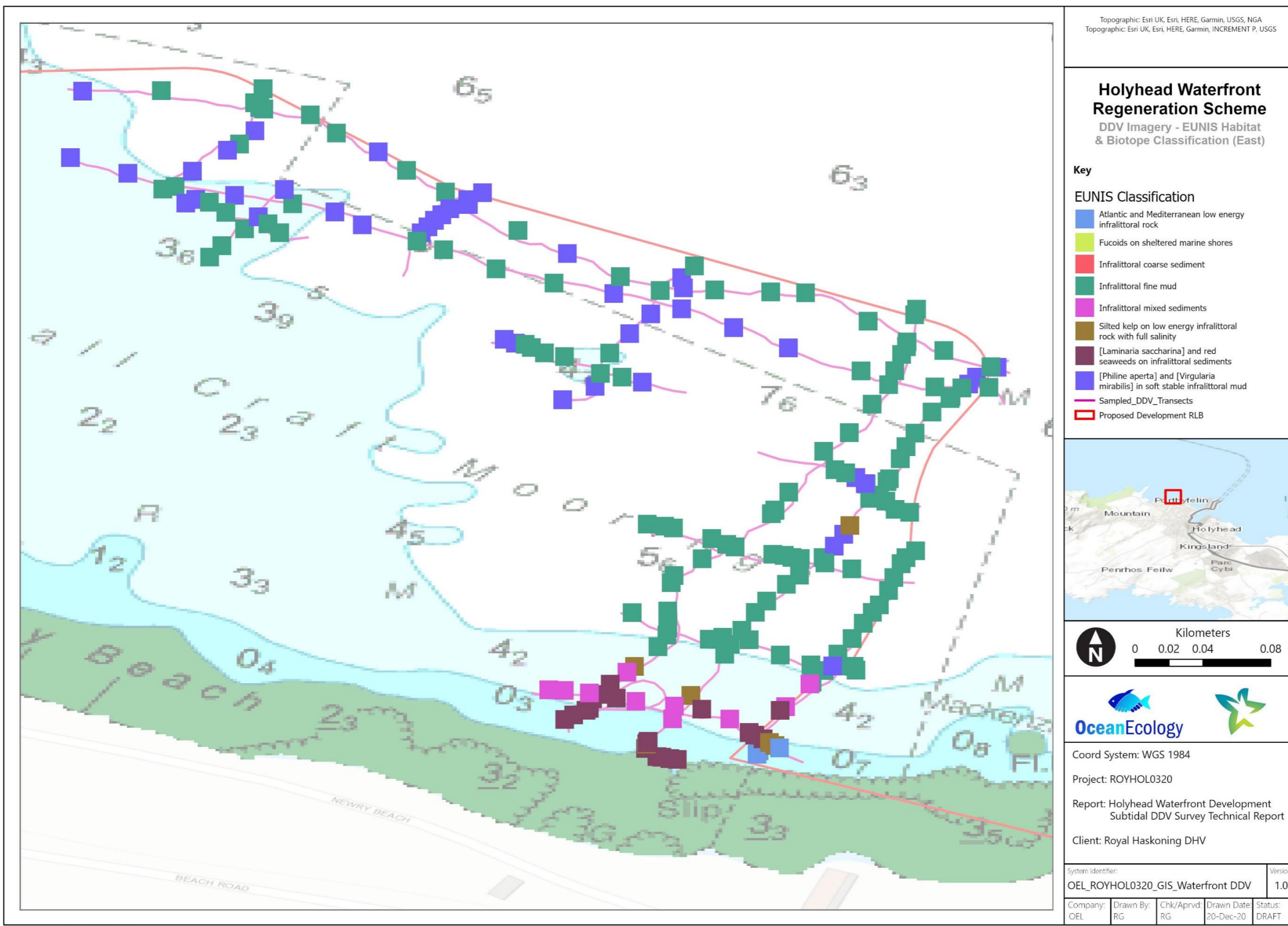
Plate 2 Example still images of EUNIS habitats and biotopes observed in the Proposed Development survey area. A) A5.343 - *Philine aperta* and *Virgularia mirabilis* in soft stable infralittoral mud B) A5.34 - Infralittoral fine mud (showing aggregated clumps of *A. aspersa*) C) A5.13 - Infralittoral coarse sediment D) A5.43 - Infralittoral mixed sediments E) A5.521 - *Laminaria saccharina* and red seaweeds on infralittoral sediments F) A3.3 - Atlantic and Mediterranean low energy infralittoral rock G) A3.31 - Silted kelp on low energy infralittoral rock with full salinity H) A1.31 - Fucoids on sheltered marine shores (intertidal biotope).

Table 4 Summary of DDV transect data including EUNIS classifications assigned during the Holyhead Waterfront Regeneration Scheme DDV survey, 2020.

Transect	Video File	Point on Line	Video Coordinates		Length m	No. of Stills Analysed	EUNIS Description(s)	Fauna / Bioturbation / Debris	Annex I Reef?	Habitat FOCI	V. mirabilis	INNS
			Easting m	Northing m								
001	ROYHOL0320_ROV_001_06_08_20	SOL	390355.2	5909098.4	15	3	A5.34 - Infralittoral fine mud	No visible fauna observed. Some fishing gear - pots.	No	No	No	No
		EOL	390350.1	5909084.9								
002	Not Sampled	SOL	-	-	-	-	-	-	-	-	-	No
		EOL	-	-								
003	ROYHOL0320_ROV_003_06_08_20	SOL	390302.9	5909137.7	73	8	A5.34 - Infralittoral fine mud A5.43 - Infralittoral mixed sediments	Sparse visible fauna with small clumps of <i>Ascidella aspersa</i> . Faunal tracks. Ships anchor.	No	No	No	No
		EOL	390362.0	5909079.0								
004	ROYHOL0320_ROV_004_06_08_20	SOL	390495.1	5909015.0	83	8	A5.34 - Infralittoral fine mud	Sparse visible fauna with Paguridae. Faunal tracks. Mooring debris (ropes / ground lines) and some plastic litter (bucket lid).	No	No	No	No
		EOL	390470.5	5908935.1								
005	ROYHOL0320_ROV_005_06_08_20	SOL	390435.9	5908956.7	50	10	A5.34 - Infralittoral fine mud A5.343 - <i>Philine aperta</i> and <i>Virgularia mirabilis</i> in soft stable infralittoral mud	No visible fauna observed. Notable bioturbation of the sediment, faunal tracks and burrows.	No	No	Yes	No
		EOL	390500.7	5908940.4								
006	ROYHOL0320_DDV_006_29_11_20_0879	SOL	390668.3	5908998.0	57	22	A1.31 - Fucooids on sheltered marine shores A3.3 - Atlantic and Mediterranean low energy infralittoral rock A3.31 - Silted kelp on low energy infralittoral rock with full salinity A5.13 - Infralittoral coarse sediment A5.43 - Infralittoral mixed sediments A5.521 - <i>Laminaria saccharina</i> and red seaweeds on infralittoral sediments	Bedrock and boulder dominated by silted <i>Saccharina latissima</i> and foliose / filamentous red algae and occasional patch of coralline algae on rock surface. Dense <i>Fucus serratus</i> colonising rock / artificial substrate (slipway). Coarse / mixed sediments with sparse / no visible mobile fauna.	Yes	No	No	No
		EOL	390629.5	5908994.7								
007	ROYHOL0320_DDV_007_29_11_20_0903	SOL	390642.9	5909009.7	28	15	A1.31 - Fucooids on sheltered marine shores A3.31 - Silted kelp on low energy infralittoral rock with full salinity A5.13 - Infralittoral coarse sediment A5.34 - Infralittoral fine mud A5.43 - Infralittoral mixed sediments A5.521 - <i>Laminaria saccharina</i> and red seaweeds on infralittoral sediments	Bedrock and boulder dominated by silted <i>Saccharina latissima</i> and foliose / filamentous red algae and occasional patch of coralline algae on rock surface. Grazing gastropods (<i>Gibbula</i> sp.) on <i>S. latissima</i> . Dense <i>Fucus serratus</i> colonising rock / artificial substrate (slipway). Coarse / mixed sediments with sparse / no visible mobile fauna.	Yes	No	No	No
		EOL	390637.1	5908990.2								
008	No video	SOL	-	-	275	31	A3.31 - Silted kelp on low energy infralittoral rock with full salinity A5.34 - Infralittoral fine mud A5.43 - Infralittoral mixed sediments A5.521 - <i>Laminaria saccharina</i> and red seaweeds on infralittoral sediments	Soft sediment habitat with sparse fauna - <i>Ophiura</i> sp., occasional <i>Pomatoschistus</i> sp. and clumps of <i>Ascidella aspersa</i> . Mixed / coarse sediments with cobble colonised by <i>Saccharina latissima</i> and filamentous red algae, occasional clumps of <i>A. aspersa</i> and grazing gastropods (<i>Gibbula</i> sp.) Bioturbation of the sediment and faunal tracks. Some plastic litter (wrapper).	Yes	No	No	No
		EOL	-	-								

009	ROYHOL0320_DDV_009_29_11_20_0806	SOL	390992.5	5908839.8	263	34	A3.31 - Silted kelp on low energy infralittoral rock with full salinity A5.34 - Infralittoral fine mud A5.43 - Infralittoral mixed sediments A5.343 - <i>Philine aperta</i> and <i>Virgularia mirabilis</i> in soft stable infralittoral mud A5.521 - <i>Laminaria saccharina</i> and red seaweeds on infralittoral sediments	Soft sediment habitat with sparse fauna - <i>Ophiura</i> sp., occasional <i>Virgularia mirabilis</i> , <i>Pomatoschistus</i> sp. and clumps of <i>Ascidella aspersa</i> . Rock colonised by <i>Saccharina latissima</i> and foliose / filamentous red algae, occasional clumps of <i>A. aspersa</i> and grazing gastropods (<i>Gibbula</i> sp.). Notable bioturbation of the sediment, faunal tracks and burrows. Fishing gear - rope.	Yes	No	Yes	No
		EOL	391110.6	5909068.0								
010	ROYHOL0320_DDV_010_29_11_20_0784	SOL	391079.4	5908960.6	136	20	A3.3 - Atlantic and Mediterranean low energy infralittoral rock A3.31 - Silted kelp on low energy infralittoral rock with full salinity A5.34 - Infralittoral fine mud A5.43 - Infralittoral mixed sediments A5.521 - <i>Laminaria saccharina</i> and red seaweeds on infralittoral sediments	Soft sediment habitat with sparse fauna - <i>Ophiura</i> sp., occasional <i>Pomatoschistus</i> sp., <i>Philine aperta</i> / <i>Haminoea</i> sp. and clumps of <i>Ascidella aspersa</i> . Rock colonised by <i>Saccharina latissima</i> and foliose / filamentous red algae, occasional green algae (<i>Ulva</i> sp.) and Coralline algae on rock surface. Faunal tracks.	Yes	No	No	No
		EOL	391020.7	5908842.2								
011	ROYHOL0320_DDV_011_29_11_20_0767	SOL	390948.1	5908881.8	105	14	A3.3 - Atlantic and Mediterranean low energy infralittoral rock A3.31 - Silted kelp on low energy infralittoral rock with full salinity A5.43 - Infralittoral mixed sediments A5.521 - <i>Laminaria saccharina</i> and red seaweeds on infralittoral sediments	Rock / cobble dominated by foliose / filamentous red algae, <i>Saccharina latissima</i> and clumps of <i>Ascidella aspersa</i> . Grazing gastropods (<i>Gibbula</i> sp.) and individual <i>Pecten maximus</i> .	Yes	No	No	No
		EOL	391028.7	5908845.7								
012	ROYHOL0320_DDV_012_29_11_20_0753	SOL	391056.7	5908890.9	92	12	A5.34 - Infralittoral fine mud A5.343 - <i>Philine aperta</i> and <i>Virgularia mirabilis</i> in soft stable infralittoral mud	Soft sediment habitat with sparse fauna - <i>Ophiura</i> sp., occasional <i>Virgularia mirabilis</i> , <i>Pomatoschistus</i> sp. and clumps of <i>Ascidella aspersa</i> . Notable bioturbation of the sediment, faunal tracks and burrows.	No	No	Yes	No
		EOL	390978.6	5908926.5								
013	ROYHOL0320_DDV_013_29_11_20_0739	SOL	390985.1	5908978.5	98	11	A5.34 - Infralittoral fine mud	No visible fauna observed. Faunal tracks.	No	No	No	No
		EOL	391056.6	5908950.5								
014	ROYHOL0320_DDV_014_29_11_20_0728	SOL	391077.8	5908983.4	65	9	A5.34 - Infralittoral fine mud A5.343 - <i>Philine aperta</i> and <i>Virgularia mirabilis</i> in soft stable infralittoral mud	Soft sediment habitat with sparse fauna - <i>Ophiura</i> sp. Notable bioturbation of the sediment, faunal tracks and burrows.	No	No	Yes	No
		EOL	391052.0	5909009.0								
015	ROYHOL0320_DDV_015_A_29_11_20_0631 ROYHOL0320_DDV_015_B_29_11_20_0631	SOL	391107.5	5909056.3	360	18	A5.34 - Infralittoral fine mud A5.343 - <i>Philine aperta</i> and <i>Virgularia mirabilis</i> in soft stable infralittoral mud	Soft sediment habitat with sparse fauna - <i>Ophiura</i> sp., occasional <i>Pomatoschistus</i> sp., <i>Philine aperta</i> / <i>Haminoea</i> sp. and clumps of <i>Ascidella aspersa</i> and <i>Ciona intestinalis</i> . Notable bioturbation of the sediment, faunal tracks and burrows.	No	No	Yes	No
		EOL	390917.0	5909141.6								
		SOL	390888.6	5909157.0								
		EOL	390786.6	5909198.9								
016	ROYHOL0320_DDV_016_A_29_11_20_0608 ROYHOL0320_DDV_016_B_29_11_20_0608	SOL	390791.8	5909237.9	370	20	A5.34 - Infralittoral fine mud A5.343 - <i>Philine aperta</i> and <i>Virgularia mirabilis</i> in soft stable infralittoral mud	Soft sediment habitat with sparse fauna - <i>Ophiura</i> sp., occasional <i>Pomatoschistus</i> sp., <i>Philine aperta</i> / <i>Haminoea</i> sp. and clumps of <i>Ascidella aspersa</i> . Notable bioturbation of the sediment, faunal tracks and burrows.	No	No	Yes	No
		EOL	390978.9	5909124.4								
		SOL	391001.0	5909117.2								
		EOL	391108.4	5909068.3								

017	ROYHOL0320_DDV_017_29_11_20_0696	SOL	390952.6	5909051.2	95	9	A5.34 - Infralittoral fine mud A5.343 - <i>Philine aperta</i> and <i>Virgularia mirabilis</i> in soft stable infralittoral mud	Soft sediment habitat with sparse fauna - <i>Ophiura</i> sp., occasional <i>Pomatoschistus</i> sp., <i>Philine aperta</i> / <i>Haminoea</i> sp. and clumps of <i>Asciella aspersa</i> . Notable bioturbation of the sediment, faunal tracks and burrows.	No	No	Yes	No
		EOL	391005.2	5909130.1								
018	ROYHOL0320_DDV_018_29_11_20_0687	SOL	390937.1	5909088.4	75	8	A5.34 - Infralittoral fine mud A5.343 - <i>Philine aperta</i> and <i>Virgularia mirabilis</i> in soft stable infralittoral mud	Soft sediment habitat with sparse fauna - <i>Ophiura</i> sp., occasional <i>Virgularia mirabilis</i> and <i>Pomatoschistus</i> sp. Occasional clumps of <i>Asciella aspersa</i> . Notable bioturbation of the sediment, faunal tracks and burrows.	No	No	Yes	No
		EOL	390985.2	5909062.1								
019	ROYHOL0320_DDV_019_29_11_20_0677	SOL	390931.5	5909174.9	58	8	A5.34 - Infralittoral fine mud A5.343 - <i>Philine aperta</i> and <i>Virgularia mirabilis</i> in soft stable infralittoral mud	Soft sediment habitat with sparse fauna - <i>Ophiura</i> sp., occasional <i>Virgularia mirabilis</i> , <i>Pomatoschistus</i> sp., <i>Philine aperta</i> / <i>Haminoea</i> sp. and clumps of <i>Asciella aspersa</i> . Notable bioturbation of the sediment, faunal tracks and burrows.	No	No	Yes	No
		EOL	390907.7	5909147.0								
020	ROYHOL0320_DDV_020_29_11_20_0660	SOL	390834.3	5909139.2	52	5	A5.34 - Infralittoral fine mud A5.343 - <i>Philine aperta</i> and <i>Virgularia mirabilis</i> in soft stable infralittoral mud	Soft sediment habitat with sparse fauna - occasional <i>Philine aperta</i> / <i>Haminoea</i> sp. Notable bioturbation of the sediment, faunal tracks and burrows.	No	No	Yes	No
		EOL	390861.6	5909178.4								
021	ROYHOL0320_DDV_021_29_11_20_0652	SOL	390826.7	5909171.2	48	6	A5.34 - Infralittoral fine mud A5.343 - <i>Philine aperta</i> and <i>Virgularia mirabilis</i> in soft stable infralittoral mud	Soft sediment habitat with sparse fauna - <i>Ophiura</i> sp., occasional <i>Virgularia mirabilis</i> and clumps of <i>Asciella aspersa</i> . Notable bioturbation of the sediment, faunal tracks and burrows.	No	No	Yes	No
		EOL	390859.4	5909153.0								
022	ROYHOL0320_DDV_022_29_11_20_0667	SOL	390855.4	5909237.7	72	8	A5.34 - Infralittoral fine mud A5.343 - <i>Philine aperta</i> and <i>Virgularia mirabilis</i> in soft stable infralittoral mud	Soft sediment habitat with sparse fauna - <i>Ophiura</i> sp., occasional <i>Virgularia mirabilis</i> and clumps of <i>Asciella aspersa</i> . Notable bioturbation of the sediment, faunal tracks and burrows.	No	No	Yes	No
		EOL	390818.8	5909179.6								



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Figure 4 Distribution and classification of EUNIS habitats and biotopes during the Holyhead Waterfront Regeneration Scheme DDV survey, 2020 (East).

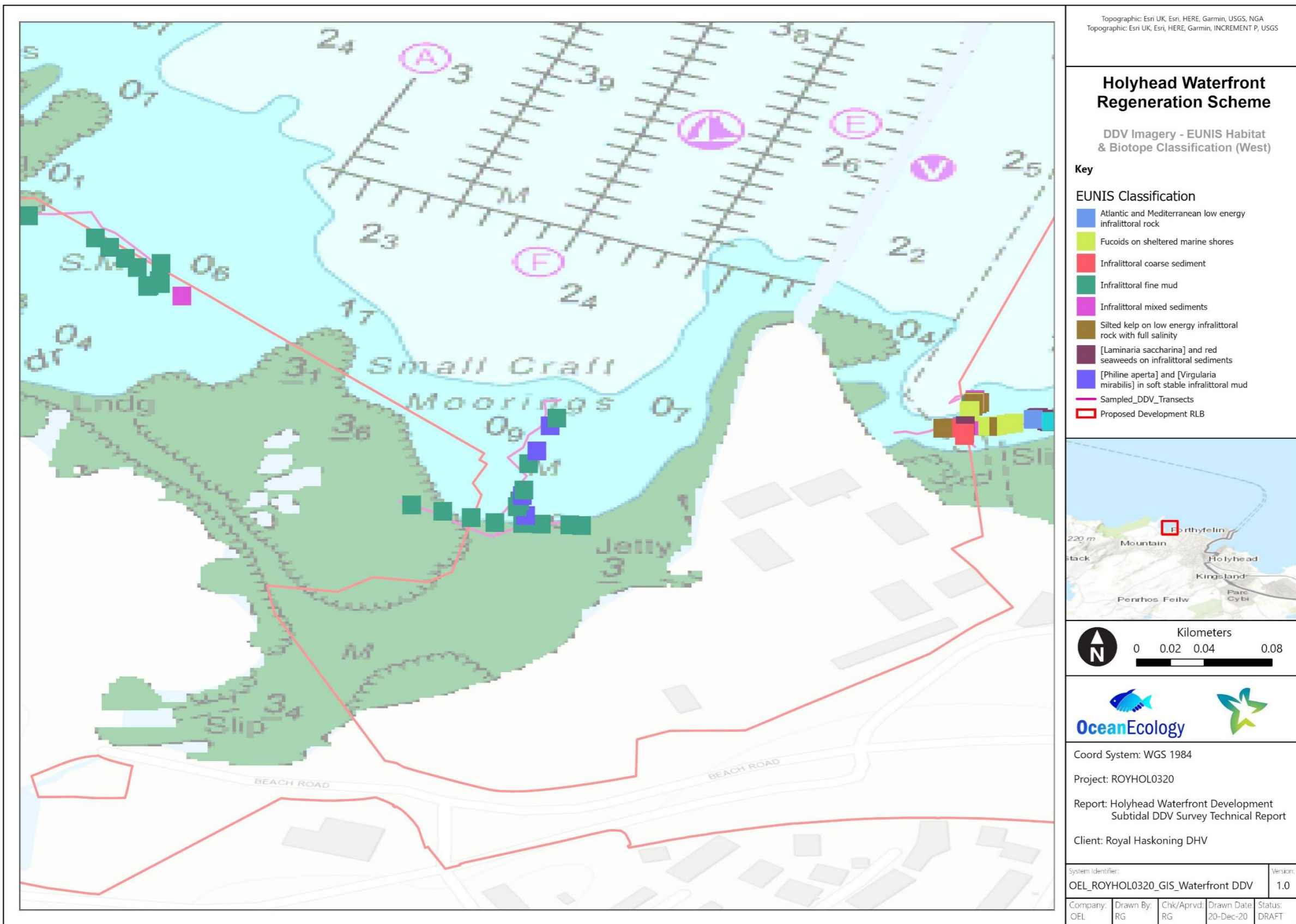


Figure 5 Distribution and classification of EUNIS habitats and biotopes during the Holyhead Waterfront Regeneration Scheme DDV survey, 2020 (West).

3.4. Notable Features

3.4.1. Sublittoral Rock Habitats

Sublittoral rock habitats were recorded in six of the 21 transects surveyed (Transects 006 – 011). Sublittoral rock habitats were restricted to the nearshore, shallow water areas adjacent to Newry Beach in the east of the survey area with no notable areas of rock habitat identified any other transects. Occasional observations of kelp and / or algae attached to hard substrate were attributed to colonisation of mooring infrastructure rather than outcropping bedrock or stony reef habitats.

In the shallow infralittoral / littoral zone, rock habitats characteristic of 'A3.31 - Silted kelp on low energy infralittoral rock with full salinity' were observed and characterised by the kelp species (*S. latissima*) and filamentous / foliose red seaweeds. Fauna was sparse and limited to the grazing gastropod (*Gibbula* sp.) and spirorbid worms (Spirorbidae), often recorded on kelp fronds. Some rock habitats (A3.3 - Atlantic and Mediterranean low energy infralittoral rock) were characterised by little to no algal cover and fauna was generally sparse. Areas along the shallowest sections of transects running into or adjacent to Newry beach, considered to be intertidal were dominated by the lower littoral furoid, *F. serratus* and characteristic of the biotope 'A1.31 - Fucoids on sheltered marine shores'. This included the lower section of the Holyhead Yacht Club slipway which intersected Transect 006 and 007.

All rock habitats observed were deemed to represent Annex I 'Reef' habitat and were predominantly representative of the Annex I 'stony reef' habitat composed of stable cobble and boulder. As expected, no observations of Annex I biogenic reef forming species such as Ross worm (*Sabellaria spinulosa*) or horse mussel (*Modiolus modiolus*) were recorded.

Examples of rock habitats recorded are presented in Plate 3 and mapped spatially in Figure 6 and Figure 7.

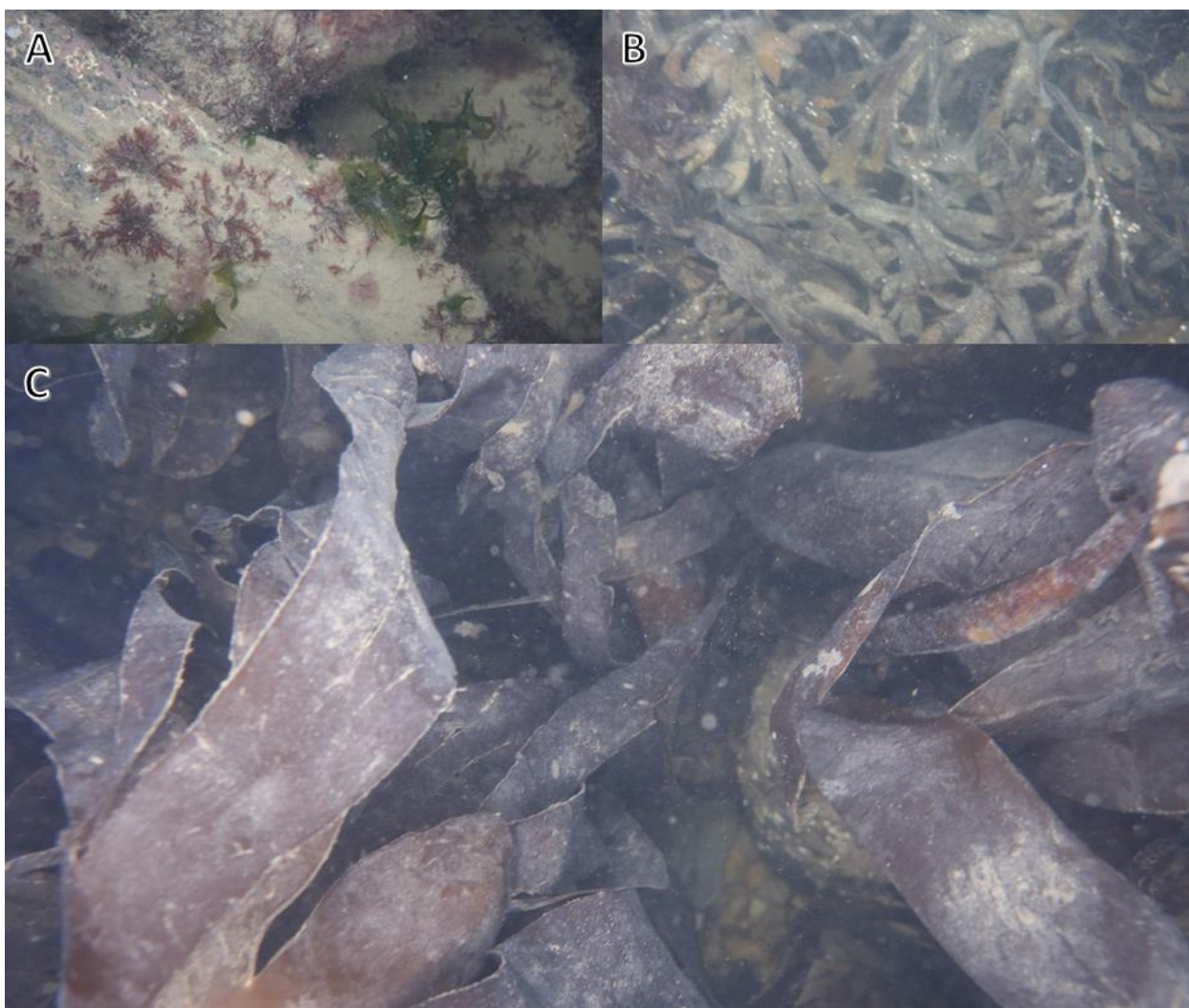


Plate 3 Example imagery of sublittoral rock habitats recorded. A) A3.3 - Atlantic and Mediterranean low energy infralittoral rock B) A1.31 - Fucoids on sheltered marine shores C) A3.31 - Silted kelp on low energy infralittoral rock with full salinity.

3.4.2. Kelp and Seaweed Communities on Sublittoral Sediment

The biotope 'A5.52 - Kelp and seaweed communities on sublittoral sediment' was recorded in six of the 21 transects surveyed (Transects 006 – 011). Areas of mixed sediments between hard substrate areas and soft mud habitats were characterised by the EUNIS Level 5 biotope 'A5.521 - *Laminaria saccharina* and red seaweeds on infralittoral sediments'. This biotope was restricted to areas between the sublittoral fringe and the soft mud habitats which dominated the sediment type from the charted 5m depth contour. Fauna was generally sparse with low numbers of grazing gastropods (*Gibbula* sp.), chitons and occasional aggregations of the ascidians *A. aspersa* and *C. intestinalis*. Flora was dominated by the kelp *S. latissima* and filamentous / foliose red seaweeds. Example images of EUNIS Level 5 biotope 'A5.521 - *Laminaria saccharina* and red seaweeds on infralittoral sediments' recorded during the DDV survey are provided in Plate 4 and presented spatially in Figure 6 and Figure 7.



Plate 4 Example imagery of EUNIS Level 5 biotope 'A5.521 - *Laminaria saccharina* and red seaweeds on infralittoral sediments' recorded during DDV surveys.

3.4.3. Seapens (*Virgularia mirabilis*)

The seapen (*V. mirabilis*), a characteristic species of the OSPAR habitat 'Seapens and burrowing megafauna communities' was recorded on several DDV transects within the Proposed Development footprint. *V. mirabilis* were recorded in mud habitats exhibiting high levels of burrowing or evidence of bioturbation and often associated with observations of the head-shield slugs, *P. aperta* and / or *Haminoea* sp. The biotope 'A5.343 – *Philine aperta* and *Virgularia mirabilis* in soft stable infralittoral mud' was therefore assigned but only when there was *V. mirabilis* and / or *P. aperta* observed or when there was notable burrowing. Overall, the frequency of individuals recorded in still images was low and whilst it is considered that these seapens can retract into burrows and potentially underrepresented in the video imagery, *V. mirabilis* populations are considered sporadic within the Proposed Development footprint.

Example images of *V. mirabilis* recorded are provided in Plate 5 and presented spatially in Figure 8.

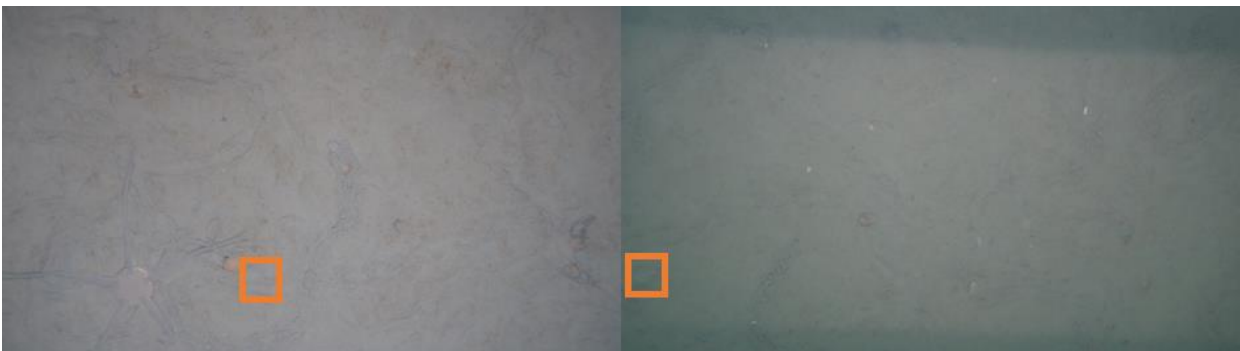
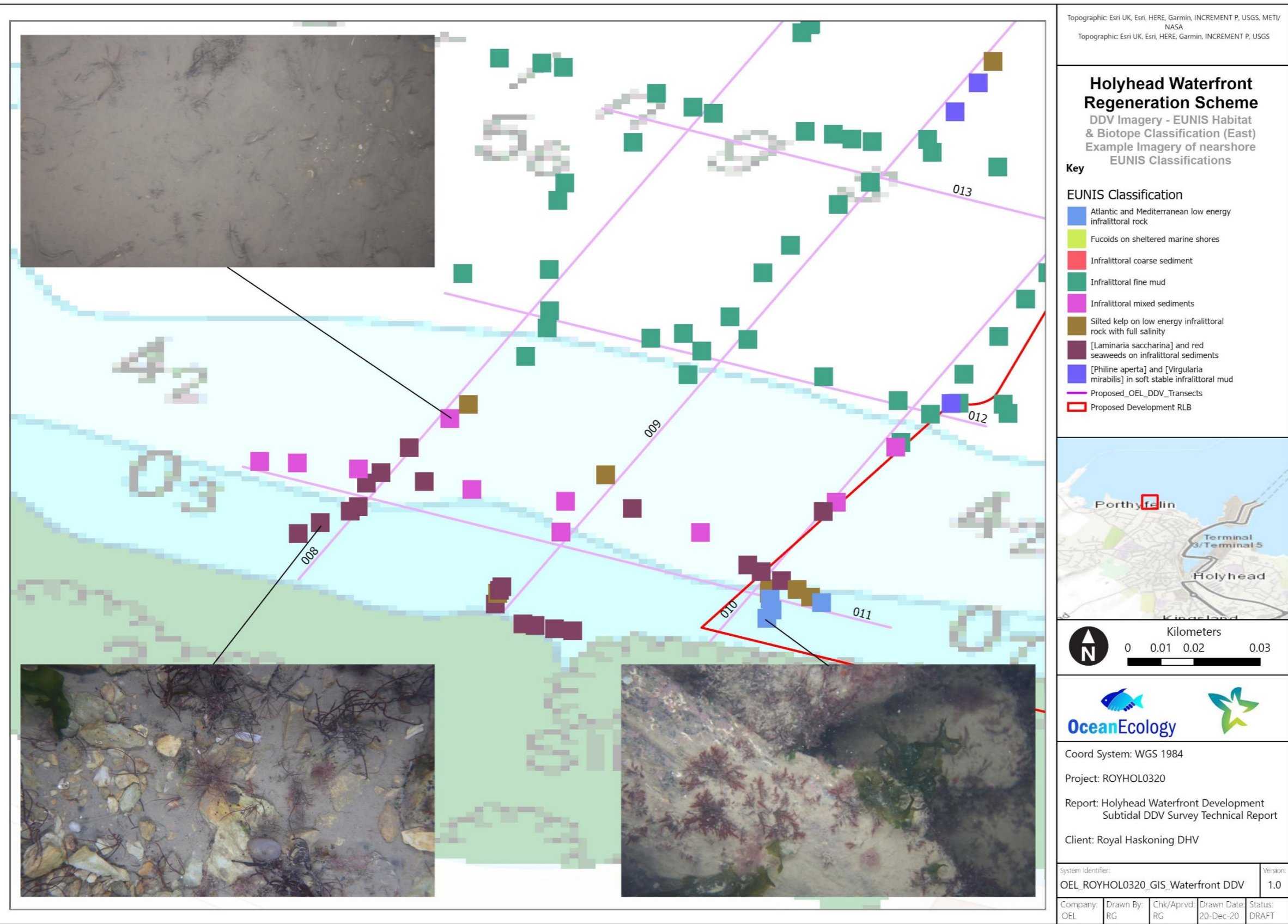


Plate 5 Example imagery of seapens, *Virgularia mirabilis* recorded during DDV surveys.

3.4.4. Invasive Non-Native Species (*Didemnum vexillum*)

There were no INNS (including *D. vexillum*) recorded in the video or still imagery collected along transects sampled within the Proposed Development footprint.



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Figure 6 Distribution and example imagery for nearshore mixed sediment / sublittoral rock habitat EUNIS classifications during the Holyhead Waterfront Regeneration Scheme DDV survey, 2020 (East).

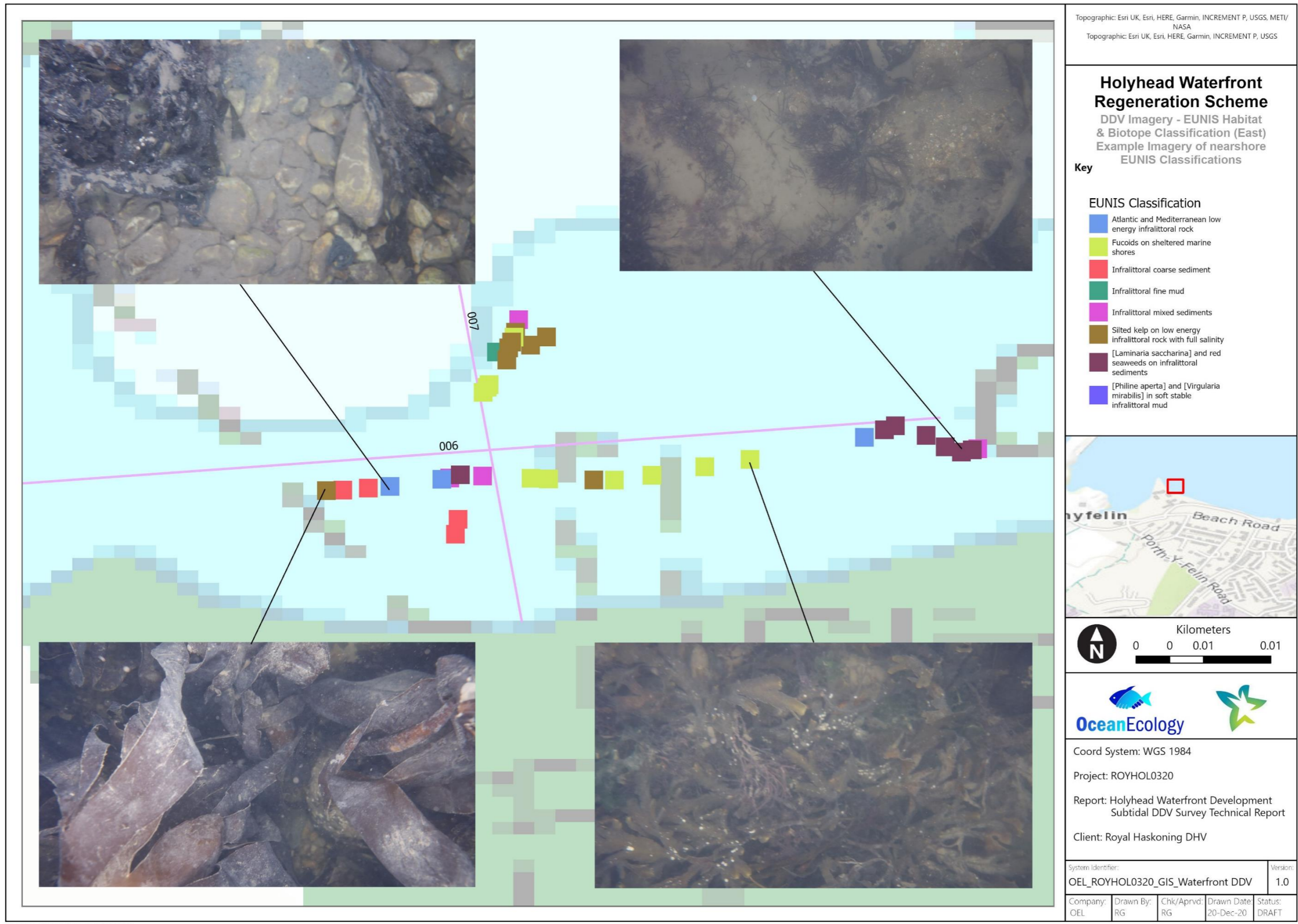
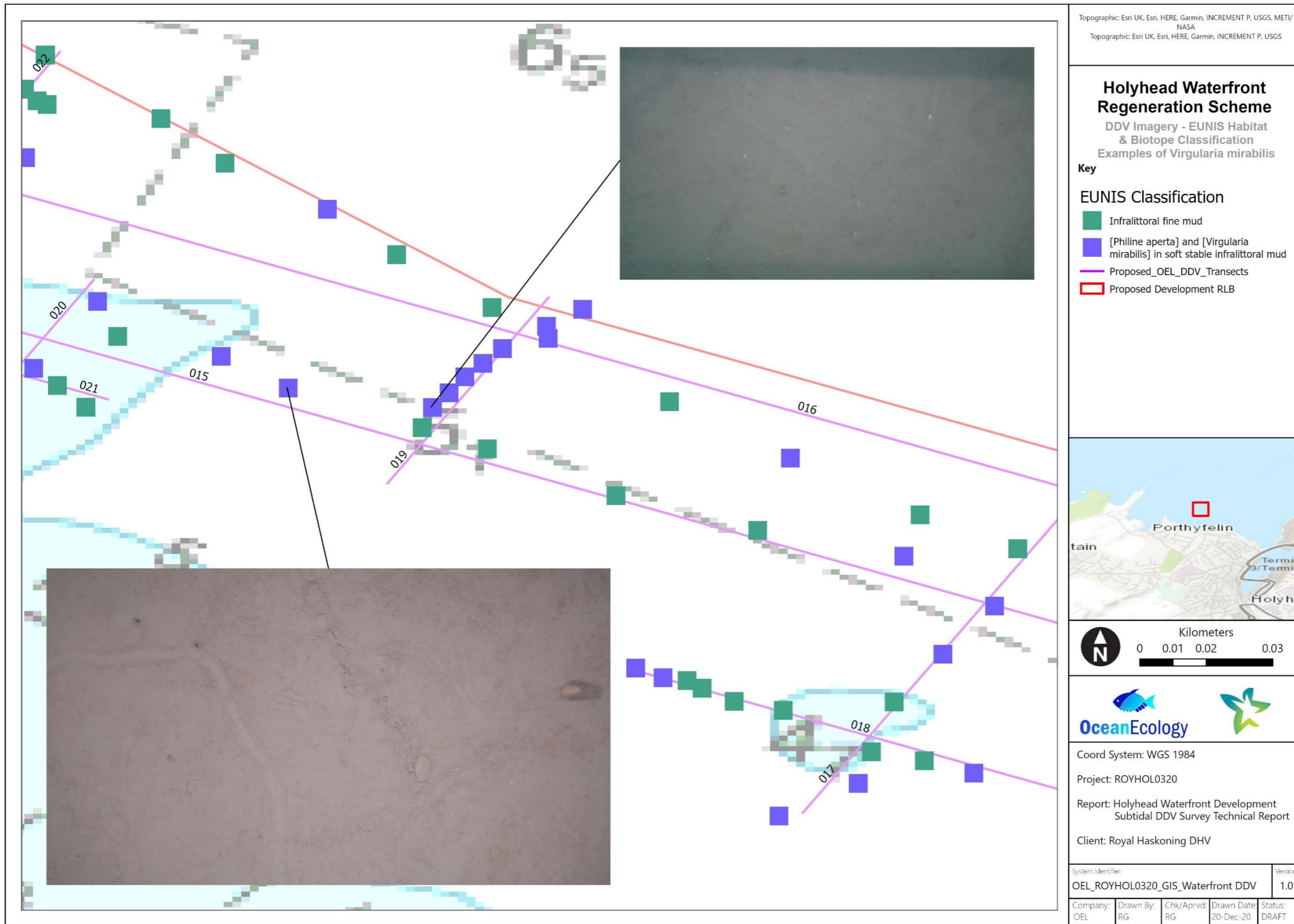


Figure 7 Distribution and example imagery for nearshore mixed sediment / sublittoral rock habitat EUNIS classifications during the Holyhead Waterfront Regeneration Scheme DDV survey, 2020 (West).



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Figure 8 Distribution and classification of EUNIS biotope A5.343 - *Philine aperta* and *Virgularia mirabilis* in soft stable infralittoral mud during the Holyhead Waterfront Regeneration Scheme DDV survey, 2020.

4. Discussion & Conclusions

OEL was commissioned by RHDHV to undertake a DDV survey of the Proposed Development area within Holyhead Harbour. The survey was undertaken through the summer and autumn of 2020 and involved the collection of high-definition video and high-resolution seabed stills along transects using a drop-down camera system. Video and still imagery were collected at 21 of 22 proposed transect locations. Following data collection all images were analysed in the laboratory by experienced marine ecologists who were also present in the field at the time of sampling. This ensured the assessment of the imagery against the project remit was consistent and further informed with in-situ field experience.

On review of the data collected, the objectives of the survey have been met and the presence / absence of notable features within the Proposed Development footprint could be confirmed. Sublittoral rock habitats, characteristic of Annex I 'Reef' habitat were predominantly representative of the Annex I 'stony reef' habitat composed of stable cobble and boulder were restricted to the nearshore, shallow water areas adjacent to Newry Beach, on the sublittoral fringe. Algal communities dominated these rock habitats with silt tolerant species including the kelp, *S. latissima* and filamentous / foliose red seaweeds most prevalent. These algal communities showed an extended range from the rock habitats on the sublittoral fringe into an area of mixed sediment (silted cobbles and pebble) which seemed to form a transition zone between rock habitats and the soft sediment mud habitats further to the north. Areas of mixed sediments were characterised by the '*Laminaria saccharina* and red seaweeds on infralittoral sediments' biotope.

There were no rock habitats identified in the wider survey area, beyond the chartered 5m depth contour which was dominated by the 'Infralittoral Fine Mud' habitat. The slender seapen, *V. mirabilis*, a characteristic species of the OSPAR habitat 'Sea-pen and burrowing megafauna communities was recorded in these mud habitats, although not in significant numbers. *V. mirabilis* was often recorded in association with observations of the head-shield slugs, *P. aperta* and / or *Haminoea* sp. and notable burrowing / bioturbation of the sediment and given the shallow nature of Holyhead Harbour, deemed characteristic of the biotope '*Philine aperta* and *Virgularia mirabilis* in soft stable infralittoral mud'.

There were observations of INNS including the carpet sea squirt, *D. vexillum* made during review of seabed imagery. It must be acknowledged however that interaction with mooring infrastructure including pontoons, jetty's, or mooring lines, upon which *D. vexillum* is known to inhabit, was actively avoided for safety reasons.

5. References

- Coutts, A. D. . (2005). The detection, spread and management of *Didemnum vexillum* in Queen Charlotte Sounds, New Zealand. *Cawthron Report*, 1092, 38.
- Greathead, C.F, Donnan, D.W, Mair, J.M, Saunders, G. . (2007). The sea pens *Virgularia mirabilis*, *Pennatula phosphorea* and *Funiculina quadrangularis*: Distribution and conservation issues in Scottish waters. *Marine Biological Association of the UK*, 87, 1095–1103.
- Griffith, K., Mowat, S., Holt, R.H., Ramsay, K., Bishop, J.D., Lambert, G. & Jenkins, S. R. (2009). First records in Great Britain of the invasive colonial ascidian *Didemnum vexillum* Kott, 2002. *Aquatic Invasions*, 4, 581–590.
- Hitchin, R., Turner, J., & Verling, E. (2015). Epibiota Remote Monitoring from Digital Imagery: Operational Guidelines. *NMBAQC and JNCC*.
- Hoare, R & Wilson, E. H. (1977). Observations on the behaviour and distribution of *Virgularia mirabilis* O.F. Müller (Coelenterata: Pennatulacea) in Holyhead harbour. *Proceedings of the Eleventh European Symposium on Marine Biology*, 329–337.
- Irving, R. (2009). *The identification of the main characteristics of stony reef habitats under the Habitats Directive*. (432).
- Jones, L.A., Hiscock, K. & Connor, D. W. (2000). Marine habitat reviews, a summary of ecological requirements and sensitivity characteristics for the conservation and management of Marine SAC's. *UK Marine SAC's Project Report*, 178.
- Long, D. (2006). BGS detailed explanation of seabed sediment modified folk classification. *Folk*.
- Mercer, T. (2009). *Holyhead Harbour Marine Ecological Surveys - September / October 2009*. 37.
- Parry, M. E. V. (2019). *Guidance on Assigning Benthic Biotopes using EUNIS or the Marine Habitat Classification of Britain and Ireland (Revised 2019)*.
- Stefaniak, Lauren & Zhang, Huan & Gittenberger, Adriaan & Smith, Kirsty & Holsinger, Kent & Lin, Senjie & Whitlatch, R. (2012). Determining the native region of the putatively invasive ascidian *Didemnum vexillum* Kott, 2002. *Journal of Experimental Marine Biology and Ecology*, 422–423. 64–71.
- Turner, J. ., Hitchin, R., Verling, E., & van Rein, H. (2016). *Epibiota remote monitoring from digital imagery: Interpretation guidelines*.
- Valentine PC, Collie JS, Reid RN, Asch RG, Guida VG, B. D. (2007). The occurrence of the colonial ascidian *Didemnum* sp. on Georges Bank gravel habitat - ecological observations and potential effects on groundfish and scallop fisheries. *Journal of Experimental Marine Biology and Ecology*, 342, 179–181.
- Veatch, B. &. (2009). *Holyhead Breakwater Environmental Scoping Report. September 2009*.