# Environmental Survey in White Bay, Whitegate, County Cork September 2020

Produced by

**AQUAFACT International Services Ltd**

On behalf of

**DixonBrosnan Environmental Consultants.**
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**Report Approval Sheet**

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AQUAFACT

# 1. Introduction

The villages of Whitegate and Aghada, Co. Cork, have been identified by the EPA as a Priority Area where untreated wastewater is being discharged into the environment. In addition, the villages are identified as part of Irish Water's Untreated Agglomeration Study (UTAS) schemes. As part of the Whitegate -Aghada Sewerage Scheme - UTAS Cork Bundle, Irish Water proposes to provide a new wastewater treatment plant with a marine outfall.

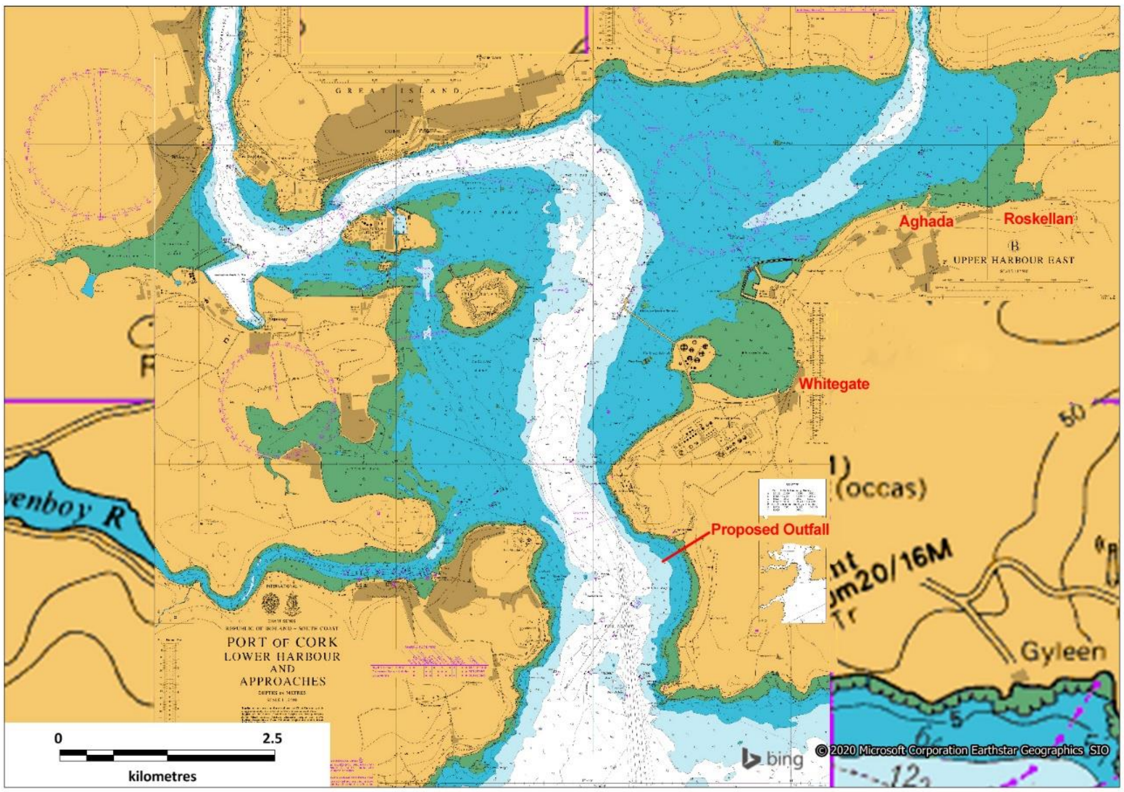


**Figure 1-1  Location of the proposed new outfall discharge point.**

Treated wastewater from the WwTP would be discharged via a proposed sea outfall at White Bay (Figure 1-1). The pipe would be constructed under the beach at White Bay and then under the sea bed, terminating at a diffuser port which would be a distance of approximately 295m from the high water mark.  The treated effluent would discharge to the sea via the diffuser port. White Bay is not a designated bathing beach.

Hydrodynamic modelling was carried out to predict the concentrations and dispersion at the proposed new outfall. However, although it was found that the treated effluent will be in full compliance with EU water quality regulations, there is no description or assessment of possible impacts of the proposed discharge on marine habitats and species within the zone of potential influence of the development. Accordingly, AQUAFACT International Services Ltd. was commissioned by DixonBrosnan Environmental Consultants to map the marine habitats and species occurring within the zone of potential impact of the proposed development (area under influence from dispersion of effluent), in order to assess the potential ecological impacts on such habitats of siltation affects due to suspension of marine sediment in the construction phase and the proposed discharge of effluent operation of the proposed new outfall pipe during the operation phase.

# 2. Methodology

The survey consisted of two elements:

1. Map the intertidal area along the route of the proposed discharge pipe and the immediate intertidal area that may be impacted during the construction phase and,
2. Map the subtidal habitats in the vicinity of the outfall point and along the potential route of the discharge as it disperses on the tidal currents.

All fieldwork was carried out on 1st September 2020.

## *2.1. Intertidal Survey*

In order to maximise the area of interest along the Intertidal zone, the intertidal survey took place around low water (12:20, 0.6m) during a spring tide period on the 1st September 2020. Weather conditions were reasonable on the day of the survey with an overcast sky and a southerly breeze.

### 2.1.1. Shore Profile

The slope of the shore from the upper splash zone to the water's edge was recorded by means of an engineer's level and metered staff. Levels were taken at regular intervals along the shore where the slope was even with additional levels taken where sudden drops or inclines occurred (Figure 2-1).

### 2.1.2. Biological Sampling

An 18 cm diameter core was used to collect faunal samples at the upper, mid and lower shore areas along the transect route. The coordinates of each location are presented in Table 2-1 and their location shown in Figure 2-1. Three replicate cores, to a depth of 15cm were collected at each of the stations for faunal analysis. The content of each core was stored in a labelled container and the core washed down to avoid any loss of the sample.

On return to the laboratory each sample was transferred portion by portion to a 1mm mesh sieve as a sediment water suspension. The sample was carefully and gently sieved. Great care was taken during the sieving process to minimise damage to taxa such as spionids, scale worms, phyllodocids and amphipods. The samples were then fixed with 4% buffered w/v formaldehyde solution and stained with Rose Bengal.

An additional core was taken at each of the stations to determine the granulometry and organic carbon content in each of the zones.

**Table 2-1 Coordinates of the shore core stations**

| Zone | Latitude | Longitude |
|---|---|---|
| Upper Shore | 51.808618 | -8.251428 |
| Mid-shore | 51.808265 | -8.251979 |
| Lower Shore | 51.807977 | -8.252493 |

#### 2.1.3. Habitat Mapping

The habitat(s) along the route of the proposed discharge pipe were recorded during a walkover survey with photographic records of any notable features encountered. In addition, features of the shore in the vicinity of the proposed pipeline were also recorded, in particular the presence and extent of the Honeycomb Worm, *Sabellaria alveolata*, a biogenic reef building polychaete that was reported from the area.

### *2.2. Subtidal Survey*

The subtidal survey was conducted from an eight-meter RIB that was licenced to ply within the Cork Harbour limits. The benthic environment was viewed by means of a drop-down video camera that was lowered to the seafloor and a recording made of the bottom type and flora and fauna encountered in a number of areas in the vicinity of the proposed outfall location and also in the general area of White Bay (Figure 2-2). Once the camera was recording, the boat was allowed to drift with the current during filming in order to get representative footage along each camera deployment. Filming occurred on the flooding tide and with a backing southerly wind, each recording followed a northerly track. The analogue video signal was digitised and recorded to hard drive for later analysis. Real time positions were imprinted to the video from a GPS unit connected to the video link and start and end coordinates from each of the deployments are presented in Table 2-2.

**Table 2-2 Coordinates of the video transects at White Bay, 1st September 2020**

| Transect | Start | | End | |
|---|---|---|---|---|
| | *Latitude* | *Longitude* | *Latitude* | *Longitude* |
| **1** | 51° 47.7509′ | 8° 15.5167′ | 51° 47.7769′ | 8° 15.5241′ |
| **2** | 51° 47.9437′ | 8° 15.4249′ | 51° 47.9548′ | 8° 15.4336′ |
| **3** | 51° 48.0537′ | 8° 15.262′ | 51° 48.0546′ | 8° 15.2218′ |
| **4** | 51° 48.1501′ | 8° 15.1874′ | 51° 48.1509′ | 8° 15.1933′ |
| **5** | 51° 48.2581′ | 8° 15.1691′ | 51° 48.2607′ | 8° 15.1718′ |
| **6** | 51° 48.2439′ | 8° 15.2818′ | 51° 48.2445′ | 8° 15.2811′ |
| **7** | 51° 48.2044′ | 8° 15.4609′ | 51° 48.2155′ | 8° 15.4691′ |
| **8** | 51° 48.292′ | 8° 15.4033′ | 51° 48.2974′ | 8° 15.4123′ |
| **9** | 51° 48.3641′ | 8° 15.3152′ | 51° 48.3648′ | 8° 15.3182′ |
| **10** | 51° 48.4104′ | 8° 15.2553′ | 51° 48.4108′ | 8° 15.2576′ |
| **11** | 51° 48.4574′ | 8° 15.2963′ | 51° 48.4584′ | 8° 15.2949′ |
| **12** | 51° 48.4155′ | 8° 15.4372′ | 51° 48.4166′ | 8° 15.4382′ |
| **13** | 51° 48.3646′ | 8° 15.4642′ | 51° 48.3784′ | 8° 15.4548′ |
| **14** | 51° 48.3574′ | 8° 15.5675′ | 51° 48.3844′ | 8° 15.5874′ |
| **15** | 51° 48.2866′ | 8° 15.7373′ | 51° 48.3238′ | 8° 15.7463′ |
| **16** | 51° 48.4628′ | 8° 15.741′ | 51° 48.4847′ | 8° 15.7605′ |
| **17** | 51° 48.6316′ | 8° 15.7888′ | 51° 48.6528′ | 8° 15.8196′ |


**Figure 2-1 Beach transect and core station locations, White Bay, Cork Harbour, 1st September 2020.**

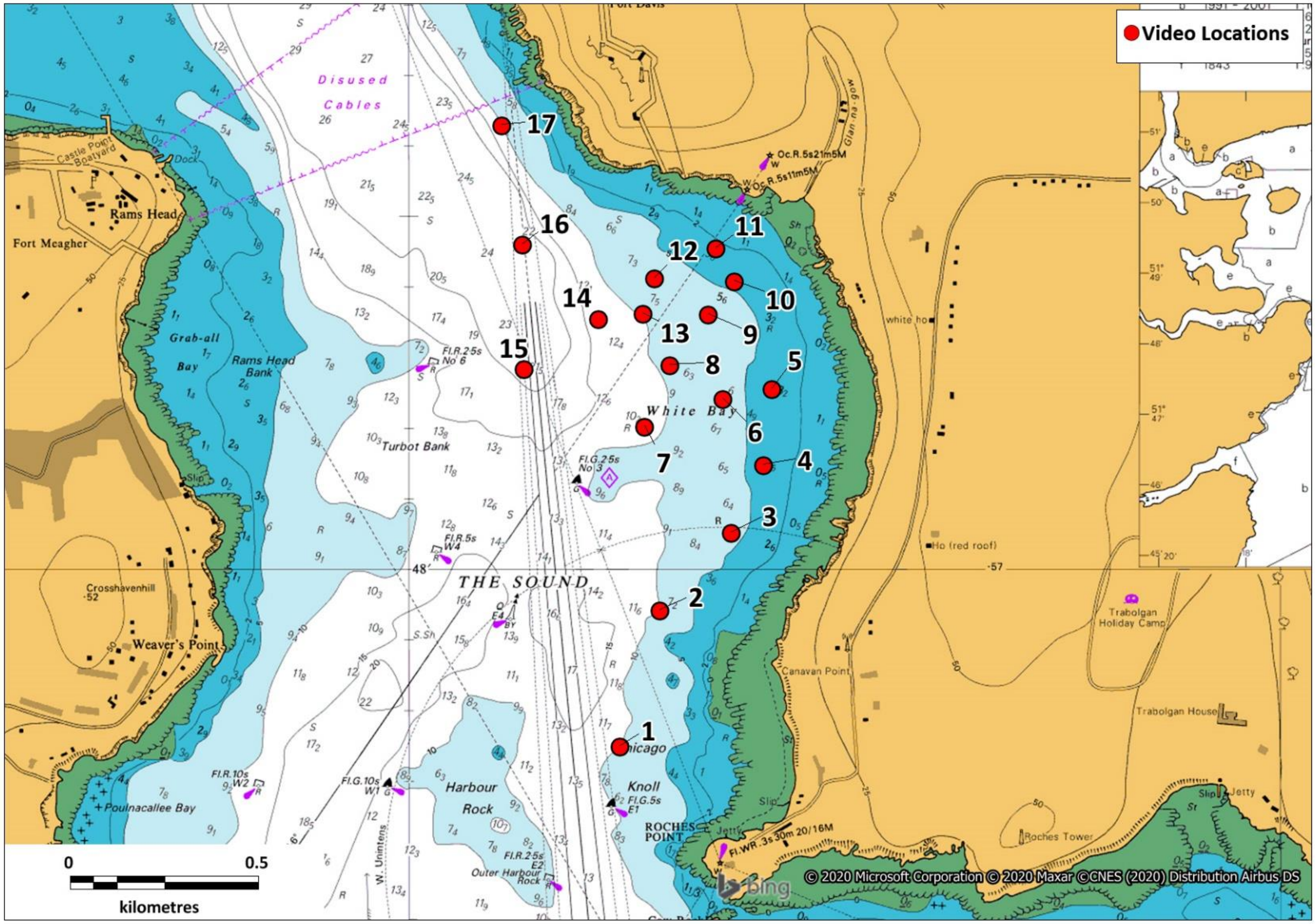


**Figure 2-2 Locations of the drop-down video recordings in White Bay, Cork Harbour, 1st September**

# 3. Results

## *3.1. Intertidal Survey*

### 3.1.1. Shore Profile

The profile of the upper splash zone and intertidal area exposed at low water on the 1st September 2020 is presented in Figure 3-1.

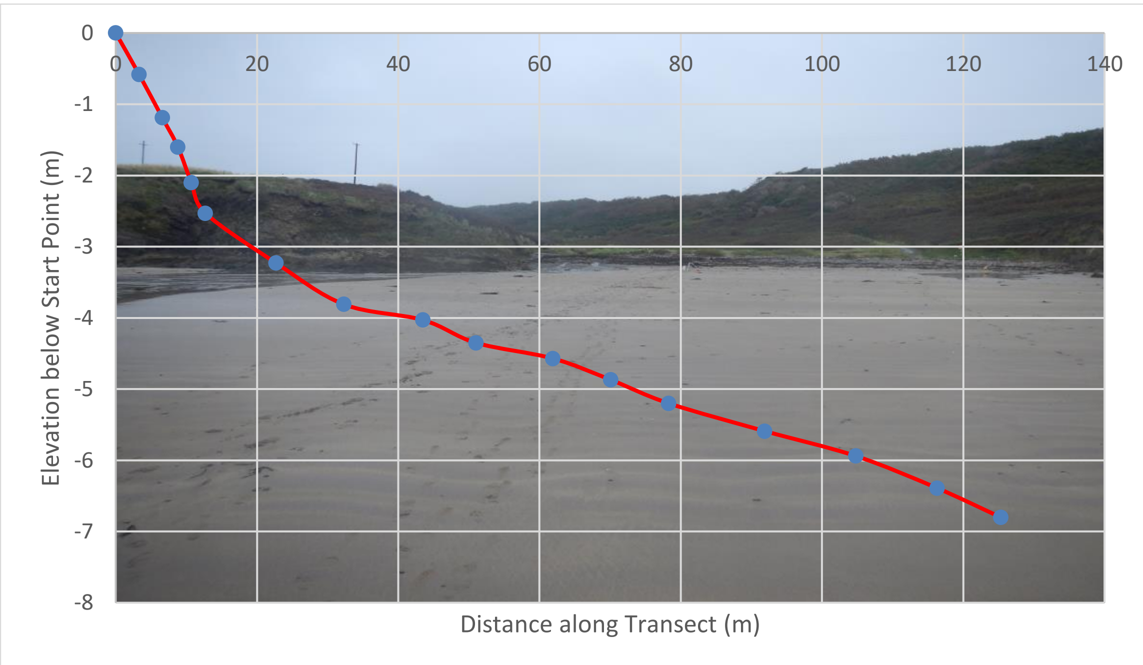


**Figure 3-1 Profile of the shore transect at White Bay Beach, 1st September 2020**

The shore transect began on an upper grass plateau that overlooked the beach (see Plate 3-1). Adjoining this was a short cobble bank that made up the upper splash zone, which continued on to a medium sand beach that continued down to the water's edge. A small stream flowed through the cobble bank and continued across the beach to enter the Bay at this location. The overall length of the transect was 125 m of which the sand beach was 115 m in an even slope dropping approximately 4m over its length.

**Plate 3-1 Images along the proposed route of the outfall pipe, White Bay.**

### 3.1.2. Biological Sampling

The shore consisted of a medium to file clean sand (≤ 0.5mm) and as a result, the majority of the material captured in the cores washed through the 1mm sieve during processing. A preliminary examination of the residues left after sieving from the cores taken at the upper, mid and lower shore zones indicated a paucity of living faunal specimens living in the sediment at each of the zones.

### 3.1.3. Habitat Mapping

Apart from the relatively gently sloping sand beach composed of clean medium sand, there were no other features along the proposed pipe route of note.

Jagged rock outcrops, extensions of the surrounding sedimentary rock cliffs, were located to the north and south of the beach (see Figure 2-1 and Plate 3-2) The rock surface was covered with barnacles, with some weed cover attached, predominantly at their base and in sheltered crevices at their base (Plate 3-2). In general, the weed was typical of rocky substrata influenced by sand scour with the inclusion of species such as *Rhodothamniella floridula*, *Ulva* sp., and brown weed such as *Fucus serratus* and *F. ceranoides*. In addition to barnacles, the main faunal species observed on the rock were Patellid limpets, Beadlet anemones (*Actinia equina*) and dog whelks, *Nucella lapillus*.

**Plate 3-2 Rock outcrops, White Bay, 1st September 2020.**

(the quadrat in the images is 25cm x 25cm)

The Honeycomb Worm, *Sabellaria aveolata,* was found to be present in small, localised patches in crevices and on the sheltered side of the rock outcrops located to the north of the proposed pipe route (Figure 3-2). These patches of *S. aveolata* (Plate 3-3) were only noted from a small area close to the sand beach and had a cover of green algae (Ulva sp.) associated with them. The area of intertidal shore further north was under the influence of loose cobble that is mobile during storm events and clears the rock of flora and fauna giving it a smooth appearance (Plate 3-4).


**Figure 3-2 Location of *Sabellaria aveolata* in White Bay, 1st September 2020.**

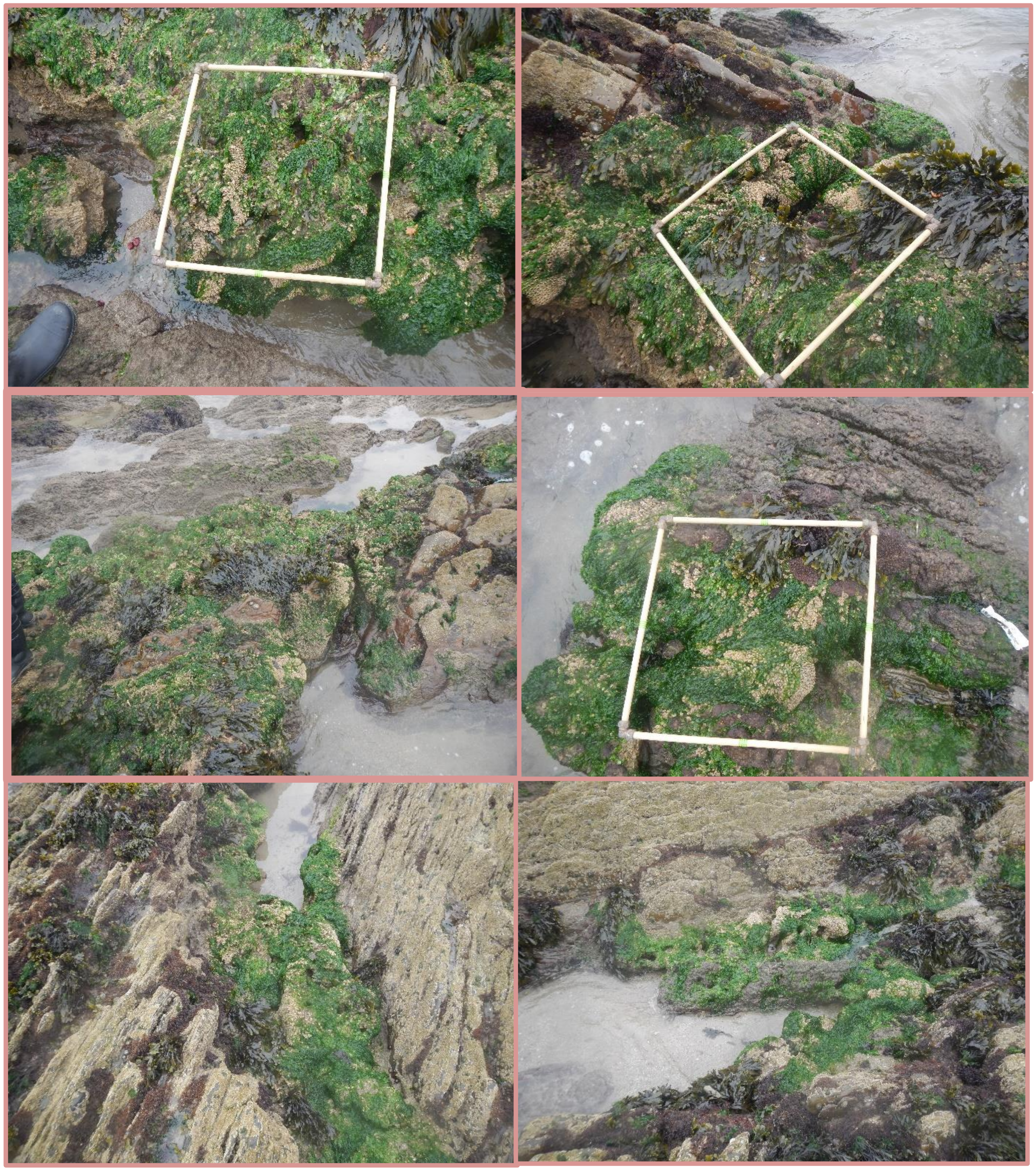

**Plate 3-3 Honeycomb Worm, *Sabellaria aveolata,* White Bay, 1st September 2020**

(the quadrat in the images is 25cm x 25cm)

**Plate 3-4 Rock and mobile cobble shore, Whiter Bay, 1st September 2020**

## *3.2. Subtidal Survey*

Images of the seafloor were captured from the videos recorded at each of the stations that drop-down video was deployed (see Figure 2-2 for station locations). Full video footage from each of the recordings is available if required. Underwater visibility was poor on the day, which reflects on the quality of the images

### 3.2.1. Transect 1

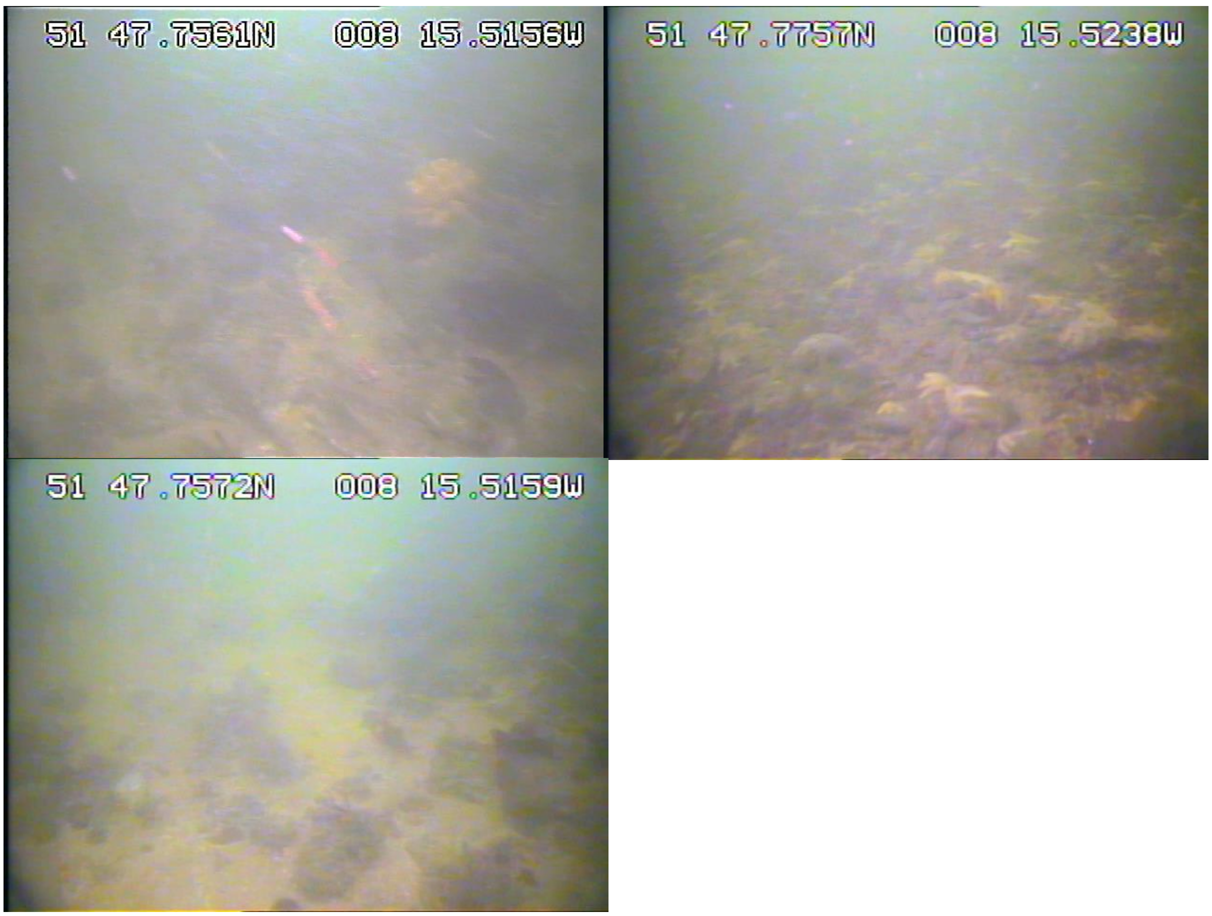


**Plate 3-5. Transect 1, White Bay, 1st September 2020**

The seafloor along Transect 1 consisted of a mix of bedrock, boulders, and sand. *Alcyonium digitatum* was recorded attached to the rock while an aggregate of starfish (*Asterias rubens*) were observed towards the end of the transect.

### 3.2.2. Transect 2

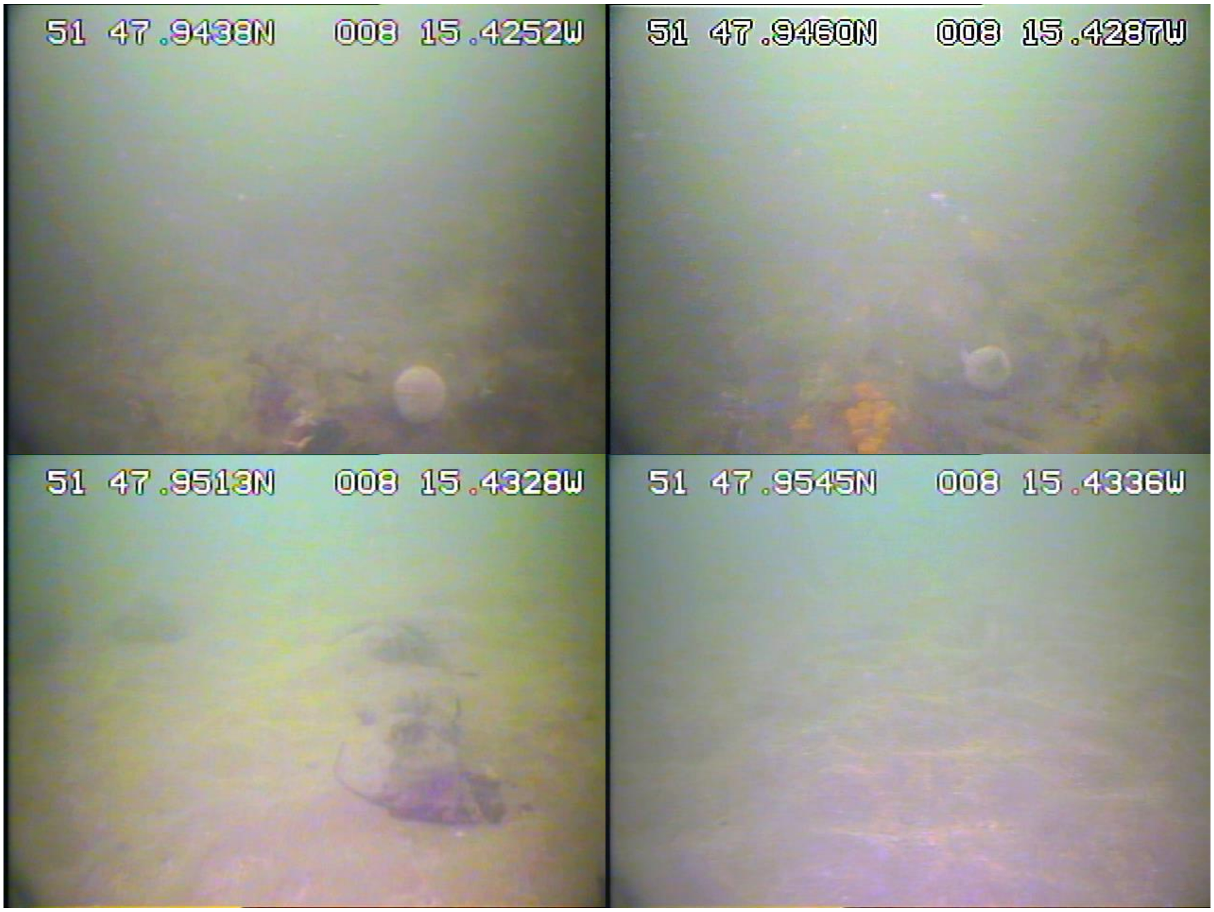


**Plate 3-6 Transect 2, White Bay, 1st September 2020**

The bottom type recorded along Transect 2 changed from rock/boulder to medium sand towards the end of recording. Sea urchins (*Echinus esculentus*), starfish (*A. rubens*) and *A. digitatum* were imaged on the rock. No fauna were observed on the sand that was formed into small waves by the action of tidal currents.

### 3.2.3. Transect 3

The seafloor along Transect 3 consisted of clean medium sand formed into small waves with shell and drift algae scattered over its surface. Starfish, *A. rubens*, were imaged foraging on the bottom.


**Plate 3-7 Transect 3, White Bay, 1st September 2020**

### 3.2.4. Transect 4


**Plate 3-8 Transect 4, White Bay, 1st September 2020**

The seafloor along Transect 4 consisted of clean medium sand formed into small waves. Sparce individual clumps of seagrass, *Zostra marina*, were recorded growing in the sand.

### 3.2.5. Transect 5

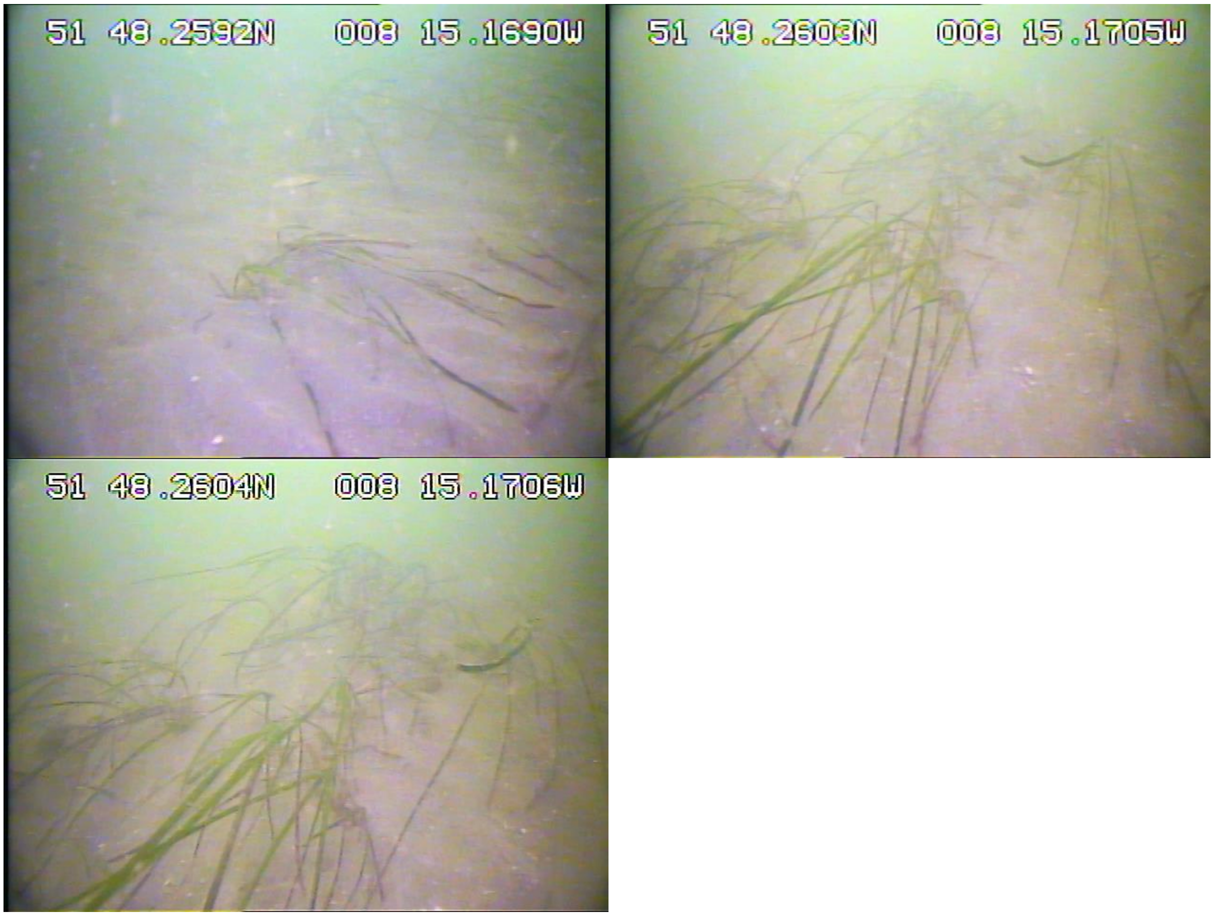


**Plate 3-9 Transect 5, White Bay, 1st September 2020**

The seafloor along Transect 5 consisted of clean medium sand formed into small waves. Sparce individual clumps of seagrass, *Zostra marina*, were recorded growing in the sand.

### 3.2.6. Transect 6

The seafloor along Transect 3 consisted of clean medium sand formed into small waves with shell and drift algae scattered over its surface. Sparce individual clumps of seagrass, *Zostra marina*, were recorded growing in the sand. A starfish, *A. rubens*, was imaged foraging on the bottom and in feeding stance probably consuming a bivalve.


**Plate 3-10 Transect 6, White Bay, 1st September 2020**

### 3.2.7. Transect 7

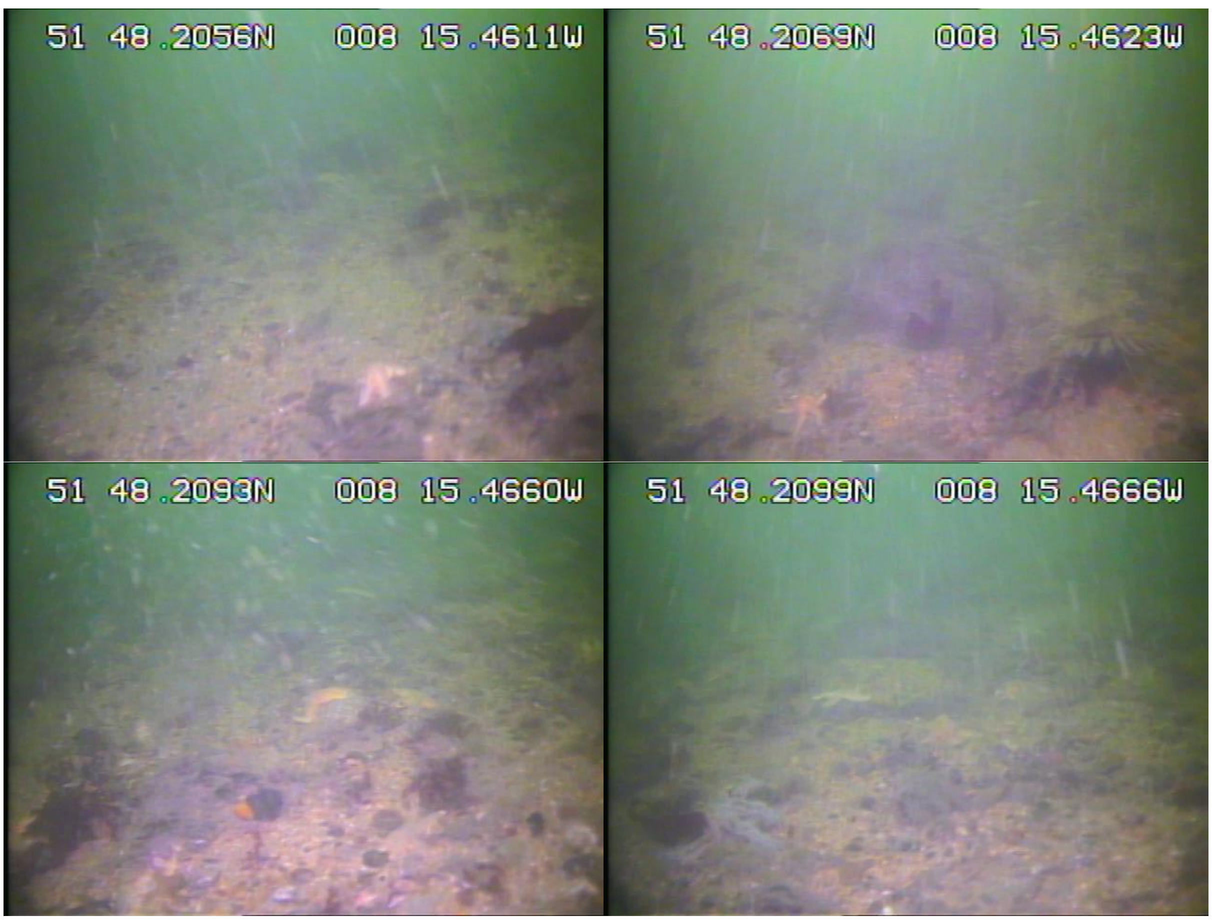


**Plate 3-11 Transect 7, White Bay, 1st September 2020**

The seafloor along Transect 7 consisted of coarse sand, cobble, and boulder. Numerous starfish (*A. rubens* and *Marthasterias glacialis*) were imaged along with hydroid tufts and red algae attached to the rock surface.

### 3.2.8. Transect 8

The seafloor recorded along Transect 8 consisted predominantly of coarse sand, stones, cobble, and boulders. The large boulders had a cover of the pink Corallinaceae crust, a hard weed that encrust rocks, shells, and other weeds. Sea urchins, *E. esculentus*, sponge, *C. celata* and starfish, *A. rubens*, were observed. A school of Coley, *Pollachius virens*, followed the camera towards the end of recording.

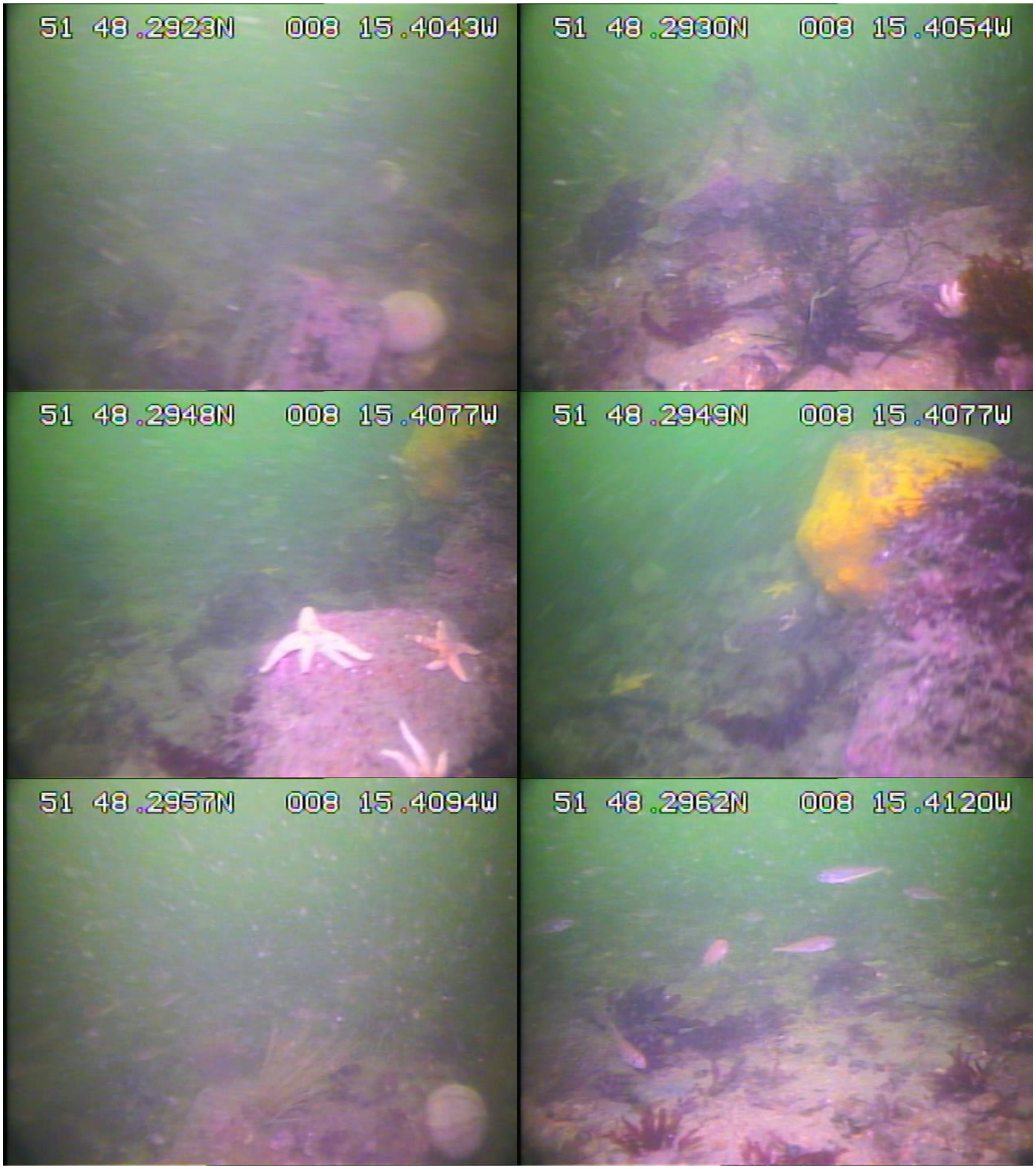


**Plate 3-12 Transect 8, White Bay, 1st September 2020**

### 3.2.9. Transect 9

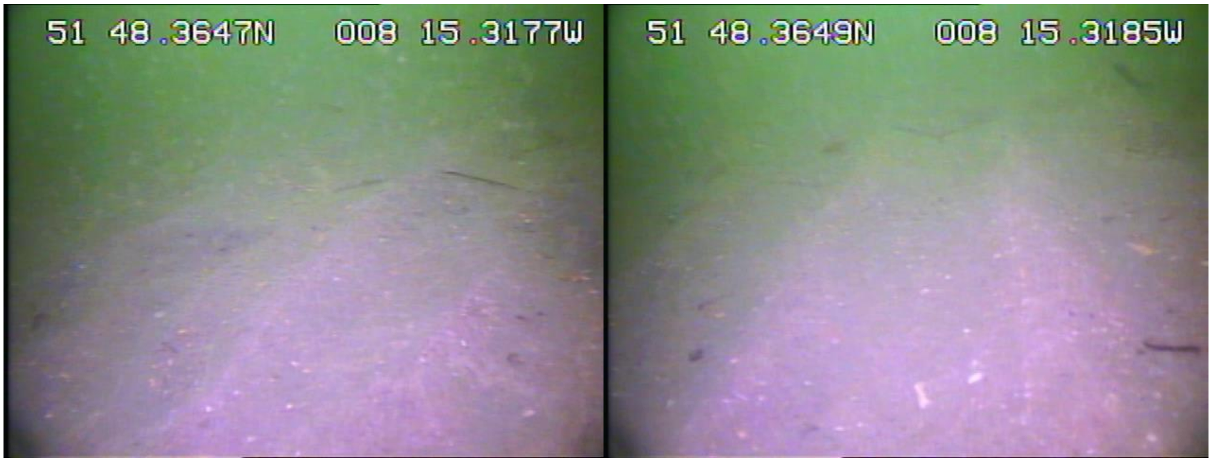


**Plate 3-13 Transect 9, White Bay, 1st September 2020**

The seafloor along Transect 9 consisted of clean medium sand formed into small waves with a light scattering of broken shell and drift algae on its surface.

### 3.2.10. Transect 10


**Plate 3-14 Transect 10, White Bay, 1st September 2020**

The seafloor along Transect 10 consisted of clean medium sand formed into small waves.

### 3.2.11. Transect 11

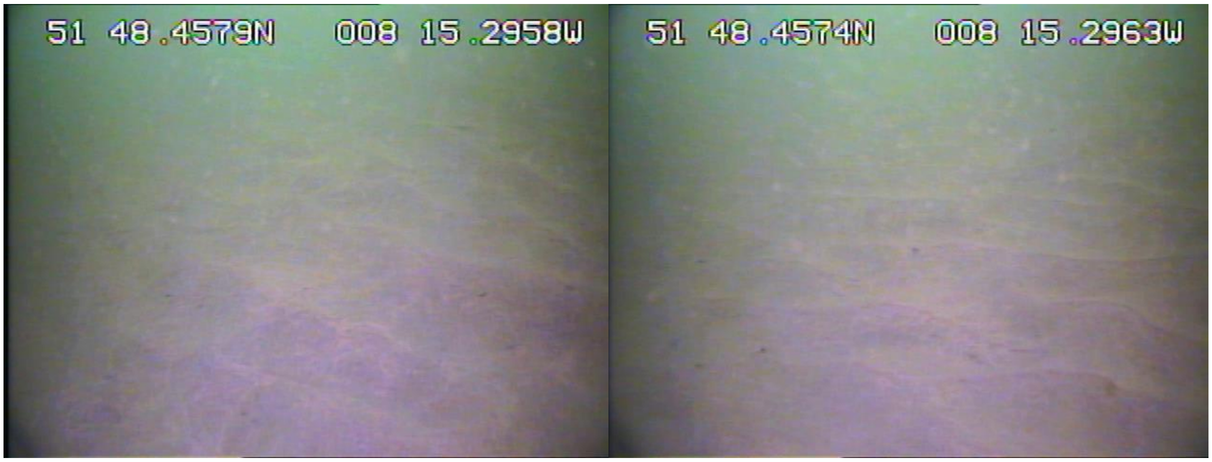


**Plate 3-15 Transect 11, White Bay, 1st September 2020**

The seafloor along Transect 11 consisted of clean medium sand formed into small waves.

### 3.2.12. Transect 12


**Plate 3-16 Transect 12, White Bay, 1st September 2020**

The seafloor along Transect 12 consisted of clean medium sand formed into small waves. A Swimming crab, *Liocarcinus depurator*, was imaged on the sand.

### 3.2.13. Transect 13

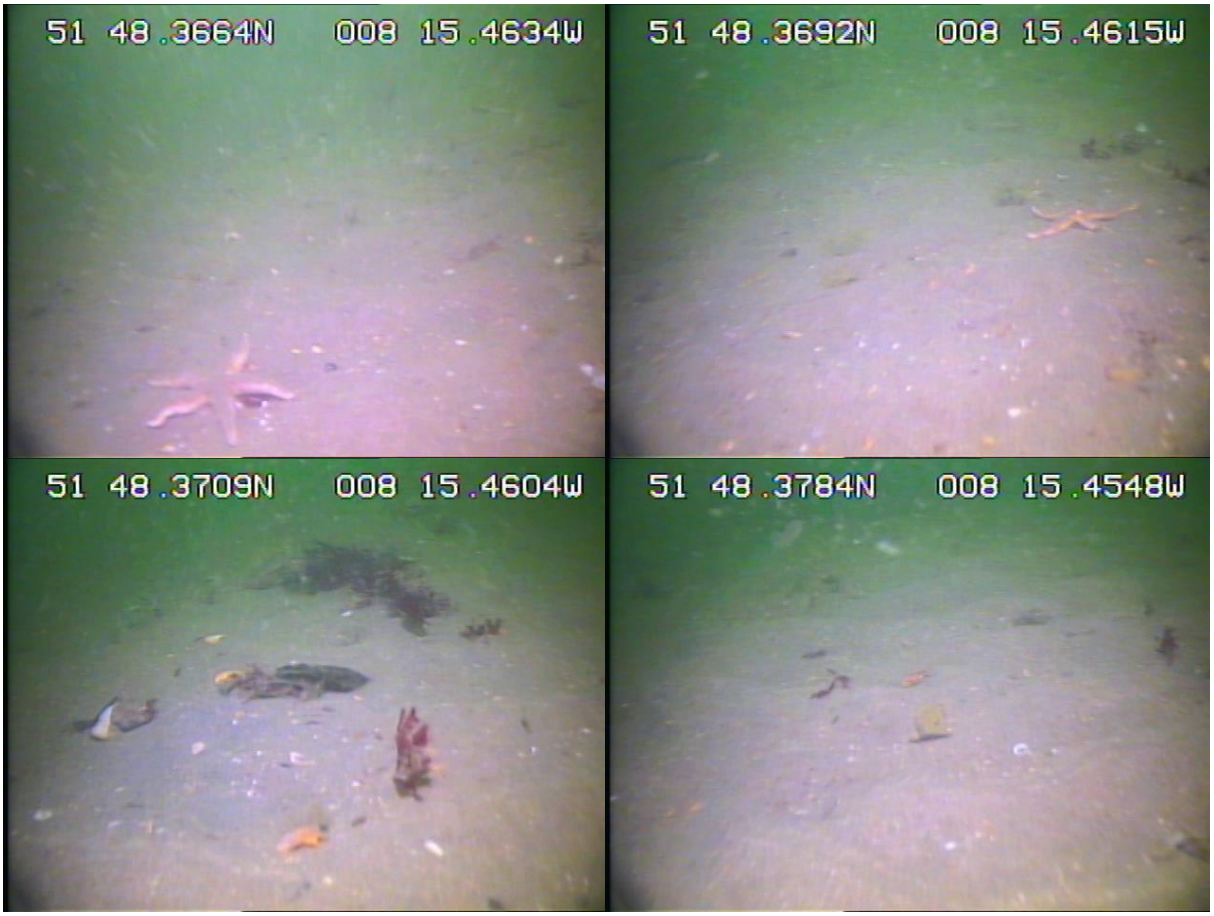


**Plate 3-17 Transect 13, White Bay, 1st September 2020**

The seafloor along Transect 13 consisted of clean medium sand formed into small waves with a scattering of broken shell and drift algae on its surface. Several starfish, *A. rubens* were imaged.

### 3.2.14. Transect 14

The seafloor along Transect 13 consisted of coarse sand, shell, and small rocks. Starfish, *A. rubens* and fish, *P. virens,* were imaged.

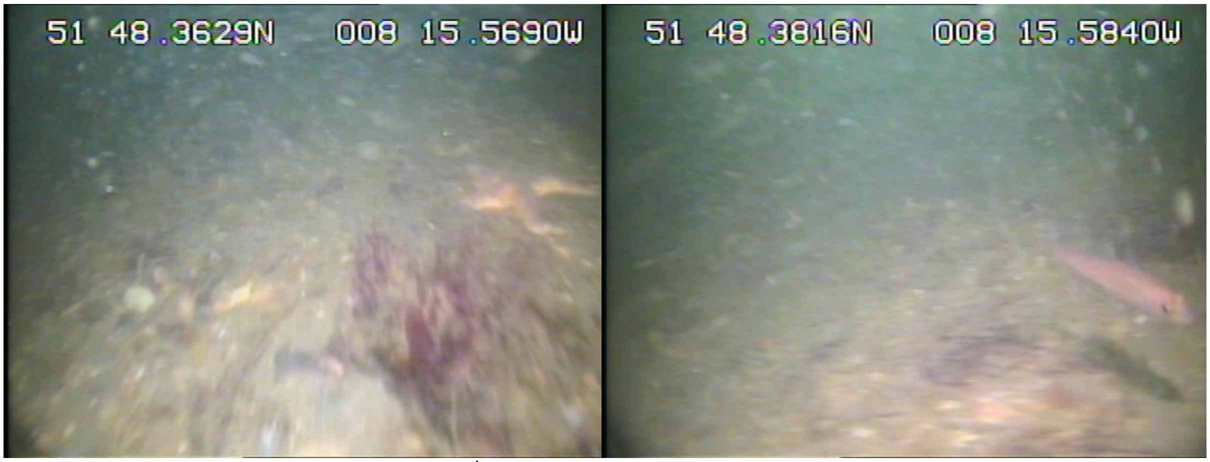


**Plate 3-18 Transect 14, White Bay, 1st September 2020**

### 3.2.15. Transect 15


**Plate 3-19 Transect 15, White Bay, 1st September 2020**

The seafloor along Transect 15 was covered with shell and coarse sand. A large starfish, *M. glacialis*, was imaged.

### 3.2.16. Transect 16


**Plate 3-20 Transect 16, White Bay, 1st September 2020**

The seafloor along Transect 16 was covered with shell and coarse sand. A starfish, *A. rubens,* was imaged.

### 3.2.17. Transect 17

The seafloor along Transect 17 consisted of coarse sand, cobble and boulders. A strong tidal current was sweeping across the bottom at the time of filming as was apparent from the red algae and hydroid tufts that were bent over in the current. Starfish, *A. rubens*, urchins, *E. esculentus* and numerous Plumose anemones, *Metridium senile,* were noted.

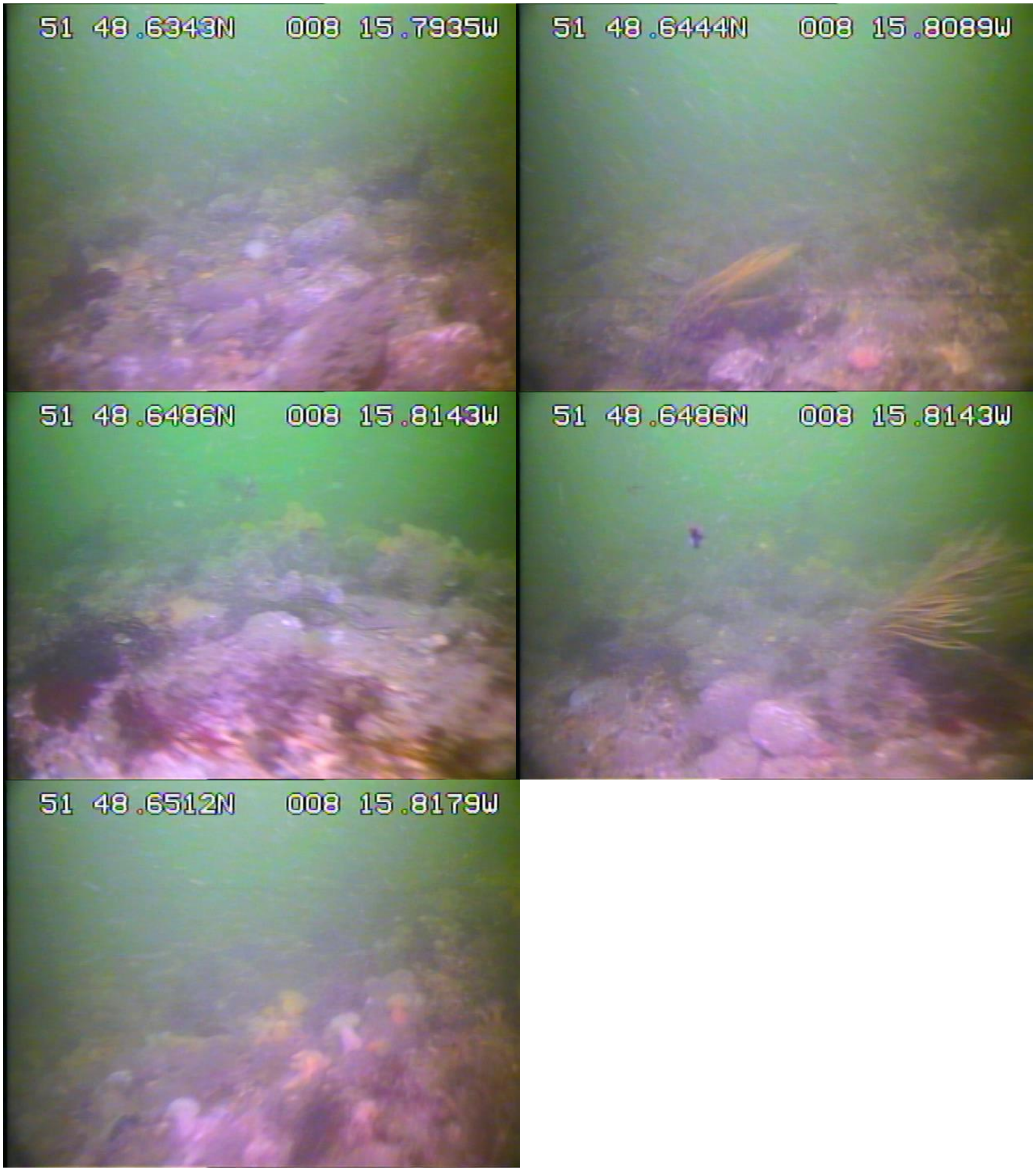


**Plate 3-21 Transect 17, White Bay, 1st September 2020**

# 4. Conclusion

The littoral shore that the proposed outfall pipe will cross can be classified as a moderately exposed medium to fine grained sand shore. A preliminary examination of the residues from each of the cores following sieving on a 1mm sieve revealed few faunal species present in the cores and it is likely the habitat can be classified as 'Barren or amphipod-dominated mobile sand shores' (JNCC, 2015, LS.LSa.MoSa, EUNIS A2.22). These are shores consisting of clean mobile sands (coarse, medium and some fine-grained), with little very fine sand, and no mud present. Shells and stones may occasionally be present on the surface. The sands are non-cohesive, with low water retention, and thus subject to drying out between tides, especially on the upper shore and where the shore profile is steep. Most of these shores support a limited range of species, ranging from barren, highly mobile sands to more stable clean sands supporting communities of isopods, amphipods and a limited range of polychaetes. Species which can characterize mobile sand communities include *Scolelepis squamata*, *Pontocrates arenarius*, *Bathyporeia pelagica*, *Bathyporeia pilosa, Haustorius arenarius* and *Eurydice pulchra*.

Mobile sand shores are typically situated along open stretches of coastline, with a relatively high degree of wave exposure. Bands of gravel and shingle may be present on the upper shore of exposed beaches. Where the wave exposure is less, and the shore profile more shallow, mobile sand communities may also be present on the upper part of the shore, with more stable fine sand communities present lower down. A strandline of talitrid amphipods (Tal) typically develops at the top of the shore where decaying seaweed accumulates. Mobile sand shores may show significant seasonal changes, with sediment accretion during calm summer periods and beach erosion during more stormy winter months. There may be a change in sediment particle size structure, with finer sediment grains washed out during winter months, leaving behind coarser sediments. (Information from Connor *et al.*, 2004; JNCC, 2015).

As this biotope is characterized by the absence, rather than the presence of species, recovery is assessed as 'High' for any level of impact.

The rock outcrops to the north and south of the sand beach can be characterised as LR.MLR.BF (JNCC, 2015, EUNIS A1.21) - Barnacles and fucoids on moderately exposed shores. This biotope is found on moderately exposed rocky shores characterized by a mosaic of fucoids and barnacles on bedrock and boulders, where the extent of the fucoid cover is typically less than the blanket cover associated with sheltered shores. Other species are normally present as well in this habitat including the winkle *Littorina littorea*, the whelk *Nucella lapillus* and the red seaweed *Mastocarpus stellatus*. The presence of boulders and cobbles on the shore can increase the micro-habitat diversity, which often results in a greater species richness. Sand-influenced exposed to moderately exposed lower shore rock can be characterized by dense mats of *Rhodothamniella floridula* (Rho). (Information from Connor *et al.*, 2004; JNCC, 2015).

Ecological relationships within this biotope are very complex resulting in dynamic communities with a mosaic of patches of fucoid cover, dense barnacles and limpets subject to small scale temporal variations due to seasonal and non-seasonal factors. While physical factors clearly influence the distribution and abundance of species on rocky shores it is the interaction between physical and biological factors that is responsible for much of the structure and dynamics of rocky shore communities.

Fucoid-barnacle mosaics on rocky shores are highly variable in space and time and considerable natural change is seen, especially in seaweed cover and number of limpets (Hartnoll & Hawkins, 1985). Natural changes can easily cause a given area to progress through a number of biotopes over time. Seasonal changes are also apparent on rocky shores with seasonal variation in growth and recruitment. *Fucus serratus* plants, for example, lose fronds in the winter, followed by regrowth from existing plants in late spring and summer, so that summer cover can be about 250% of the winter level (Hawkins & Hartnol, 1980). The barnacle population can be depleted by the foraging activity of the dog whelk *Nucella lapillus* from spring to early winter and replenished by settlement of *Semibalanus balanoides* in the spring and *Chthamalus* spp. in the summer and autumn.

*Sabellaria alveolata* was recorded within this biotope on the rock outcrops north of the beach. The occurrence of the species was restricted to very small patches within LR.MLR.BF rather than the classic honeycomb reef. This micro habitat can be described as *Sabellaria alveolata* reefs on sand-abraded eulittoral rock - LS.LBR.Sab.Salv (JNCC

2015, EUNIS A2.711). *Sabellaria alveolata* reefs occur in littoral wave exposed or moderately exposed locations. Where siltation does occur, wave action is likely to rapidly remove silty deposits. As reefs have some resistance to periodic smothering and burial, resistance to siltation is assessed as 'High' and recovery as 'High', so that this biotope is considered to be 'Not Sensitive'.

A number of habitats were recorded during the drop-down video survey of the sublittoral area in the vicinity of the outfall location and greater White Bay area (Figure 4-1). The seafloor at the proposed location of the outfall consisted of medium to fine sand sea formed into small waves by the action of the tidal currents. This is a continuation of the sand shore intertidal and it is likely the habitat can be described as Infralittoral mobile clean sand with sparse fauna- SS.SSa.IFiSa.IMoSa (JNCC 2015, EUNIS A5.231). Typically, this has medium to fine sandy sediment in shallow water, often formed into dunes, on exposed or tide-swept coasts that often contain very little infauna due to the mobility of the substratum. Some opportunistic populations of infaunal amphipods may occur, particularly in less mobile examples in conjunction with low numbers of mysids such as *Gastrosaccus spinifer*, the polychaete *Nephtys cirrosa* and the isopod Eurydice *pulchra*. Sand eels *Ammodytes* sp. may occasionally be observed in association with this biotope (and others). Common epifaunal species such as *Pagurus bernhardus,Carcinus maenas, Asterias rubens* and *Liocarcinus depurator* may be encountered and are the most conspicuous species present (JNCC, 2015).

As a consequence of the dynamic nature of the habitat the faunal component of the biotope is very sparse and low in species richness. Therefore, the community might be considered 'mature' only a few days or weeks after the last storm event, as the mobile species displaced from the biotope and those from adjacent area colonize the substratum via the surf plankton. Even following severe disturbances recovery would be expected to occur within a year. Biotope resilience is therefore assessed as **'High'** for any level of impact (e.g. where resistance is 'None', 'Low' or 'Medium').

The seagrass, *Zostera marina*, was recorded in low density at a number of locations within the sand habitat. The habitat where this species is found is described as *Zostera (Zostera) marina* beds on lower shore or infralittoral clean or muddy sand - SS.SMp.SSgr.Zma (JNCC 2015, ENUS A5.5331). However, SS.SMp.SSgr.Zma is normally associated with seagrass meadows and sparse beds of *Zostera marina* may be more readily characterized by their infaunal community (MarLIN, 2020).

Outside the sand habitat, the seafloor was predominantly composed of boulder, cobble and coarse sand. There were two main biotopes recorded from here and mainly differentiated by the percentage cover of rock and boulders. The rockier biotope can be described as CR.MCR.EcCr.AdigVt – *Alcyonium digitatum* and faunal crust communities on vertical circalittoral bedrock (JNCC 2015, EUNIS A4.215).

This biotope typically occurs on the vertical faces and overhangs of exposed to moderately exposed lower infralittoral and upper circalittoral bedrock subject to moderately strong to weak tidal streams. Due to the large numbers of the urchin *Echinus esculentus* often recorded, this biotope tends to have a grazed appearance, and the bedrock is often encrusted with pink coralline algae, encrusting bryozoans such as *Parasmittina trispinosa* and the calcareous tubeworm *Spirobranchus triqueter*. Dense aggregations of dead man's fingers *Alcyonium digitatum* may be present along with the cup coral *Caryophyllia smithii.* Other species present include the echinoderms *Asterias rubens, Ophiothrix fragilis* and *Antedon bifida*, the ascidians *Clavelina lepadiformis, Ciona intestinalis* and *Ascidia mentula*, the anthozoans *Urticina felina, Cortynactis viridis, Metridium senile* and *Sagartia elegans*, the gastropod *Calliostoma zizyphinum* and the crustacean *Cancer pagurus*. Three regional variations of this biotope have been recorded (Information from Connor *et al.*, 2004). The biotope is faunally dominated and circalittoral and is therefore not dependent on light, so a change in suspended sediment is unlikely to affect the characterizing species and resistance is therefore assessed as '**High**', resilience as '**High**' and the biotope is '**Not sensitive**' (MarLIN, 2020).

The other biotope recorded was Sublittoral coarse sediment (SS.SCS, JNCC 2015), that is difficult to determine without a description of the faunal component that requires a grab sampling effort. There was a strong tidal current along these stations at the time of recording.

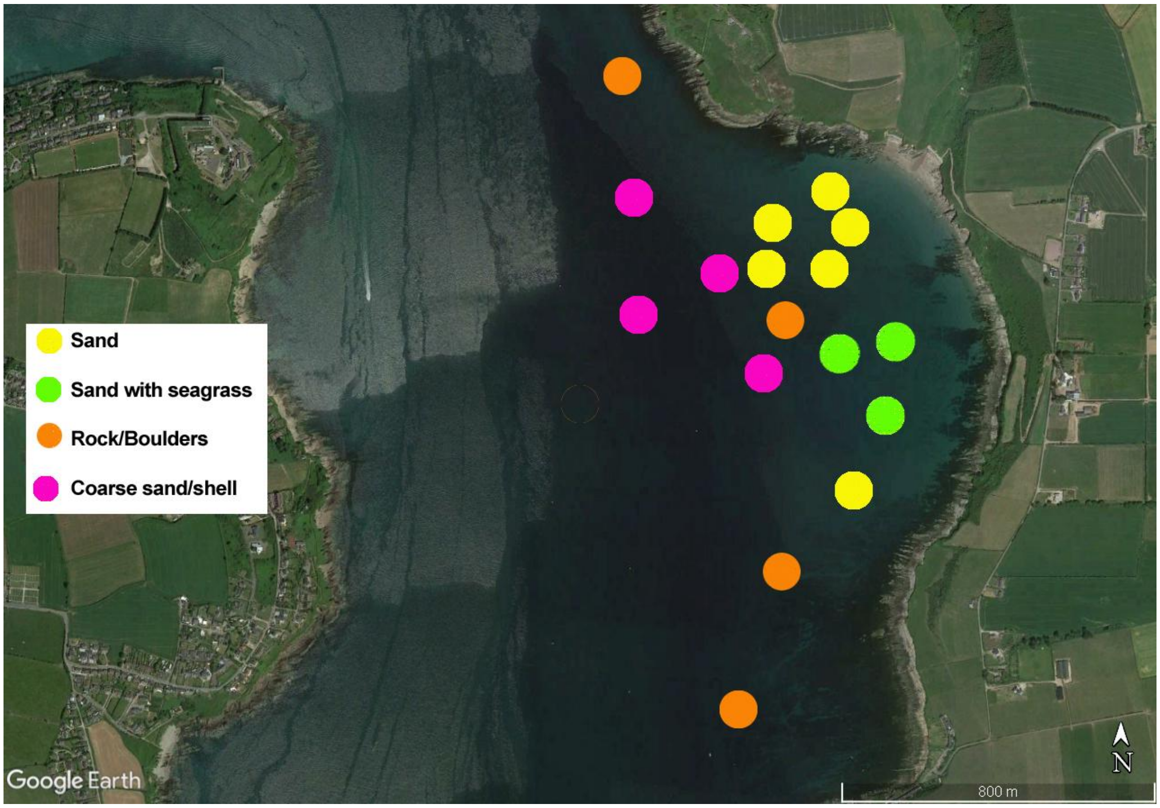


**Figure 4-1 Habitat distribution, White Bay, 1st September 2020.**

## References

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