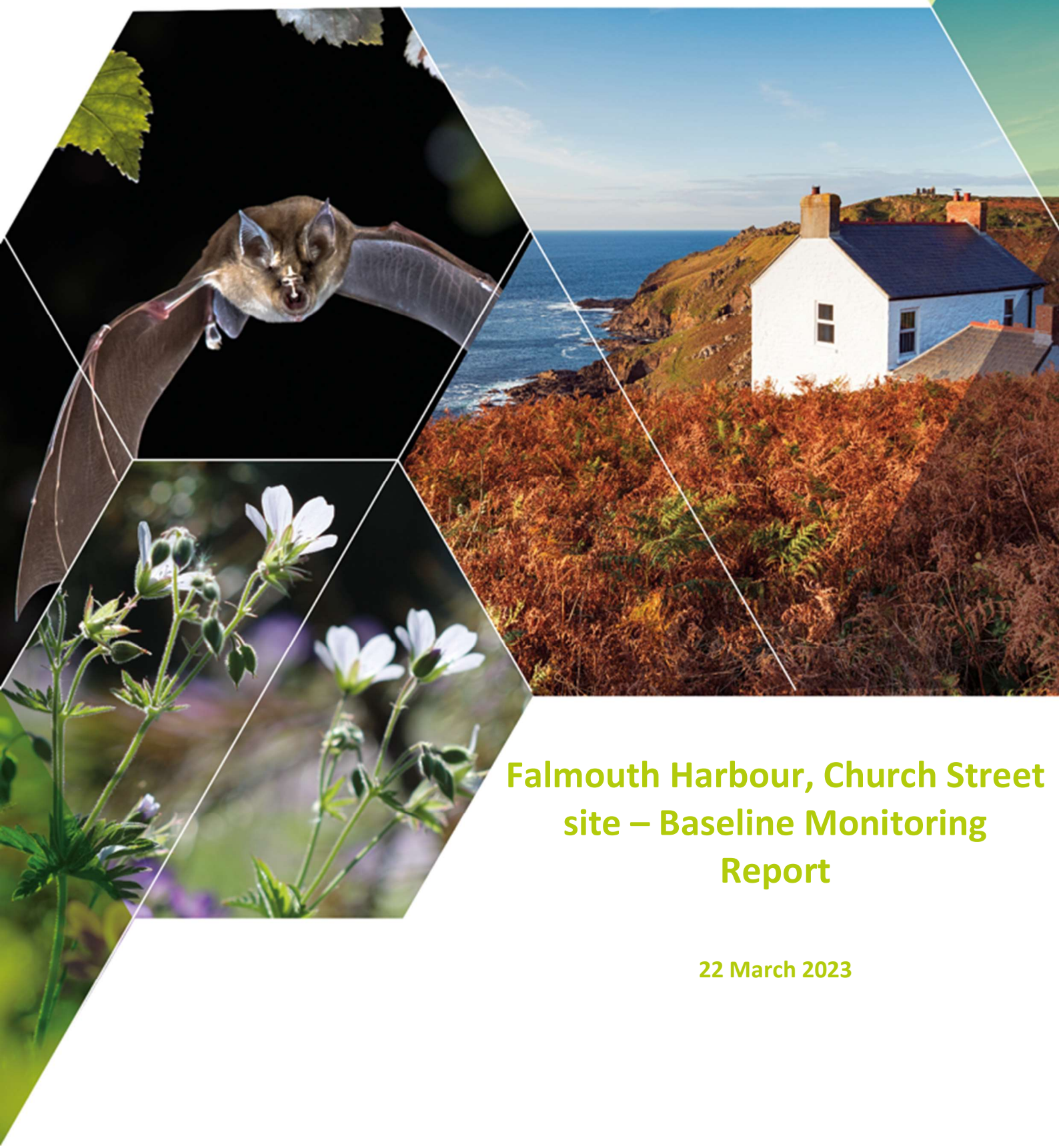
cornwall environmental consultants LTD



Falmouth Harbour, Church Street site – Baseline Monitoring Report

22 March 2023

Revision	Prepared by	Checked by	Approved by
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Disclosure

The information, opinion and advice which we have prepared and provided is true and has been prepared and provided in accordance with the CIEEM's Code of Professional Conduct and the British Standard for Biodiversity – Code of Practice for Planning and Development (2013). We confirm that the opinions expressed are our true and professional bona fide opinions.

Contents

1. Introduction

1.1. Background

1.1.1. Cornwall Environmental Consultants (CEC) Ltd were commissioned by Falmouth Harbour Commissioners in February 2023 to undertake a baseline ecological survey of a small area of intertidal habitat before the installation of up to 14 Arc Marine Reef Cubes (each with a 1m^2 footprint), up to 10 granite blocks on the seabed and the alteration of the South-eastern quay wall of Church Street Car Park in Falmouth by attaching up to 30 living sea wall tiles (each with a 0.3m^2 footprint). The location of the site is shown in

1.1.2.

1.1.3.

1.1.4. Figure 1 below.

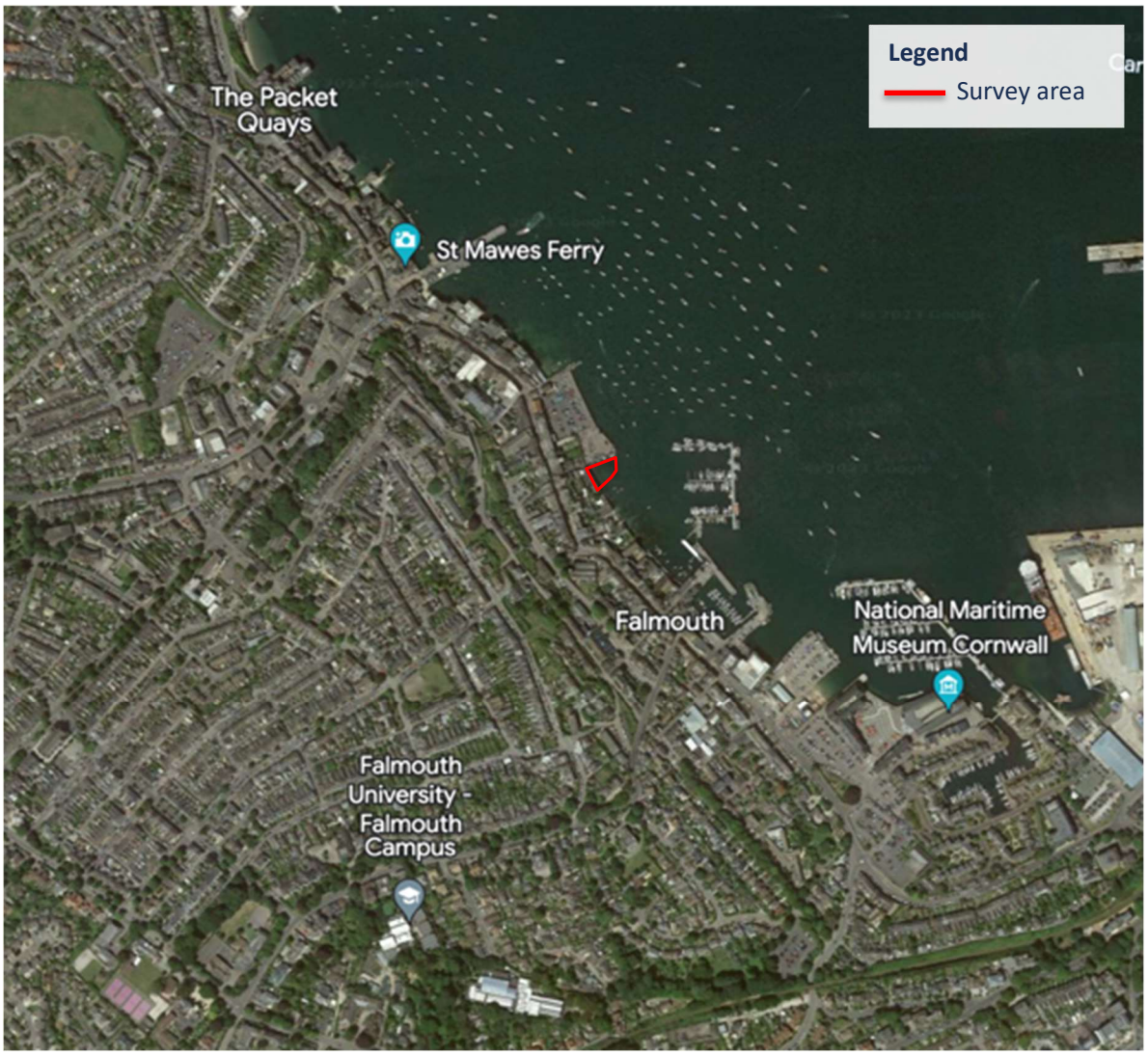

Figure 1: Site location – taken from Google Earth

1.1.5. The c. 0.08ha site (c. 0.09ha with the seawalls included) is within Falmouth, on the south Cornwall coast. The site itself is surrounded by a residential area with mixed-use agricultural fields and hedges across the wider landscape. The site itself is dominated by the marine habitat as it lies adjacent to Carrick Roads, the estuary of the River Fal.

1.1.6. The client has requested the following:

- A walkover survey of the intertidal habitat at low tide (spring)
- During the initial walkover data will be gathered for a BNG calculation, a species list, SACFOR estimations and location of INNS
- Removal of invasive species, where found

- Production of a report with biotope maps of the baseline and changes, an assessment of their ecological value alongside the conclusions for BNG in relation to the siting of the 14 intertidal Marine Reef Cubes and the 30 living sea wall tiles.
- Production of a marine recorder excel sheet of the biotopes found at the site
- A return walkover survey of the intertidal habitat at low tide, 12 months after the reef blocks and living wall tiles have been deployed This will follow in 2024, along with an updated report.

1.1.7. This report has been prepared by Dr Polly Couldrick, who has over thirty years' experience of conducting ecological assessments.

2. Methodology

2.1. Desk Study

2.1.1. The desk study consisted of a search of all existing ecological records within a 0.5km radius of the site to identify notable or protected species/habitats (suitable scope for sites of 1ha or less, CIEEM, 2017) using the information held by the Multi-Agency Geographic Information for the Countryside (MAGIC) mapping tool and the National Biodiversity Network (NBN) Atlas. This data search was conducted on 20th February 2023.

2.2. Field Survey

2.2.1. A walkover site survey was undertaken to identify biotopes present, collect a species list, SACFOR estimations and location of INNS. The condition of biotopes was also assessed for the BNG element of the work. The survey was carried out by Dr Polly Couldrick on 22nd February 2023 with a return visit on 25th February 2023. The survey area included the area that will be lost under the reef blocks and living wall tiles. The weather conditions at the time of the survey were dry, cold with a light wind.

2.2.2. The survey work was carried out in accordance with the following documents:

- Marine Nature Conservation Review (Hiscock, 1996)
- Marine Habitat Classification for Britain and Ireland (JNCC, 2023)
- Biodiversity Metric 3.1 (Panks *et al*., 2022)
- Marine Recorder (JNCC, 2023)

2.3. Biodiversity Net Gain

2.3.1. The baseline Biodiversity Units on site have been measured using in accordance with current guidance and using the DEFRA Biodiversity Metric 3.1.

2.3.2. The baseline calculations were based on information gathered during the site survey on habitat type, extent and condition.

2.3.3. The area of the vertical sea wall was included in the calculations by adding the square meterage of the face of the wall to the total site area.

2.3.4. Strategic significance of land within the site was assessed as being “formally identified in local strategy”, due to the location of the site adjacent to the Fal & Helford Special Area for Conservation.

2.4. Limitations

2.4.1. The conclusions and recommendations presented within this report are based on the current ecological features identified, and the current red line boundary as shown in Figure 1. Ecological features can change over time, particularly if site management/use changes; as a guide it is recommended that this report is valid until March 2024.

2.4.2. The presence of INNS will be an ongoing issue due to the species being ‘seeded’ from habitats outside of the survey area. After the initial removal of INNS on 25th February 2023, it will not be the responsibility of CEC to maintain the survey area of INNS in the future. In addition, INNS are often cryptic species and can easily be missed. Although best endeavours were undertaken to remove INNS, CEC is not responsible for any INNS missed due to their size or cryptic location.

2.4.3. Data from biological records centres or online databases is historical information, and datasets may be incomplete, inaccurate or missing. It is important to note that even where data is held, a lack of records for a defined geographical area does not necessarily mean that the species is absent: the area may simply be under-recorded. Additionally, detailed grid reference locations of European Protected Species (EPS) records may be withheld by record centres / animal recording groups and remain confidential.

2.4.4. Furthermore, not all returned desk study records are listed and discussed in this report, only a discussion of important species, with relevance to the geographic location and the habitat types present within the site, is provided.

3. Baseline Ecological Conditions

3.1. Site Description

3.1.1. The site (Figure 2) is comprised of an area of littoral rock and sediment in front of two perpendicular sea walls. Seawall A is constructed from stone/cobbles while Seawall B is constructed from concrete blocks. The littoral sediment is comprised of sand, shingle, and mixed substrate, some influenced by freshwater.

Figure 2: Site Overview – Seawall A (black dotted line), Seawall B (white dotted line)

3.1.2. A marine biotope map is shown below (Figure 3) and a species list for each biotope is included in Appendix A of this report.

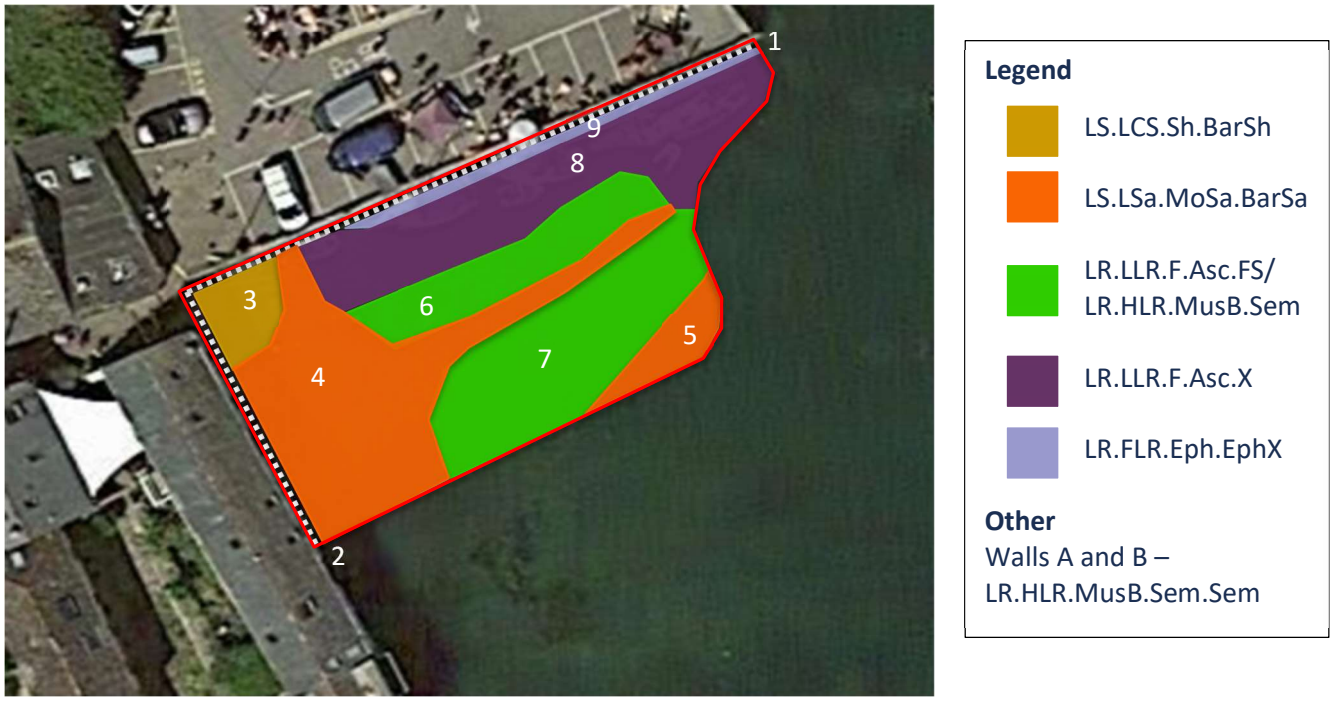

Figure 3: Biotope Map of the Survey Area – Numbers relate to the different polygons of habitat

3.2. Designated Sites

Statutory Designated Sites

3.2.1. The site lies adjacent to the Fal and Helford Special Area of Conservation (SAC). The Fal and Helford SAC has been designated due to the presence of four habitats; Sandbanks which are slightly covered by sea water all the time, Mudflats and sandflats not covered by seawater at low tide, Large shallow inlets and bays and Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*). The SAC has also been designated for the presence of the Shore dock (*Rumex rupestris*).

3.2.2. The habitats or Shore dock listed in the designation of the Fal and Helford SAC are not present at the study site and therefore will not be lost under the footprint of the marine reef cubes of living sea wall tiles.

3.3. Habitats

1 - Sea Wall* – Semibalanus balanoides, Patella vulgata *and* Littorina *spp. on exposed to moderately exposed or vertical sheltered eulittoral rock - LR.HLR.MusB.Sem.Sem

3.3.1. Sea wall 1 is approximately 41m long with a biotope of approximately 1.5m high (i.e. 61.5m^2) and comprised of concrete blocks with mortar between (Figure 4). The biotope at Sea Wall 1 is impoverished with regard to the characterising species (Appendix A), but additional species were observed in the cracks in the concrete blocks which provide additional diversity. The invasive species, the Pacific Oyster (*Magallana gigas*) was present in this biotope (Rare).

2 - Sea Wall* – Semibalanus balanoides, Patella vulgata *and* Littorina *spp. on exposed to moderately exposed or vertical sheltered eulittoral rock - LR.HLR.MusB.Sem.Sem

3.3.2. Sea wall 2 is approximately 17m long with a biotope of approximately 1.5m high (i.e. 25.5m^2) and comprised of stone blocks with gaps between (Figure 5). Bitumen paint covers the top third of the wall. The biotope at Sea Wall 2 is impoverished with regard to the characterising species (Appendix A), but additional species were observed in the cracks of the stonework which provide additional diversity. The invasive species, the Pacific Oyster (*Magallana gigas*) was present in this biotope (Rare).

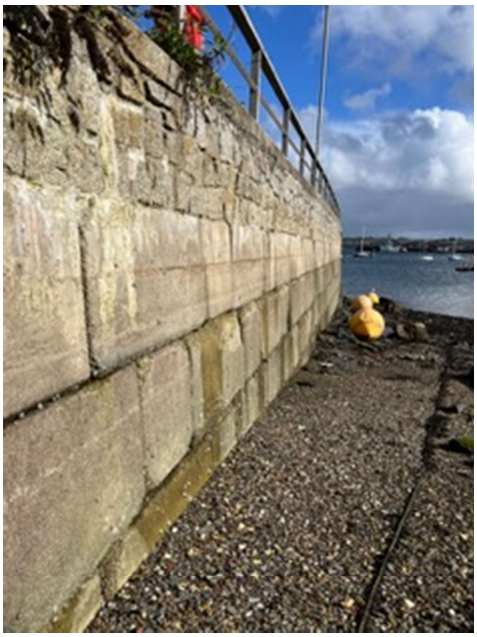

Figure 4: Seawall 1

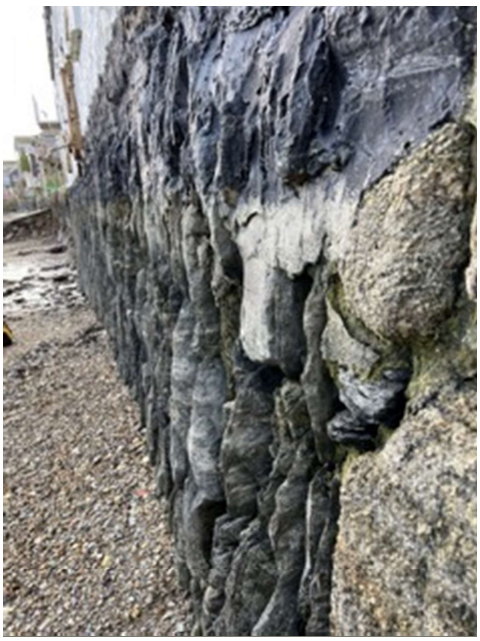

Figure 5: Seawall 2

Polygon 3 - Barren Littoral Shingle – LS.LCS.Sh.BarSh

3.3.3. At the northwest corner of the survey site is approximately 40m^2 of barren shingle. This habitat is typified by a sediment particle size of 4-256mm, with some coarse sand mixed in. This habitat supports virtually no macrofauna due to the freely draining substratum (Tillin *et al*., 2019).

Polygons 4 & 5 - Barren Littoral Coarse Sand – LS.LSa.MoSa.BarSa

3.3.4. Below the barren shingle and across the survey site there is approximately 270m^2 of barren littoral coarse sand (approximately 230m^2 in polygon 4 and 40m^2 in polygon 5) that is occasionally overlaid with shingle (Tillin & Budd, 2016). The barren sand in the survey area did not appear to support any burrowing macrofauna.

Polygons 6 & 7 - Ascophyllum nodosom *on full salinity mid eulittoral rock – LR.LLR.F.Asc.FS,* Semibalanus balanoides *on exposed to moderately exposed or vertical sheltered eulittoral rock – LR.HLR.Mus.Sem*

3.3.5. Across the survey site there is approximately 270m^2 of intertidal rock (approximately 90m^2 in polygon 6 and 180m^2 in polygon 7) dominated by *Ascophyllum nodosum* which is the key structuring species of this biotope (Jenkins *et al.,* 2008, Pocklington, *et al.,* 2018). However, the *A. nodosum* biotope forms a mosaic with areas dominated by barnacles and the limpet *Patella vulgata*. The LR.HLR.Mus.Sem biotope is usually associated with exposed or moderately exposed intertidal areas or can be found on vertical surfaces in sheltered areas. However, in this case the biotope LR.HLR.Mus.Sem is found on horizonal rock platforms. Both biotopes are impoverished, and the species present are less likely to represent the biotope and more likely to be an indication of which species can tolerate the conditions at the site. The invasive species, the Pacific Oyster (*Magallana gigas*) was present in this biotope (Frequent).

Polygon 8* - Ascophyllum nodosum *on full salinity mid eulittoral mixed substrata – LR.LLR.F.Asc.X

3.3.6. To the northern end of the survey site, there is approximately 195m^2 of mixed substrata associated with *A. nodosum*. LR.LLR.F.Asc.X has a reduced number of *A. nodosum* than expected for the sheltered conditions and an increased number of barnacles. The species present are less likely to represent the biotope and more likely to be an indication of which species can tolerate the conditions at the site.

Polygon 9 - Ephemeral green and red seaweeds on variable salinity and/or disturbed eulittoral mixed substrata – LR.FLR.Eph.EphX

3.3.7. Adjacent to Wall A is approximately 25m^2 of mixed substrata that is subject to variable salinity as freshwater flows across the area. LR.FLR.Eph.EphX is usually associated with a low species diversity, however the biotope at the survey site has a diversity of red and green algae as there is no dominance by a single species. The mixed substrata and crevices in the base of the wall provides opprotunities for colonisation of different species.

3.4. Species

Invasive Non-Native

3.4.1. The invasive species, the Pacific Oyster (*Magallana gigas*) was present on Wall A, Wall B, although in low numbers (rare) but was frequent in the biotope mosaic LR.LLR.F.Asc.FS *and* LR.HLR.Mus.Sem. On the 25th February 2023, 153 Pacific Oysters were removed from the survey site.

3.4.2. The desk study found six records of the American Slipper Limpet (*Crepidula fornicata*) and one record of the Wireweed (*Sargassum muticum*) within 0.5km of the survey area. These species were not observed during the walkover site survey.

Other Species

3.4.3. No other notable plant or animal species or species of conservation concern were identified on site.

Birds

3.4.4. The desk study revealed a range of bird species of conservation value have been recorded within 0.5km of the site. All birds are legally protected whilst nesting under the Wildlife & Countryside Act 1981, as amended. The bird records are of differing statutory protection and conservation importance.

3.4.5. In addition, the marine bird species records returned by the desk study all have the potential to forage near the site, although the absence of macrofauna in the sediment means that this site will not support these birds.

Bony Fish

3.4.6. A number of notable fish species are found within 0.5km of the site. These species are highly mobile and are likely to be present in the water adjacent to the site.

4. Predicted BNG Calculation

4.1. Condition Assessment

4.1.1. The condition assessment (Table 1) separates the different biotopes as well as different areas of the same biotope, i.e. the two polygons of Barren Sand – 2 - LS.LSa.MoSa.BarSa and 3 - LS.LSa.MoSa.BarSa (Figure

3). The condition assessment using the BNG calculation (Panks *et al.*, 2022) identifies the majority of the biotopes as good condition with two biotopes (the mosaic of LR.LLR.F.Asc.FS/LR.HLR.MusB.Sem and LR.FLR.Eph.EphX) as moderate condition.

Table 1 – Condition Assessment of the different biotopes and areas of biotopes at the survey site.

	Condition Assessment Criteria						
Biotope – Intertidal Hard Structures	**Coastal Processes**	**Presence/Abundance of INNS**	**Water Quality***	**Litter**	**Amount of Colonisation**	**Total Score**	**Condition Assessment Result**
1 - Seawall - LR.HLR.MusB.Sem.Sem	1	3	2	3	3	12	Good Condition
2 - Seawall - LR.HLR.MusB.Sem.Sem	1	3	2	3	3	12	Good Condition
6 - LR.LLR.F.Asc.FS/ LR.HLR.MusB.Sem	1	2	2	3	3	11	Moderate Condition
7 – LR.LLR.F.Asc.FS/ LR.HLR.MusB.Sem	1	2	2	3	3	11	Moderate Condition
Biotope – Intertidal sediment	**Coastal Processes**	**Presence/Abundance of INNS**	**Water Quality***	**Non-natural structures and direct human impacts**	**Litter**	**Total Score**	**Condition Assessment Result**
3 – LS.LCS.Sh.BarSh	1	3	2	3	3	12	Good Condition
4 - LS.LSa.MoSa.BarSa	1	3	2	3	3	12	Good Condition
5 - LS.LSa.MoSa.BarSa	1	3	2	3	3	12	Good Condition
8 - LR.LLR.F.Asc.X	1	3	2	3	3	12	Good Condition
9 - LR.FLR.Eph.EphX	1	3	2	2	3	11	Moderate Condition

* A pragmatic approach has been taken to assess water quality. A lack of significant algal blooms, but the water quality in the harbour is considered to be of lower quality than in other location e.g. the lack of *Nucella lapillus* at the site indicates a raised level of pollution

4.1. Footprint of the Marine Reef Cubes and Living Seawall Tiles

4.1.1. A total of 14 Marine Reef Cubes will be placed in the intertidal region of the survey area, totalling a footprint of 14m^2. Although the total area under the footprint of the 14 no. marine cubes is 14m^2, each individual marine cube has a surface area of approximately 7.3m^2, totalling 102.2m^2 of habitat. The extra habitat created by the marine cubes is therefore 88m^2 (102.2m^2 – 14m^2 of lost habitat under the footprint of the cubes).

4.1.2. The placement of the marine reef cubes should be on the intertidal rocky shore mosaic of LR.LLR.F.Asc.FS/LR.HLR.MusB.Sem (Polygons 6 & 7) as this habitat is in moderate condition rather than good. The rigid surface of the cubes also allows for a like for like replacement/creation/enhancement.

4.1.3. A total of 30 Living Seawall Tiles will be placed on Seawall 1. Each tile is 0.67m wide thus approximately 0.3m^2 totalling an area of 9m^2.

4.2. Predicted BNG Headline Results

4.2.1. Table 2 contains the predicted BNG headline results for the habitat creation and enhancement at Falmouth Harbour resulting in a +1% change.

4.2.2. The loss of 14m^2 of rocky shore habitat is replaced by 102.2m^2 of rocky shore habitat resulting in a gain of 88m^2.

4.2.3. The loss of 9m^2 of intertidal hard structure (artificial hard surface) at Seawall 1 is replaced by 9m^2 of Living Seawall Tiles changing the substrate from intertidal hard structure to rocky shore habitat.

Table 2 – Headline results for the predicted BNG at the survey site.

On-site baseline	*Habitat units*	1.30
	Hedgerow units	0.00
	River units	0.00
On-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	1.31
	Hedgerow units	0.00
	River units	0.00
On-site net % change (Including habitat retention, creation & enhancement)	*Habitat units*	1.00%
	Hedgerow units	0.00%
	River units	0.00%
Off-site baseline	*Habitat units*	0.00
	Hedgerow units	0.00
	River units	0.00
Off-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	0.00
	Hedgerow units	0.00
	River units	0.00
Total net unit change (including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	0.01
	Hedgerow units	0.00
	River units	0.00
Total on-site net % change plus off-site surplus (including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	1.00%
	Hedgerow units	0.00%
	River units	0.00%
Trading rules Satisfied?	Yes ✓	

5. Conclusions

5.1.1. Nine polygons of seven different biotopes were identified at the survey site. Of these, six biotopes were assessed as being in good condition and three biotopes were assessed as being in moderate condition.

5.1.2. The placement of the marine reef cubes should be targeted on the rocky shore as this habitat is currently in moderate condition and the marine cubes allows for a like for like replacement/creation/enhancement.

5.1.3. The prediction of the BNG headline for the habitat creation and enhancement at Falmouth Harbour results in a +1% change.

5.1.4. The site will be revisited one year after the installation of the Marine Reef Cubes and Living Seawall Tiles to determine the actual BNG at the site and the report updated to reflect this.

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7. List of Appendices

A. Biotope Species Lists – Observed/Expected

A. Biotope Species Lists – Observed/Expected

7.1.1. Observed/Expected (expected taken from JNCC 2023), X – not observed/no figure given for biotope

Scientific name	Wall A – LR.HLR.MusB.Sem.Sem	Wall B – LR.HLR.MusB.Sem.Sem	LR.LLR.F.Asc.FS/ (LR.HLR.MusB.Sem)	LR.LLR.F.Asc.X	LR.FLR.Eph.EphX
Semibalanus balanoides	C/C	C/C	C/F(A)	C/O	O/O
Patella vulgata	O/C	O/C	C/F(C)	O/O	O/X
Mytilus edulis	R/O	X/O	X/X(O)	X/O	X/O
Nucella lapillus	X/F	X/F	X/O	X/O	
Verrucaria mucosa	X/F	X/F	X/O(F)		
Ulva intestinalis	X/O	X/O	X/O(O)	X/O	X/F
Phorcus lineatus	O/X	O/X			
Actinia equina	R/X	R/X	X/O		
Littorina saxatilis	R/X	R/X	R/X(F)		
Gelidium sp.			R/F	R/X	
Lithophyllum incrustans	O/X		R/X	R/X	C/X
Halichondria sp.	R/X				R/X
Magallana gigas	R/X	R/X	F/X		
Steromphala umbilicalis		R/X			
Ascophyllum nodosum			F/A	F/A	
Fucus vesiculosus			O/F	O/F	O/X
Vertebrata lanosa			X/F	X/F	
Corallinaceae			X/F		
Littorina littorea			F/O(C)	O/O	O/O
Littorina obtusata			R/F	R/C	
Carcinus maenas			X/O	X/O	X/O
Dynamena pumila			X/O		

Scientific name	Wall A – LR.HLR.MusB.Sem.Sem	Wall B – LR.HLR.MusB.Sem.Sem	LR.LLR.F.Asc.FS/ (LR.HLR.MusB.Sem)	LR.LLR.F.Asc.X	LR.FLR.Eph.EphX
Fucus serratus			X/O		R/X
Spirorbinae			R/F	R/O	
Chondrus crispus			X/O	R/X	A/X
Cladophora rupestris			X/F		
Mastocarpus stellatus			X/O		
Hymeniacidon perleve			R/X	R/X	
Gammaridae				X/F	
Dumontia cordata	R/X			O/X	C/X
Porphyra umbilicalis				O/X	F/O
Ulva lactuca					X/F
Austrominius modestus					X/O
Cancer pagurus					R/X
Spirobranchus triqueter					R/X

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