Peterhead - Smith Quay Extension

Benthic Characterisation Report

Peterhead Port Authority

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1. Introduction

1.1. The Site

Smith Quay is a 120 m long and 40 m wide suspended deck quay with a separate berthing dolphin at its western end and an area of reclaimed land to the northwest. It is a westward extension in 10 m water depth of the existing outer harbour quays at Peterhead and came into use in 2010. The structure, which incorporates a heavy lift area, is framed from steel box girders which span from a bankseat on a rock mound to 1.4 m diameter piles at the quay front. The piles are socketed into the granite rock that underlies Peterhead and there is a deck over the girders which consists of prestressed bridge beams with in-situ concrete infill. The concrete deck acts with the steel box girders to form a composite structure.

The quay has an adjacent working area of 16,000 m² with additional reclaimed land behind the quay (Peterhead Port Authority, 2024), comprised from 100,000 m³ of rock and soft materials which were dredged from the harbour and suitable material was combined with imported material to construct 9,000 m^2 of working area. An additional 32,000 m^2 of reclaimed land was added to the west of Smith Quay in 2018 coming from the harbour deepening project.

Figure 1.1 Smith Quay location within Peterhead and form

The port is used by many industries, such as the pelagic fishing sector, renewable energy, oil and gas decommissioning, subsea construction and maintenance industry, and ship repair facilities.

1.2. Planned Works

Peterhead Port Authority (PPA) proposes an 80 m extension to the western end of the existing 120 m long Smith Quay, which will provide vital additional berthing capacity and deck space with adjacent laydown area for this busy port.

To support an application for a marine license, an environmental appraisal is required and in turn a characterisation of the benthic habitat is required to support the conclusions of the EIA, in particular regarding the presence or absence of Annex I habitat such as reef, or other important features such as Priority Marine Features (PMF).

1.3. Ecological Constraints

The habitat within the harbour falls outside of the boundaries of any protected site such as Special Area of Conservation (SAC); however, the habitats were nonetheless checked for presence of any features resembling Habitats Directive Annex I habitat (e.g. reef) and against the Scottish list of Priority Marine Features (PMFs, see list of features considered in Table 1.1). PMFs which only occur in habitats not present in Peterhead Bay, such as tide-swept areas and those found only at depths greater than 10 m, are not mentioned in this listing but would be noted if found during survey.

Table 1.1 Potentially present Scottish Priority Marine Features

Scottish Proirity Marine Feature	Component biotopes/ species
Blue Mussel Beds	• *Mytilus edulis* beds on littoral sediments. • *Mytilus edulis* and *Fabricia sabella* in littoral mixed sediment. • *Mytilus edulis* beds on sublittoral sediment. • *Mytilus edulis* beds on reduced salinity infralittoral rock.
Horse mussel beds	• *Modiolus modiolus* beds with fine hydroids and large solitary ascidians on very sheltered circalittoral mixed substrata. • *Modiolus modiolus* beds with *Chlamys varia*, sponges, hydroids and bryozoans on slightly tide-swept very sheltered circalittoral mixed substrata.
Intertidal mudflats	• Littoral mud.
Kelp and seaweed communities on sublittoral sediment	• Kelp and seaweed communities on sublittoral sediment.
Maerl beds	• Maerl beds.
Native oysters	• *Ostrea edulis* beds on shallow sublittoral muddy mixed sediment.
Northern sea fan and sponge communities	• *Caryophyllia smithii* and *Swiftia pallida* on circalittoral rock. • Mixed turf of hydroids and large ascidians with *Swiftia pallida* and *Caryophyllia smithii* on weakly tide-swept circalittoral rock. • Deep sponge communities (circalittoral). • Northern sea fan.
Seagrass beds	• *Zostera noltii* beds in littoral muddy sand. • *Zostera marina*/ *angustifolia* beds on lower shore or infralittoral clean or muddy sand.
Serpulid aggregations	• *Serpula vermicularis* reefs on very sheltered circalittoral muddy sand.

2. Survey Method

A seabed visual inspection survey was conducted at Smith Quay Extension in Peterhead by Spectis Robotics Ltd in collaboration with the NIRAS Group UK.

As the area for the survey is relatively small and immediately adjacent to port facilities, a visual survey of the proposed development area was undertaken with an ROV.

The ROV used in this survey was the DeepTrekker PIVOT Micro-ROV System (Figure 2.1). This system includes a vehicle, tether, and spares configurations. It was equipped with optional features such as an obstacle avoidance sonar and a gripper. The Micro-ROV is designed for underwater operations, providing high manoeuvrability and the ability to capture detailed visual data of the seabed.

Figure 2.1 Micro-ROV

The ROV was deployed to acquire video footage and still images of the seabed in the proposed extension area, a buffer area, and around the rock armour on the existing harbour wall.

Seventeen transects were surveyed, following a north to south (179.5 degree) orientation with 10 m separation (Figure 2.2). It should be noted that transects which cross the Smith Quay extension and reclamation area also crossed the intertidal zone, which was surveyed at high tide using the ROV[1]. Where possible, the start and end point for each line extended approximately five metres beyond the proposed development area or dredge pocket. Transects were planned either side of the existing Smith Quay; however, the survey team were unable to complete transects 1 – 4 to the seaward side of the quay.

[1] Undertaking the survey during low tide would have required working outside of daylight hours; this was decided against due to concerns over surveyor safety and reduced visibility.

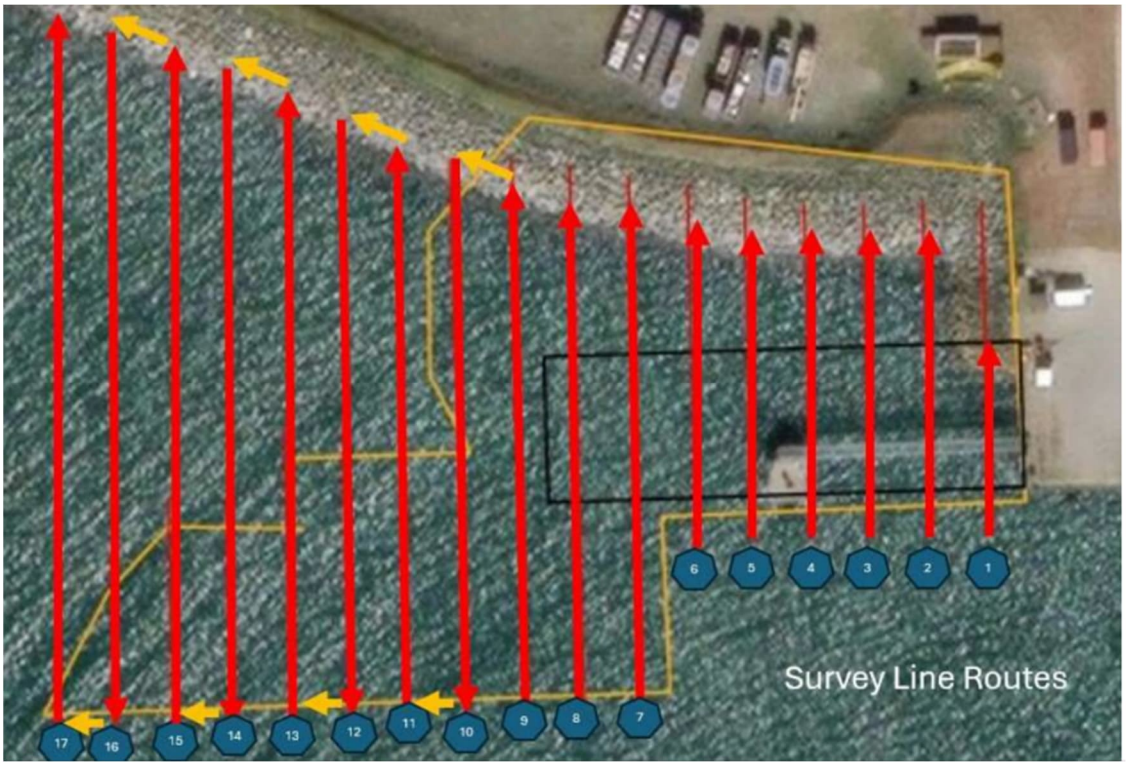

Figure 2.2 Survey transects as planned - 27/11/2024

Throughout the survey the ROV was 'flown' as slowly as possible to reduce disturbance of sediment and maximise manoeuvrability. The ROV was 'flown' close to the seabed with video recording continuously as well as still images taken at regular intervals.

3. Results

The ROV collected 250 still images from 17 transect lines and at least one video from each line, although the latter were generally of low quality and less use than the still images. Visibility varied both between and within transect lines but was generally no better than moderate with suspended material preventing detailed examination of the habitat and biota. The habitats and biota observed on each transect line have been described in

Appendix 1 and are illustrated in Figure 3.1 as well as summarized below.

The habitat identified from the ROV imagery was divided into three categories, and example images have been provided:

- Natural reef (Figure 3.2 and Figure 3.3Figure 3.3) – smaller, natural stones with epifaunal species and algal colonisation;
- Artificial reef (Figure 3.4 and Figure 3.5) – Rock armour with/without algal colonisation;
- Sediment (Figure 3.6 and Figure 3.7)– soft sediment (predominantly sandy); and
- NA – non-identifiable habitat type, e.g. poor quality image.

On transects 1 to 12, the habitats encountered were relatively consistent: in the deeper water the seabed was fine sandy sediment which was often rippled and in some areas evidence of infauna such as worm casts and burrow entrances could be seen. Once the rock armour protecting the reclaimed area was encountered, large boulders were seen which near the seabed were covered in silt and possibly supported some epifauna though the generally poor visibility prevented identification. Into shallower water, various types of red algae were observed as well as sugar kelp *Saccharina latissima* and sea lettuce *Ulva lactuca*. Near to the water's surface in what was most likely the intertidal zone, the surface of the boulders was covered with barnacles in amongst which limpets were occasionally seen. Above the barnacles was a canopy of fucoid algae most likely saw wrack *Fucus serratus* and spiral wrack *Fucus spiralis*, with a green alga likely gutweed *Ulva intestinalis* in places. Mobile epifauna observed on transects 1 to 12 included a squat lobster, a velvet swimming crab *Necora puber* and common starfish *Asterias rubens*.

On transects 13 to 17 the habitats described above were occasionally seen but in addition, areas of variable sized large particles, from pebbles to large boulders, were seen in a matrix of fine sediment in some places. The size range of the boulders further away from the intertidal area was generally much smaller than those present around the rock armour/intertidal zone and there was a substantial separation between rock armour at the intertidal zone and stony ground areas, indicating that the habitat here may be natural.

This (potentially) naturally hard ground had characteristics of stony reef. According to Irving (2009), the criteria for stony reef are as follows:

- Physical Composition: Stony reefs must have at least 10% of the seabed made up of particles larger than 64 mm (cobbles and boulders), with the rest being smaller material. They can be continuous or patchy.

- Biological Cover: Dominance of epifaunal species (organisms living on the surface) indicates a stony reef, while infaunal species (organisms living within the seabed) do not.

- Elevation: Stony reefs must rise from the seafloor, making them topographically distinct.

- Extent: The minimum area for a stony reef is 25 m², with no maximum limit.

- Quality: Assessed by physical structure, associated species, stability, and functionality as a habitat for mobile fauna.

The area of stony ground on transects 13 to 17 appears to meet the criteria for reef in terms of physical composition, and elevation, as there is significant coverage of cobbles and boulders appearing larger than 64 mm, at a distinct elevation from the seafloor. The area exceeds the minimum for reef; however, this habitat is biotically

depauperate with fauna and flora limited to some red algae and sugar kelp as well as occasional common starfish and sea urchin *Echinus esculentus*. This habitat (hard ground on transects 13 to 17) has been tentatively classified as low 'reefiness' stony reef as per the guidance provided in Irving (2009).

Figure 3.2Figure 3.3Figure 3.3Scattered anthropogenic debris, such as discarded tyres, were also seen throughout the survey area.

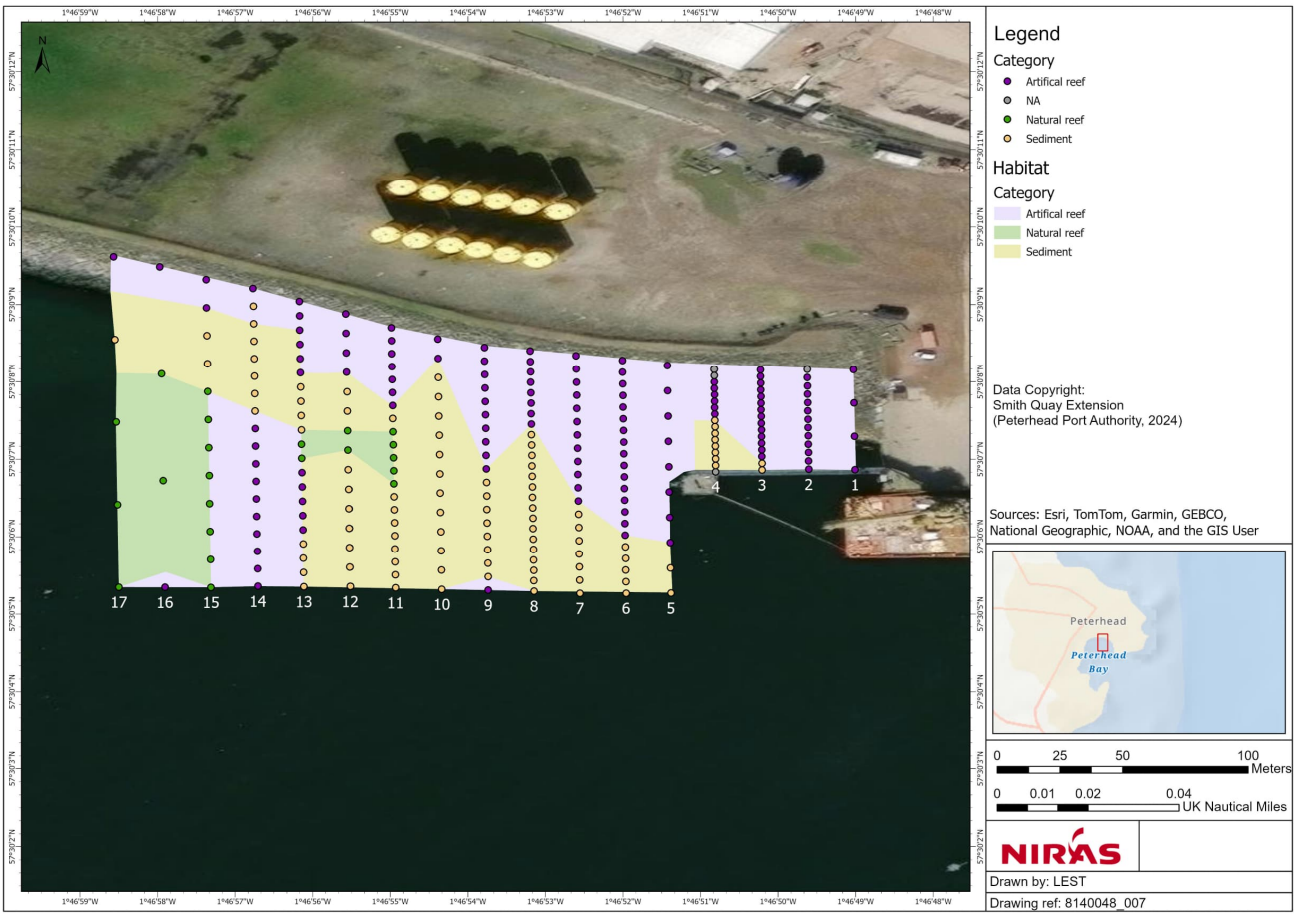

Figure 3.1 Habitat classifications in survey area

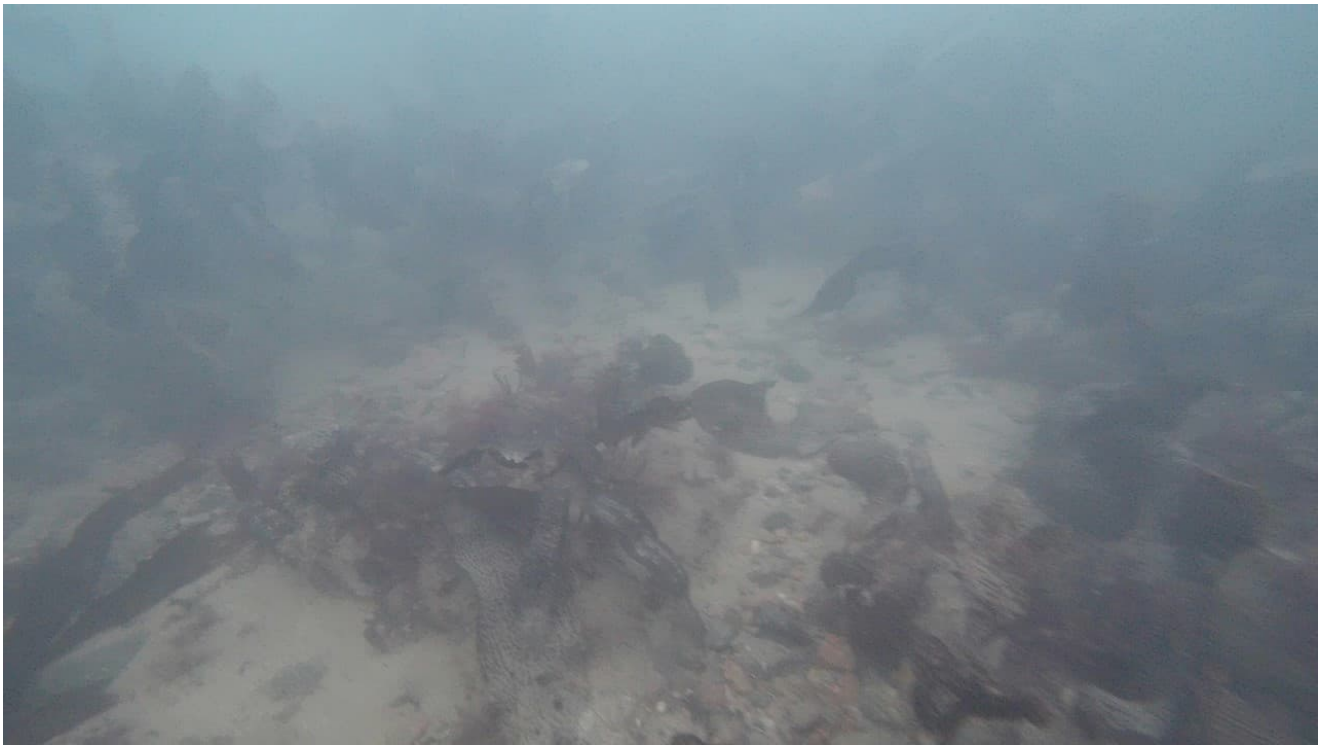

Figure 3.2 Natural reef - Transect 15 (Image 7).

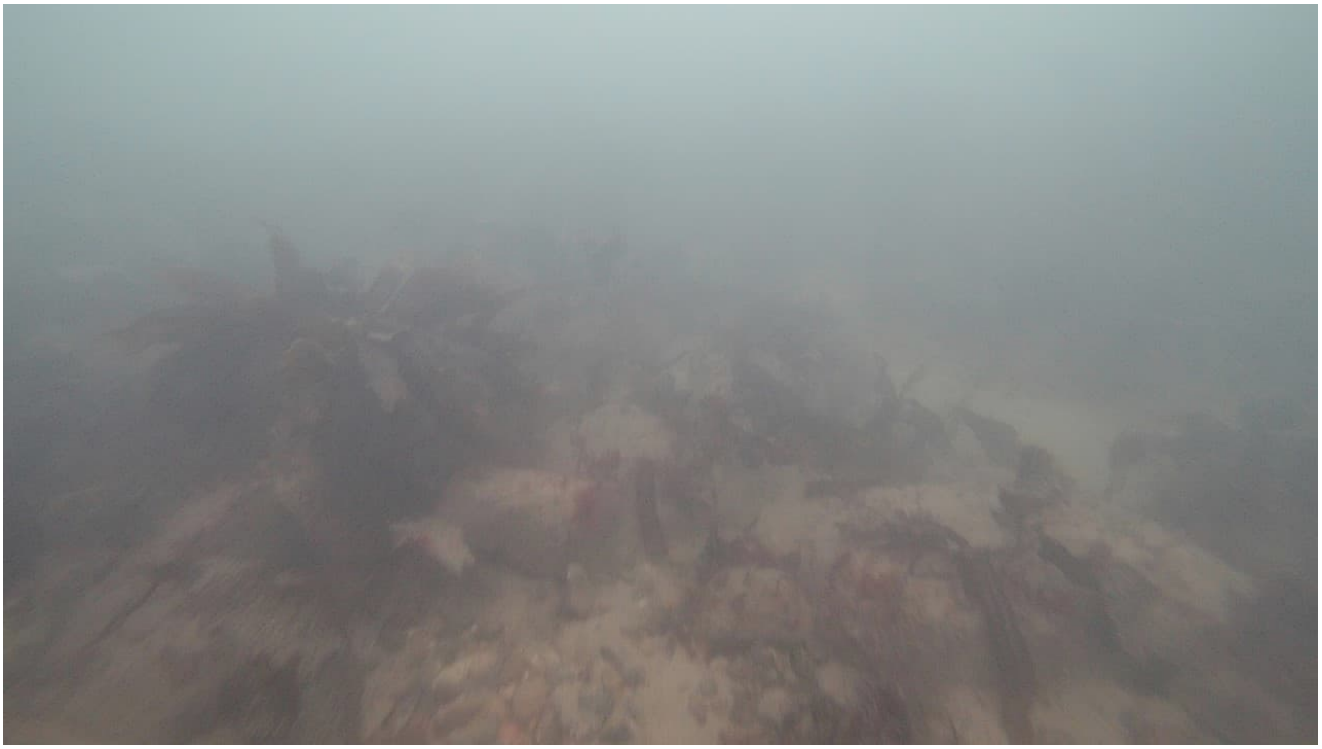

Figure 3.3 Natural reef - Transect 16 (Image 3).

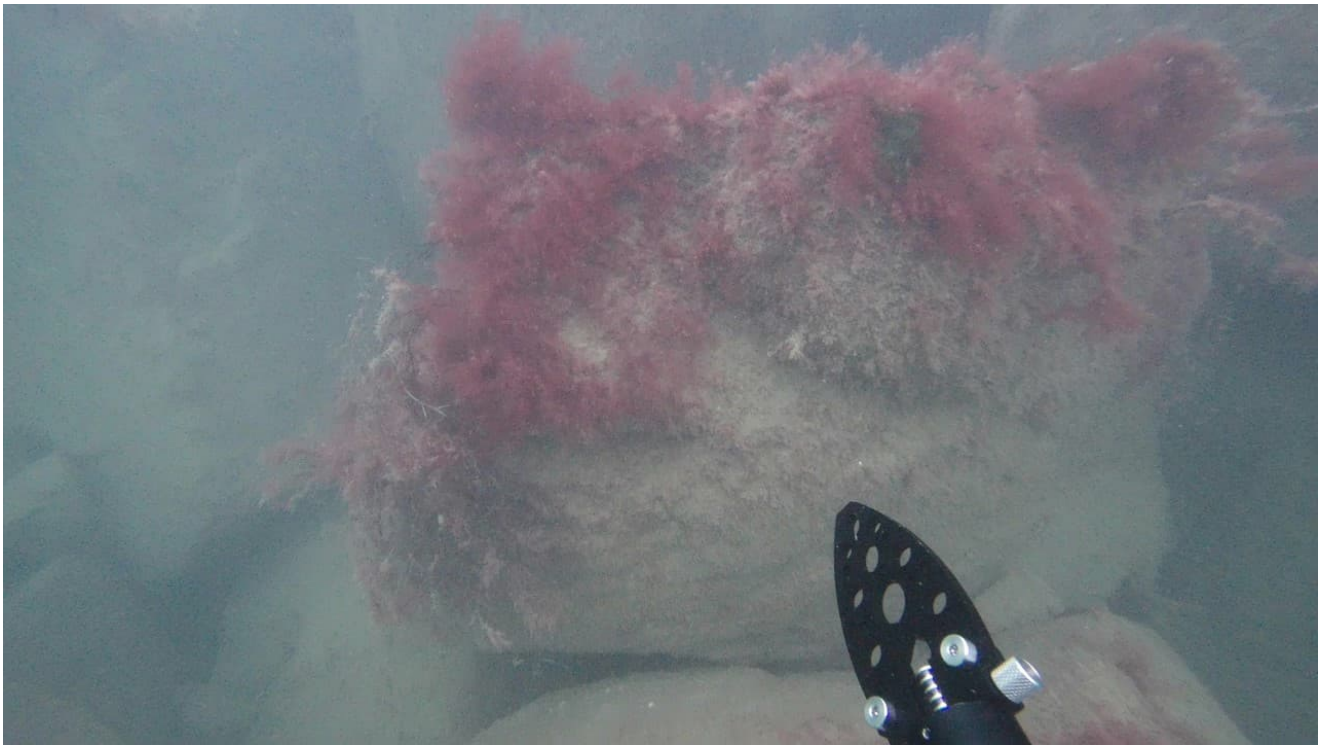

Figure 3.4 Artificial reef – Transect 6 (Image 12).

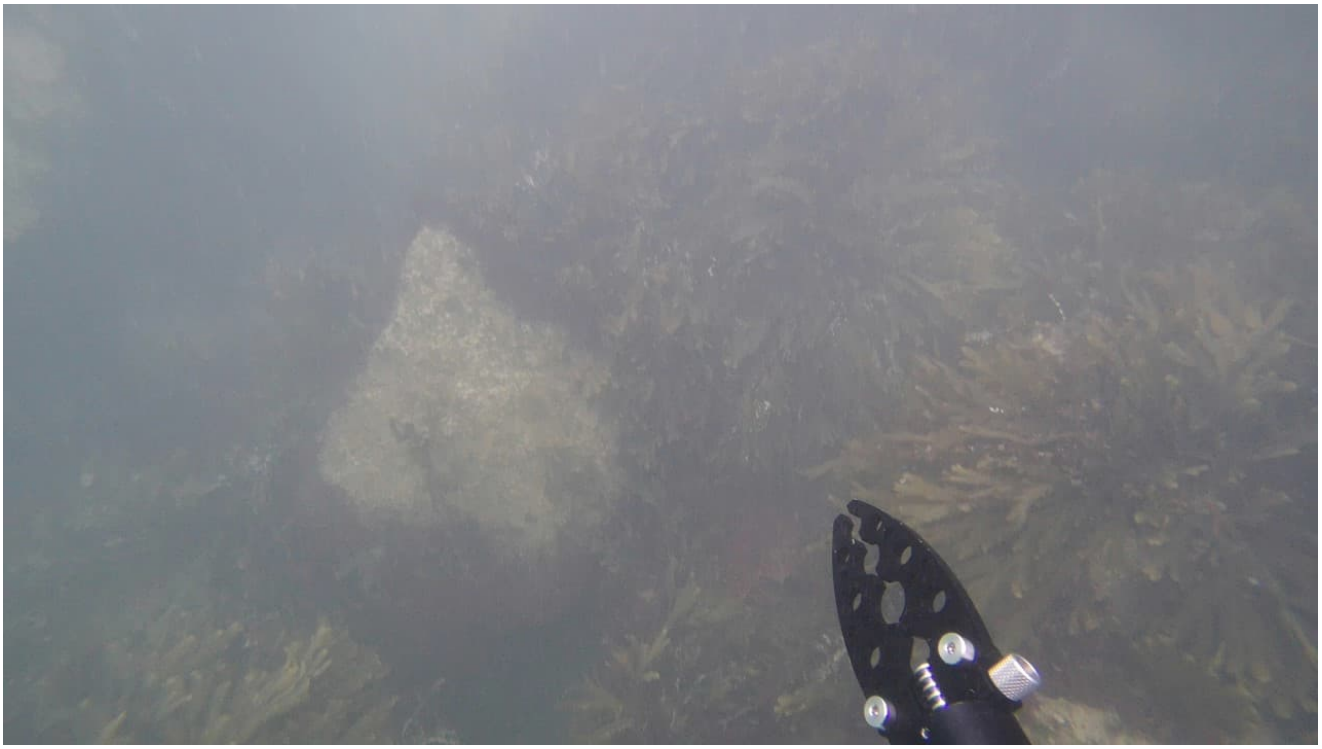

Figure 3.5 Artificial reef – Transect 6 (Image 19).

Figure 3.6 Sediment – Transect 14 (Image 2).

Figure 3.7 Sediment - Transect 8 (Image 6)

4. Conclusions

The habitat of mixed-size large particles seen in transects 13 to 17, outside the proposed quay extension area, meets the description of stony reef with overall low 'reefiness' taking into account both the physical structure and biotic composition. This habitat does not appear to have been formed from dumped material as the size range is very different to the material deposited in the intertidal and shallow subtidal to protect the reclaimed land. Whether or not the reef has formed as a result of historic dredging of fine sediment, or may result from the presence of irregular stones originating from harbour wall construction, can only be speculated upon, but for current purposes this area is assumed to be low quality reef.

The remaining areas are characterised by fine, sandy, sediment away from the harbour wall, and rock associated with the harbour wall itself.

There was no evidence of priority marine features.

5. References

Irving, R. (2009). *The identification of the main characteristics of stony reef habitats under the Habitats Directive: Summary report of an inter-agency workshop 26–27 March 2008* (JNCC Report No. 432). Joint Nature Conservation Committee.

NatureScot. (2012). Identification of Priority Marine Features in Scottish Territorial Waters (SNH Commissioned Report No. 388).

Peterhead Port Authority. (2024, March 25). Retrieved from Smith Quay & Merchant's Quay: https://www.peterheadport.co.uk/areas/smith-embankment

Appendix 1

ROV Line 1

This was a relatively short line with four still images taken. At depth, the visibility was poor but boulders with a covering of silt could be seen. In shallower water, the boulders have a varied flora of brown, green and red algae including sugar kelp *Saccharina latissima*, sea lettuce *Ulva lactuca* and saw wrack *Fucus serratus* which supported epibiont growth of encrusting bryozoa. Nearer the surface, barnacles were the dominant covering on the boulders with some fucoid algae and possibly limpets.

ROV Line 2

Twelve still images were taken on this line which showed boulder with a covering of silt in deeper water where a squat lobster and a common starfish *Asterias rubens* were observed filamentous red algae became more evident as the water depth decreased with a substantial covering of kelp as the water became shallower still. In the shallowest section of the line, fucoid algae and barnacles make up the principal growth on the boulders.

ROV Line 3

Sixteen images were taken on this line but visibility was generally poor and it was not possible to identify much of the epiflora present. The line starts with a level seabed of fine silt or sand with no obvious fauna which then changes into boulders coated with silt and there is some obvious growth which may have been filamentous red algae or possibly erect hydroid but the poor visibility prevented a positive ID. Filamentous red algae is obvious in later images and as the water depth decreases kelp and green algae become more prevalent. In the intertidal area, barnacles and fucoid algae become predominant and limpets are clearly visible in one of the images.

ROV Line 4

Sixteen images were taken on this line. The seabed here was rippled in places and there were obvious entrance holes for refuges of burrowing macrofauna and a discarded lobster pot was recorded in two of the images. Once the base of the placed boulder (rock armour) was reached this followed the typical zonation of filamentous red algae up to kelp and finally fucoid algae and barnacles.

ROV Line 5

Ten images were taken on this line which showed a level seabed pocked with the entrances to burrows of infauna followed by silt-coated boulders amongst which there was a lobster pot and then boulders with red algae as the water depth decreased. Much less kelp was seen on this line than previously though the upper boulders were as usual dominated by barnacles and fucoid algae.

ROV Line 6

Twenty-one images were taken on this line which started on a flat seabed of silt or fine sand which only showed evidence of burrows in one of the five images from this area. At the base of the boulders there was sparse growth of red algae and other erect biota though the poor visibility prevented a precise identification. As the water depth decreases the growth of red algae became thicker and a velvet swimming crab *Necora puber* was seen on one of the boulders, shallower still and the variety of red algae increased with filamentous and broad-fronded species present. Once again in the shallowest areas there was a predominance of fucoid algae and barnacles though there was less kelp coverage on this line than the previous lines.

ROV Line 7

Nineteen still images were taken on this line. The first five images show a level seabed of silt or fine sand with occasional casts produced my infaunal polychaetes. At the base of the placed boulder there was no visible epifauna or flora but then there was a gradually increasing coverage of red algae with some sugar kelp as the water depth decreased. There were at least three different species of red algae in one of the images but these were supplanted by fucoid algae and barnacles towards the sea surface though red algae and sea lettuce persisted in the crevices between boulders.

ROV Line 8

Twenty four images were taken on this line. The first images show a level seabed of rippled sediment on which casts produced by infaunal polychaetes can be seen. This habitat then morphs into a seabed of fine sediment with pebble, cobble and boulder with sparse red algae and sugar kelp as well as common starfish. At the base of the boulders there is clearly encrusting biotic growth on the boulder but the image is not clear enough to positively identify it. As the water depth decreases the boulders support a variety of algae including sea lettuce, sugar kelp and various red algae. Nearest to the water's surface, fucoid algae and barnacles but with red and green algae in the darker crevices, with the exception of the last two images which have a green alga (possibly gutweed *Ulva enteromorpha*) on the upper surface of the boulders.

ROV Line 9

Nineteen images were taken on this line. Initially there was a level seabed of rippled sediment with casts from infaunal polychaetes which then morphs into apparently the same habitat but with a covering of sugar kelp, presumably attached to a hard substrate beneath the sediment surface. As the boulders were encountered the visibility was rather poor but more sugar kelp could be seen attached to the rock surface as well as red algae. As the depth decreased the algal community became richer with several species of red algae, sea lettuce and sugar kelp present. In nearer to the sea surface, the algal community became less rich with a dominance by fucoids (probably saw wrack *Fucus serratus*) with barnacles encrusting the rock. In the images taken at or near the sea surface the main alga appeared to be spiral wrack *Fucus spiralis* with barnacles and gutweed underneath.

ROV Line 10

Fourteen images were taken on this line which appeared to start near the sea surface and then travel out into deeper water. The first images show the fucoid and barnacle on rock community followed by the community of red algae and sugar kelp with a level seabed of rippled sediment in the deepest part of the line. Two lobster pots were seen in the images, one in amongst the boulders and one almost completely buried in the fine sediment and both are presumed lost/abandoned.

ROV Line 11

Twenty-one images were taken on this line in which there was very poor visibility in the upper water column. The first half of the images are of a level seabed of rippled fine sediment which then becomes boulders and cobble on/in the sediment and supporting growth of kelp and red algae in which several common starfish were seen. The boulder rock armour can then be seen with red algae and kelp which merges into a biota of fucoid algae and barnacles nearer to the sea surface.

ROV Line 12

Fifteen images were taken on this line which again started near the sea surface and descended to the seabed. Away from the seabed the visibility was poor (and only moderate at the seabed) but fucoid algae attached to the boulders could be seen at the start of the line which changed to kelp and red algae as the ROV descended. Once the ROV reached the seabed, this was initially the fine sediment with worm casts see elsewhere but as the line was traversed there were areas of coarse particles including isolated boulders supporting algal growth as well as pebbles and cobble amongst fine sediment.

ROV Line 13

Twenty-one images were taken on this line. Initially, the seabed was of fine sediment with occasional worm casts but this then morphed into an area of mixed sediment with boulders, cobble and pebble as well as fine sediment supporting sparse growths of red algae and potentially some epifauna (though visibility was not good). Common starfish were relatively common in this section of the line with five seen in one image and there were patches of dense growth of sugar kelp. As the line continued, the seabed went back to fine sediment before reaching the base of the sea wall where the boulders supported a community of red algae and kelp which changed near to the sea surface to a community of fucoid algae and barnacles.

ROV Line 14

Seventeen images were taken on this line. Initially, the seabed is of fine sediment in which burrow entrances and worm casts can be seen. This then grades into an area of mixed size large sediment particles which supports growths of various red algae and kelp with common starfish and sea urchin *Echinus esculentus* seen. The transect line ends on this habitat, the rock armour recorded in previous lines was not present.

ROV Line 15

Twelve images were seen on this line which starts in the habitat of mixed large particles with finer sediment and with red algae and kelp on the largest particles. This habitat is patchy but continues for several images until the habitat becomes the rippled fine sediment seabed observed in all lines before the final two images appear to show the rock armour one with a dense stand of kelp *Laminaria hyperborea* and the final image of large boulders with barnacles and fucoid algae.

ROV Line 16

Just four images were taken on this line of which the first is an image in poor visibility of kelp but details of the underlying habitat cannot be seen, this is followed by an image of a fine sediment seabed habitat with some kelp that appears to be attached hard substrate though the visibility is poor. The final two images are of the mixed large particle habitat with some fine sediment as well as red algae and kelp.

ROV Line 17

Five images were taken on this line on which the visibility was generally poor. The first two images show the mixed large particle habitat with sugar kelp and red algae, the third and fourth images show a fine sediment seabed though some kelp is present though it is not clear if it is attached or not. The last image shows a dense stand of brown algae which includes a *Laminaria* kelp and possibly some fucoids but the visibility is poor and the underlying habitat cannot be seen.