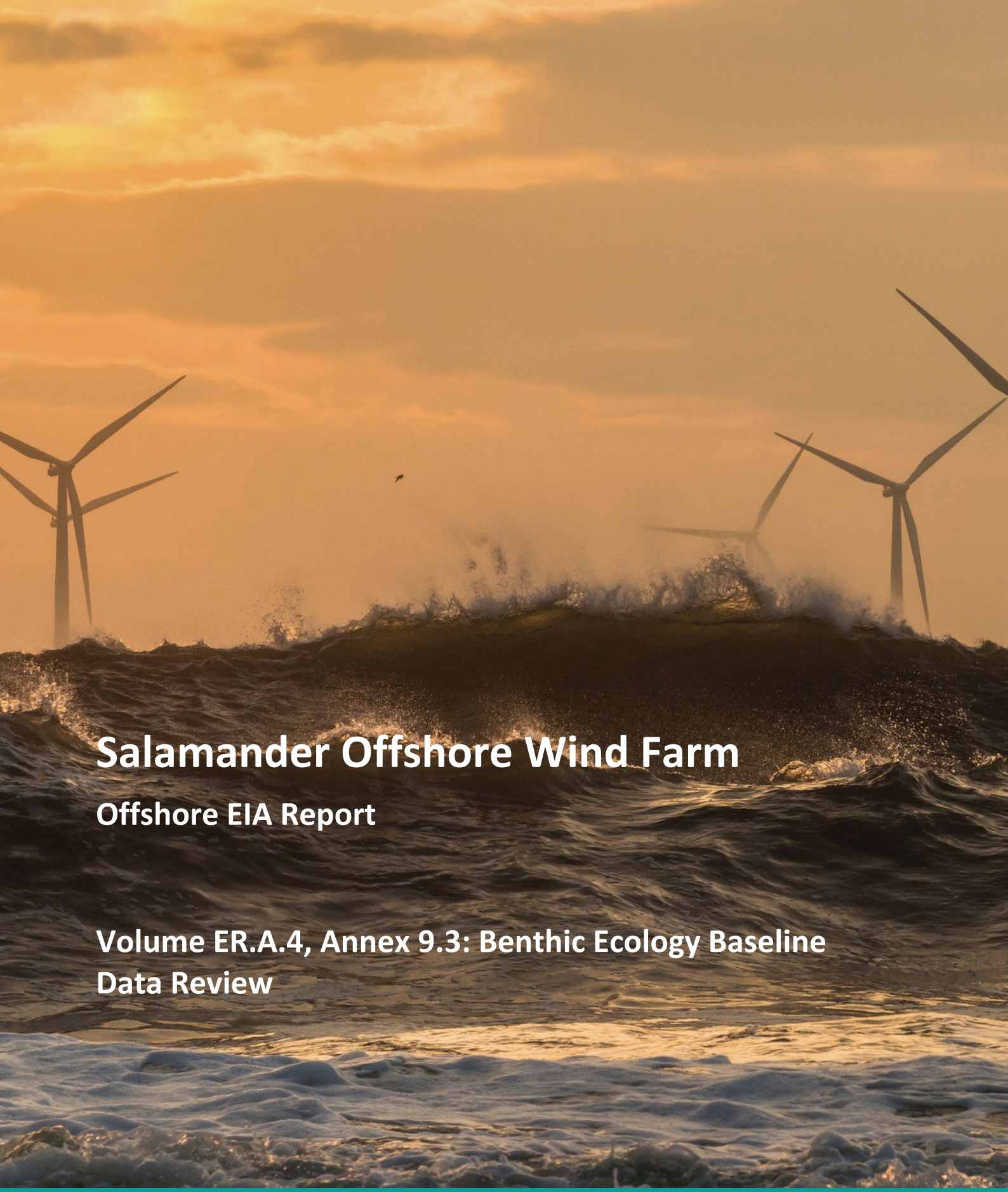

# Salamander Offshore Wind Farm

## Offshore EIA Report

## Volume ER.A.4, Annex 9.3: Benthic Ecology Baseline Data Review

SALAMANDER

Powered by Ørsted and
Simply Blue Group

Simply Blue Energy Ltd

# Salamander Offshore Wind Farm EIA Scoping (Offshore/Onshore)

## Benthic Ecology Baseline Data Review

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# CONTENTS

# ACRONYMS

| ACRONYM | DEFINITION |
|---|---|
| CEFAS | Centre for Environment, Fisheries and Aquaculture Science |
| EIA | Environmental Impact Assessment |
| EUNIS | European Nature Information System |
| GW | Gigawatt |
| JV | joint venture |
| MBES | multibeam echo sounder |
| MW | Megawatt |
| NCMPA | Nature Conservation Marine Protected Area |
| NMPI | National Marine Plan Interactive |
| PMF | Priority Marine Feature |
| SBES | Simply Blue Energy (Scotland) Limited |
| SBTi | Science Based Targets initiative |
| SNH | Scottish Natural Heritage |
| SSS | side scan sonar |
| UK | United Kingdom |

# 1 INTRODUCTION

## 1.1 Company background

Salamander Offshore Wind Company Ltd. is a joint venture (JV) partnership between Ørsted, Simply Blue Group and Subsea 7 is proposing the development of the Salamander Offshore Wind Farm (the Project).

Ørsted develops, constructs, and operates offshore and onshore wind farms, solar farms, energy storage facilities, renewable hydrogen and green fuels facilities, and bioenergy plants. Moreover, Ørsted provides energy products to its customers. Ørsted is the only energy company in the world with a science-based net-zero emissions target as validated by the Science Based Targets initiative (SBTi). Ørsted ranks as the world's most sustainable energy company in Corporate Knights' 2022 index of the Global 100 most sustainable corporations in the world and is recognised on the CDP Climate Change A List as a global leader on climate action.

Simply Blue Group is a leading marine developer with projects covering wind energy, wave energy and aquaculture. Working to replace fossil fuels with offshore renewable alternatives, Simply Blue Group collaborate with likeminded partners to advocate for offshore wind, wave power and the development of sustainable aquaculture. Founded in 2011, Simply Blue Group have projects located in the seas off the British and Irish coasts, with a combined capability of approximately 2.7 Gigawatt (GW), with projects including the Western Star Floating Wind, Emerald Floating Wind and Erebus Floating Wind farms.

Subsea 7 is a global leader in the delivery of offshore projects and services for the evolving energy industry. Subsea 7 creates sustainable value by being the industry's partner and employer of choice in delivering the efficient offshore solutions the world needs.

## 1.2 Project overview

The Project is proposing to demonstrate the offshore wind capabilities of the North Sea through the installation of an up to 100 Megawatt (MW) capacity floating wind farm approximately 35 km off the coast of Peterhead supported by an export cable corridor making landfall approximately 2.5 km to the north of Peterhead. This will help facilitate the move towards the net-zero targets as transposed through the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 and will contribute to the United Kingdom (UK) Government's target of developing 1 GW of operational offshore wind power by 2030. Additionally, the learnings from the Project will support the commercialisation of floating offshore wind, especially the Scotwind projects that are likely to follow soon after Salamander.

The Project will combine the knowledge of the JV partnership and their experience in offshore wind energy to provide an opportunity for the local supply chain to scale-up in preparation for the commercial, GW scale opportunities in Scotland resulting from the ScotWind process. This will maximise the financial benefit of offshore wind power capabilities in Scotland and generate long term job opportunities for local communities. The Project will be supported by a UK grid connection to maximise the benefits of this offshore wind resource.

## 1.3 Purpose and scope of this report

In August/September 2022, the Project undertook specific geophysical and benthic surveys within the Salamander export cable corridor and the array area. Nineteen grab samples were taken along the Project export cable corridor, and thirty-eight grab samples were taken in the Salamander array area. It was not possible to reach an agreement with creelers to clear the inshore area of gear to enable the surveys to take place in the nearshore 8 km of the export cable corridor despite efforts to engage and reach agreement following FLOWW best practice guidance. In addition there were not the available weather days to enable a safe survey over the winter months. Therefore, the Project has been unable to acquire site specific data in the nearshore ~8 km (west of the 1°40 line, and here after referred to as the "Salamander nearshore export cable corridor"). The rest of the export cable corridor from the 1°40 line to the array area (and the array area itself) has been surveyed. SBES has recently engaged with MS-LOT and NatureScot regarding this and it was agreed in principle to use existing data to support the EIA. SBES have asked Xodus to undertake a Benthic Ecology Baseline Data Review of available desktop data for the Salamander nearshore export cable corridor area. The Benthic Ecology Baseline Data Review is required to assess and demonstrate the level of robustness and confidence that the data will be sufficient for the purposes of the EIA. The results of this Benthic Ecology Baseline Data Review will be included in the Scoping Report to enable agreement on using alternative desk based assessments to support the Section 36 consent and Marine Licence applications. This report will also be used by the Project's EIA consultants to help inform the baseline for the EIA.

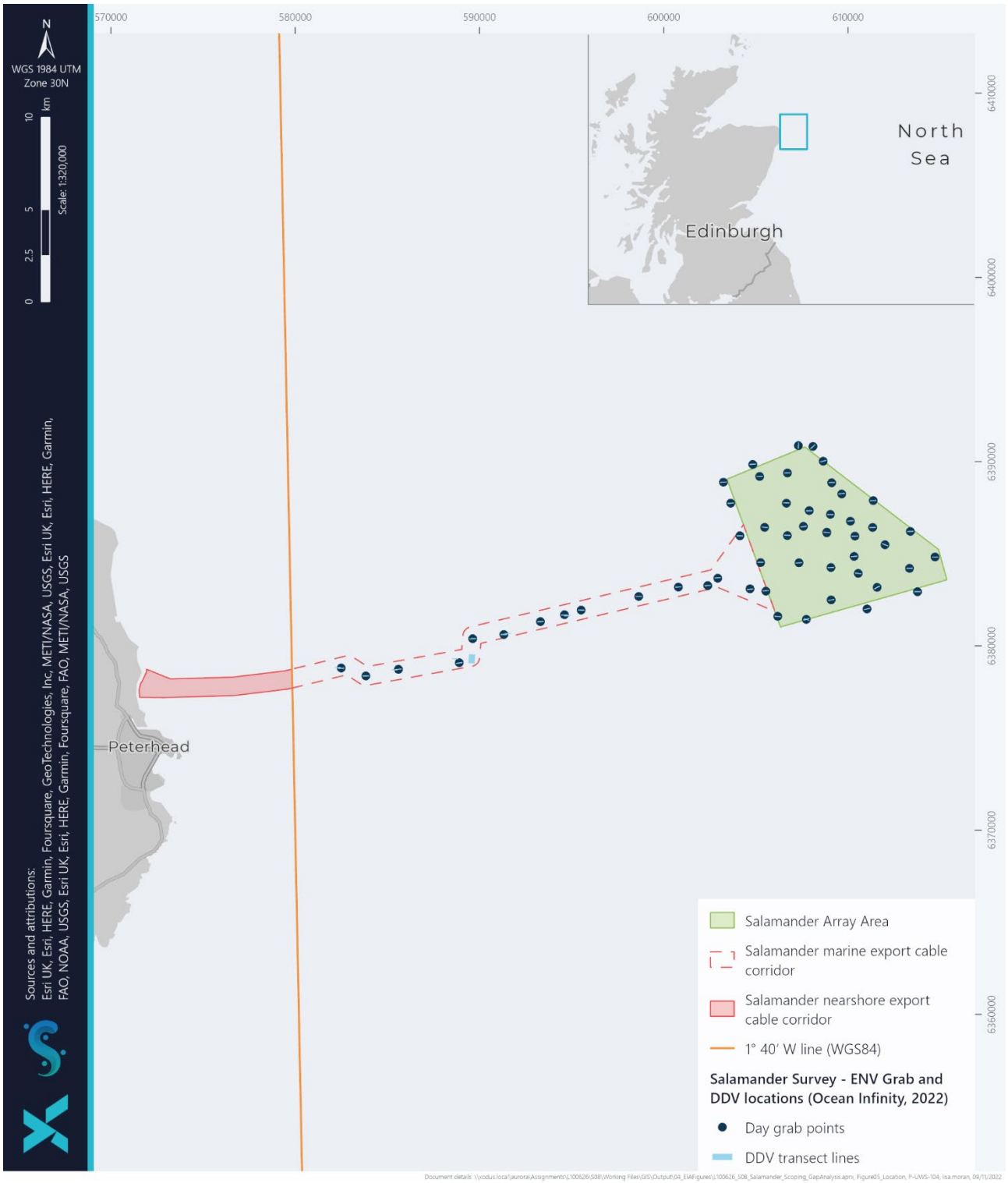



*Figure 1-1 Export Cable corridor showing Salamander nearshore cable corridor west of the 1°40 line*

# 2 METHODOLOGY

- This Benthic Ecology Baseline Data Review utilises publicly available data sources and survey results from neighbouring projects to describe the survey coverage for the Salamander nearshore export cable corridor where SBES were unable to undertake benthic and geophysical surveys.
- The data sources and survey results found have been outlined and discussed, and GIS figures have been created to show the overlaps/ proximity of the data to the Salamander nearshore export cable corridor area.
- The report contains a discussion of the outcomes of the analysis, outlining remaining data gaps and uncertainties as well as recommendations.

# 3 BENTHIC ECOLOGY BASELINE DATA REVIEW

## 3.1 Overview of available survey data

The key surveys identified during the desk-top review and incorporated into this Benthic Ecology Baseline Data Review are outlined in Table 3-1.

*Table 3-1 Summary of Key Datasets and Reports*

| SOURCE AND DATA | SURVEY/REPORT TITLE | DESCRIPTION OF SURVEY AND RELEVANCE TO SALAMANDER |
|---|---|---|
| Scottish Natural Heritage (SNH) (2015) | 2015 SNH Southern Trench (outer Moray Firth) benthic camera and infaunal grab survey | • A benthic survey was carried out by Centre for Environment, Fisheries and Aquaculture Science (CEFAS) for SNH (now NatureScot) within the Southern Trench Nature Conservation Marine Protected Area (NCMPA) proposal from the vessel RV Endeavour from 5th-7th December 2015.<br>• 14 video camera sites were worked during the survey.<br>• The most relevant sample sites to Salamander nearshore export route were STTR09 and STTR10 (Figure 3-1), located 5 km north and 9.6 km northeast respectively. |
| SNH (2017) | 2017 SNH Rattray Head benthic camera survey | • Quantitative drop-down camera sampling was undertaken.<br>• 17 sample sites located between Fraserburgh and Peterhead.<br>• Through the analysis of seabed video, segments were assessed for the presence of protected features and other Priority Marine Features (PMFs), as well as for the presence of species and habitats of recognised conservation importance (SNH, 2017b).<br>• Sample sites SAB_V05, SAB_V08 and SAB_V10 were of particular interest for this report.<br>• Site SAB_V08 is located within the Salamander nearshore export cable corridor.<br>• Sites SAB_V05 and SAB_V10 are located approximately 3.14 km and 11.03 km north of the Salamander nearshore export cable corridor (Figure 3-1). |
| Axelsson O'Dell and Dewey (2017) | Infaunal and particle size analysis (PSA) analyses of benthic samples collected from South Arran MPA, Lochs Duich, Long and Alsh MPA and Southern Trench MPA proposal | Report of the infauna and sediment particle size analysis carried out at seven out of 14 sample stations acquired during the 2015 SNH Southern Trench survey. However, sediment particle size analysis was not undertaken at STTR09 or STTR10, and therefore this source is not discussed further within this report. |
| Moore (2017) | Biological analyses of underwater video from ongoing monitoring and research cruises in Southern Trench | This report analysis the video footage from the 2015 SNH Southern Trench benthic camera surveys. |
| Moore (2019) | Biological analyses of underwater video from monitoring and research cruises in Rattray Head, and around the Southern Trench in outer Moray Firth. | This report analysis the video footage from the 2017 SNH Rattray Head benthic camera surveys. |
| MMT (2013a) | Hywind Geophysical survey | Geophysical survey undertaken for the Hywind offshore wind farm area and export cable corridor. The Hywind cable corridor survey it is located 0.23 km south of the Salamander nearshore export cable corridor at the closest point. Instruments used during the geophysical survey were multibeam echo sounder (MBES), side scan sonar (SSS), sub-bottom profiler and magnetometer. This data acquisition was used to identify bathymetry and seabed features which informed the habitat characterisation and the selection of environmental sample stations. |
| MMT (2013b) | Hywind Environmental survey report. | • Environmental baseline survey (including habitat assessment) undertaken for the Hywind offshore wind farm area and export cable corridor.<br>• Hywind cable corridor survey is located 0.23 km south of the Salamander nearshore export cable corridor at the closest point.<br>• The survey included drop down camera, grab sampling, MBES and SSS.<br>• Sample points S01 to S07 of the 2013 MMT survey have been discussed further within this report. These are the closest sample points undertaken by MTT (2013) to the Salamander nearshore export cable corridor. (Note that grabs were only taken at S01 and S07). |

## 3.2 Survey coverage

As outlined in Table 3-1 and shown in Figure 3-1, three surveys were undertaken in the vicinity of the Salamander nearshore export cable corridor including the 2017 Rattray Head survey (SNH, 2017), the 2015 Southern Trench survey (SNH, 2015) and the 2013 MMT geophysical and environmental survey (MMT, 2013a; MMT, 2013b). The findings from these surveys have been used to help characterise the benthic environment within the Salamander nearshore export cable corridor. The closest and most relevant stations from these surveys are SAB_V08, SAB_V05, and S02, S03, S04, S05, S06 and S07, as shown in Figure 3-1. For further details on the survey observations for these stations, see Appendix A and Appendix B. For habitat images of these stations, see Appendix C.

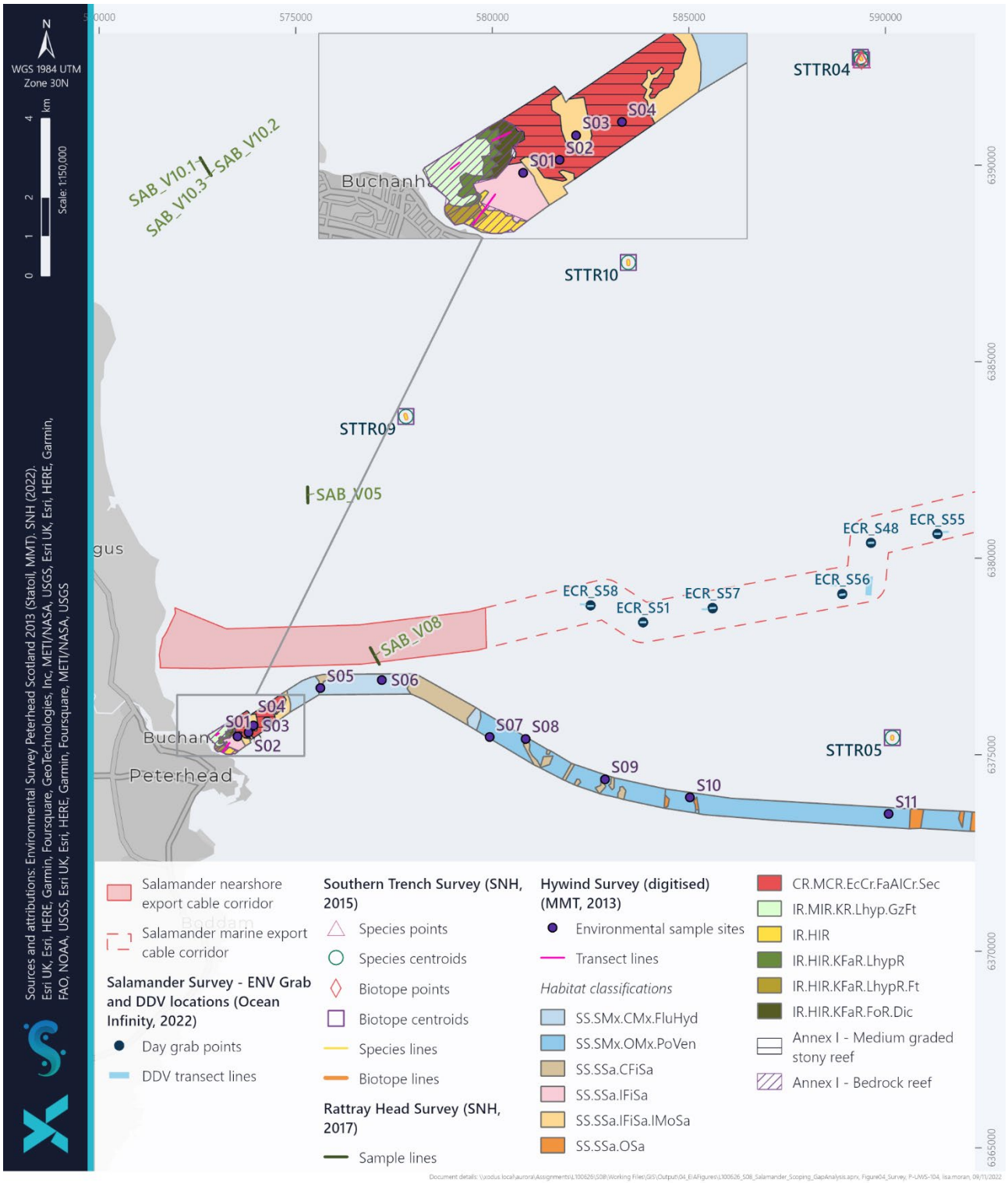
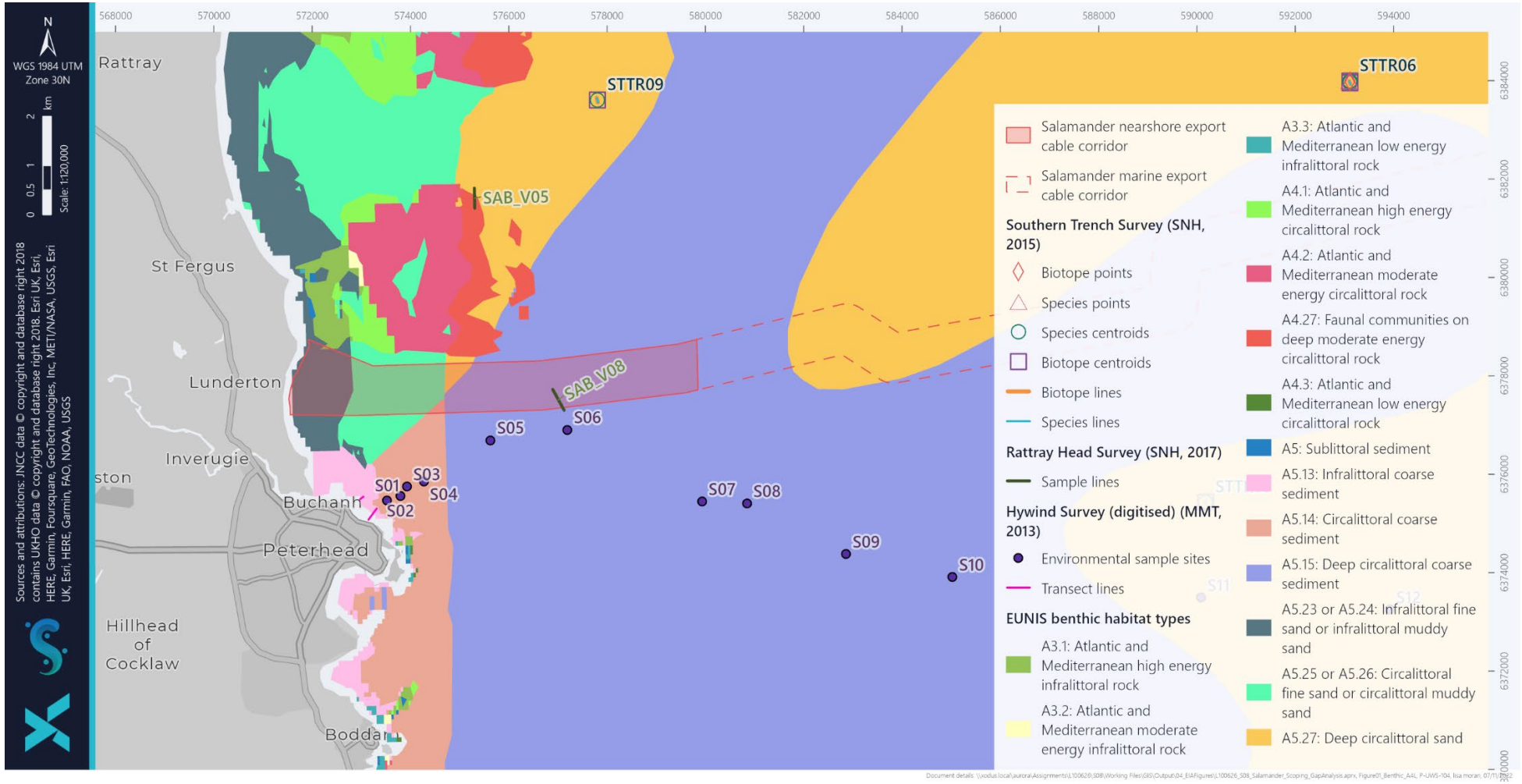



*Figure 3-1 Survey locations in relations to the Salamander nearshore export cable corridor*

## 3.3 Benthic habitats and species

The benthic habitat type that underlies the Salamander nearshore export cable corridor is classified under the European Nature Information System (EUNIS). The following EUNIS benthic habitat types may be found within the nearshore area (Figure 3-2; EUSeaMap, 2019):

- A5.23 or A5.24: Infralittoral fine sand or infralittoral muddy sand;
- A5.25 or A5.26: Circalittoral fine sand or circalittoral muddy sand;
- A5.14: Circalittoral coarse sediment;
- A3.1: Atlantic and Mediterranean high energy infralittoral rock;
- A5.27: Deep circalittoral sand; and
- A5.15: Deep circalittoral coarse sediment.




*3-2 EUNIS Benthic Habitats with Survey sample data (SNH, 2015, 2017 and MMT, 2013)*

Beyond approximately 3 km from landfall, there is an extensive area of seabed predicted to be comprised of a single EUNIS habitat: A5.15: Deep circalittoral coarse sediment. This EUNIS habitat was well represented in the surveys included in this Benthic Ecology Baseline Data Review. From the SNH (2017) survey, the transect SAB_V08 falls within the Salamander export cable corridor along this section of route at approximately 50 m depth. The habitat was described as predominantly fine sand (70%) with cobbles and boulders encrusted with *Sabellaria spinulosa* and supporting the soft coral *Alcyonium digitatum* and hydroid and bryozoan turfs (CR.MCR.CSab.Sspi.ByB) (Moore, 2019). The Hywind survey corridor runs parallel to the Projects nearshore export corridor route, in particular, the habitats described in the Hywind survey stations S05, S06 and S07 could be considered to serve as a proxy of the habitats expected to be encountered, especially the habitats at stations S05 and S06, which are situated approximately 0.25 km to the south of the Salamander nearshore export cable corridor (~0.25 km) (MMT, 2013b).

Sample station S05 was described as a large sand and gravel area with frequent boulder occurrence where, despite a depth of approximately 50 m, had very strong currents. Attached on the boulders were hydrozoans and anthozoans that together formed the habitat "*Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment" (SS.SMx.CMx.FluHyd). In this boulder field, the sample station S06 had an area with larger blocks in clast and matrix supported pattern that arose from the seabed. S06 was scored as a "Medium graded stony reef" (Irving, 2009) supporting the habitat "*Flustra foliacea* on slightly scoured silty circalittoral rock" (CR.MCR.EcCr.FaAlCr.Flu) (MMT, 2013b). While it was situated further away, Station S07 was considered representative of the seabed deeper conditions (~62 meters) along the nearshore export corridor immediately to the west of the 1°40 line. This station was notable for having a particularly high number of infaunal species and presence of *Sabellaria* with the habitat being characterised as a "Polychaete rich deep Venus community in offshore mixed sediments (SS.SMX.OMx.PoVen)" (MMT 2013b). As described above this occurs within the broad EUNIS habitat "Deep Circalittoral coarse sediment" which is highly variable.

Stations S04, S03 and S02 are located close to the Hywind cable landfall location, approximately 1.5 km to the south of the Salamander export cable corridor. These stations are characterised by coarse sediments with an increased presence of boulders. While there may be some of this habitat type present in the Salamander Export corridor, it is not expected that this is representative of the habitats close to the landfall of the Salamander nearshore export cable corridor which is expected to be more comprised of finer sands. Along the Salamander export cable corridor towards the shore, the circalittoral coarse sediment is predicted to transition into fine sand and muddy sand as the water depth becomes shallower (Figure 3-2). However, there was no equivalent survey stations that were representative of the fine/muddy sand habitat. The Hywind cable corridor reaches landfall approximately 2 km further to the south and passes through an extension of the circalittoral coarse sediment habitat where there are further boulders and stony reef described as "*A. digitatum* with *S. securifrons* on tide-swept moderately wave-exposed circalittoral rock" (CR.MCR.EcCr.FAAlCr.Sec) (Stations S02 and S04). This is interspersed with areas of "Infralittoral mobile clean sand with sparse epifauna (SS.SSa.IFiSa.IMoSa) (Station_S03) which is expected to be similar to the broad habitat found towards the landfall of the Salamander export cable corridor. Closer to the Hywind landfall site, outcropping bedrock supporting Kelp (*Laminaria*) dominated biotopes in depths <12 m and in areas >12 m, "Foliose red seaweed with dense *Dictyota dichtoma* and/or *Dictyopteris membranacea* on exposed lower infralittoral rock" (MMT 2013b). There is the potential that infralittoral rock habitats similar to this are present along the Salamander nearshore export cable corridor close to the landfall point, although it is anticipated that the coastal area will be primarily composed of sand as was described for Station S03, based on the predicted EUNIS habitats (Figure 3-2).

### 3.3.1 Protected habitats and species

*Annex I Habitats*

The Annex I habitats most likely to occur within the Salamander nearshore export cable corridor are rocky, stony or biogenic reefs, (defined as hard substrata on the sea floor which can be formed in several different ways (EU Commission, 2013).

As shown in Figure 3-3, there is a potential area of rocky reef slightly overlapping to the north of the Salamander nearshore export cable corridor within approximately 1 km from shore (Downie *et al.*, 2016). The nearest sample station to this reef feature was SAB_V05, situated approximately 4 km to the northeast, which indicated heterogenous coarse sediments with patches of potential stony reef and *Sabellaria* aggregations (Moore, 2019). Moore (2019) also reported dense encrustations of *Sabellaria spinulosa* on rock at sample locations SAB_V08, located within the export cable corridor. The habitat was considered to fall within the definition of '*Sabellaria* reefs' on the OSPAR's List of Threatened and/or Declining Species and Habitats (OSPAR, 2013) and also the interpretation of biogenic reef within the EC Habitat Directive. In addition, a small area of 'medium' graded stony reef, assessed based on the Irvine (2009) criteria, was identified at Station S06 approximately 0.25 km to the south of the Salamander nearshore export cable corridor (MMT, 2013b). This stony reef and the potential *Sabellaria* reef at Station SAB_08 are present in an area broadly categorised as circalittoral coarse sediment which occurs across ~5 km of the Salamander nearshore export cable corridor thus indicating that such reef habitats may potentially occur within the corridor.

There are also extensive areas of bedrock reef close to shore, approximately 2 km to the south-east of the Salamander export cable corridor landfall location (MMT 2013a; 2013b) as shown in Figure 3-1. These areas occur out-with the potential Annex I reef area, and therefore indicate that Annex I reef features are more extensive, and/or distributed more widely than is presented in Figure 3-3. It is considered that the biota associated with these bedrock reef features near the landing point of the Hywind survey (*Laminaria* and foliose red seaweeds) are likely to be similar to that found on any bedrock features within the Salamander nearshore export cable corridor close to shore (within ~1 km).

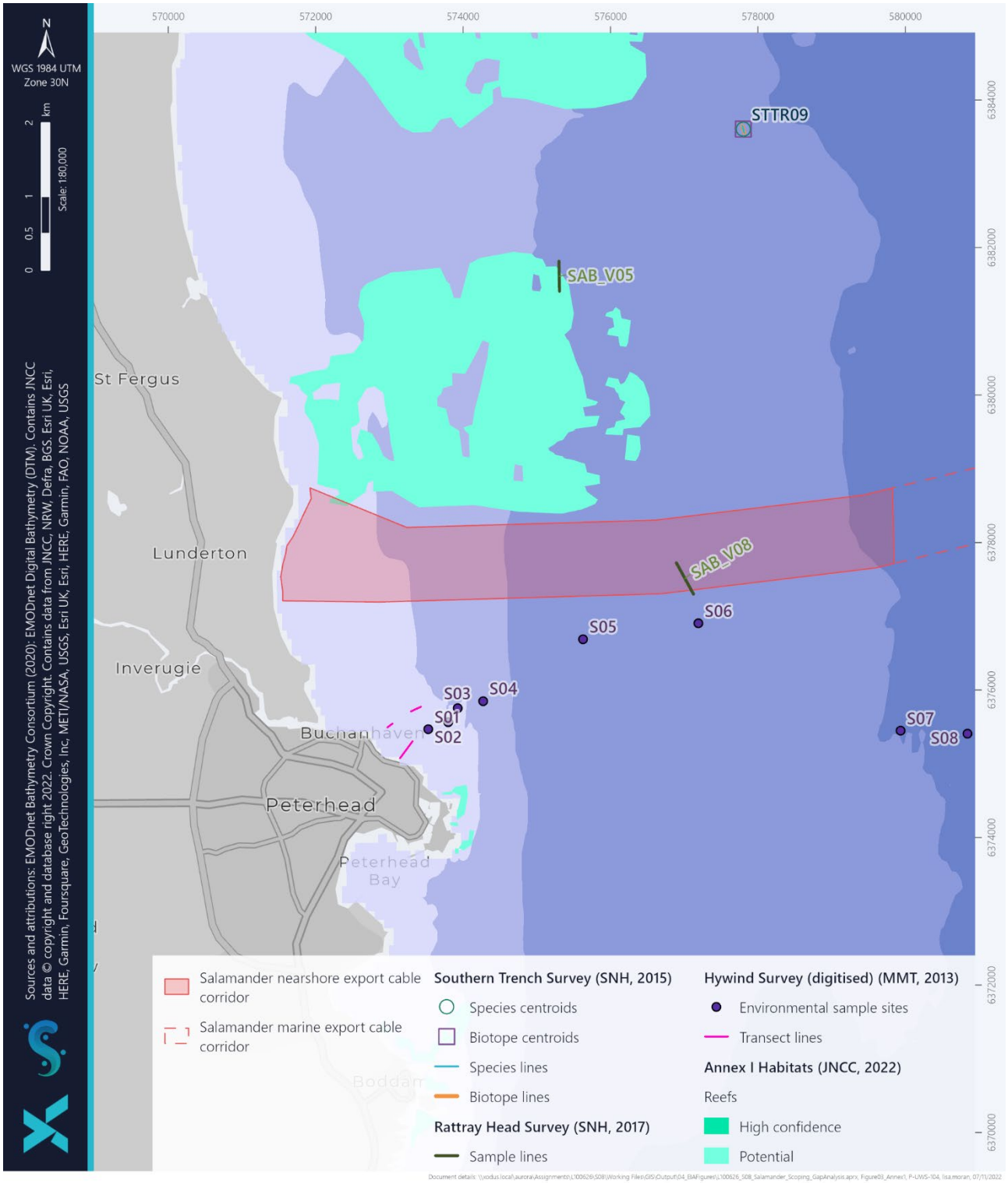



*Figure 3-3 Annex I habitats in the vicinity of the Salamander nearshore export cable corridor*

*Southern Trench Marine Protected Area*

The Southern Trench NCMPA overlaps with the Salamander export cable corridor. This NCMPA is designated for the protection of 'burrowed muds' and 'shelf deeps' which support the OSPAR (2008) List of Threatened and/or Declining Species and Habitats benthic fauna 'Seapens and burrowing megafauna'. However, the 'burrowed mud' habitats for which this NCMPA is designated, are primarily located in the deeper waters located further north off the coast of Fraserburgh and Banff. Therefore, the likelihood of burrowed mud habitat occurring within the Salamander nearshore export cable corridor is considered low and any interaction between the Project and these benthic habitats is expected to be negligible. While there may be 'muddy sand' closer to the shore it is not expected that this would comprise of burrowed mud or habitat suitable for seapens due to the shallow water depth and associated high level of wave /current exposure.

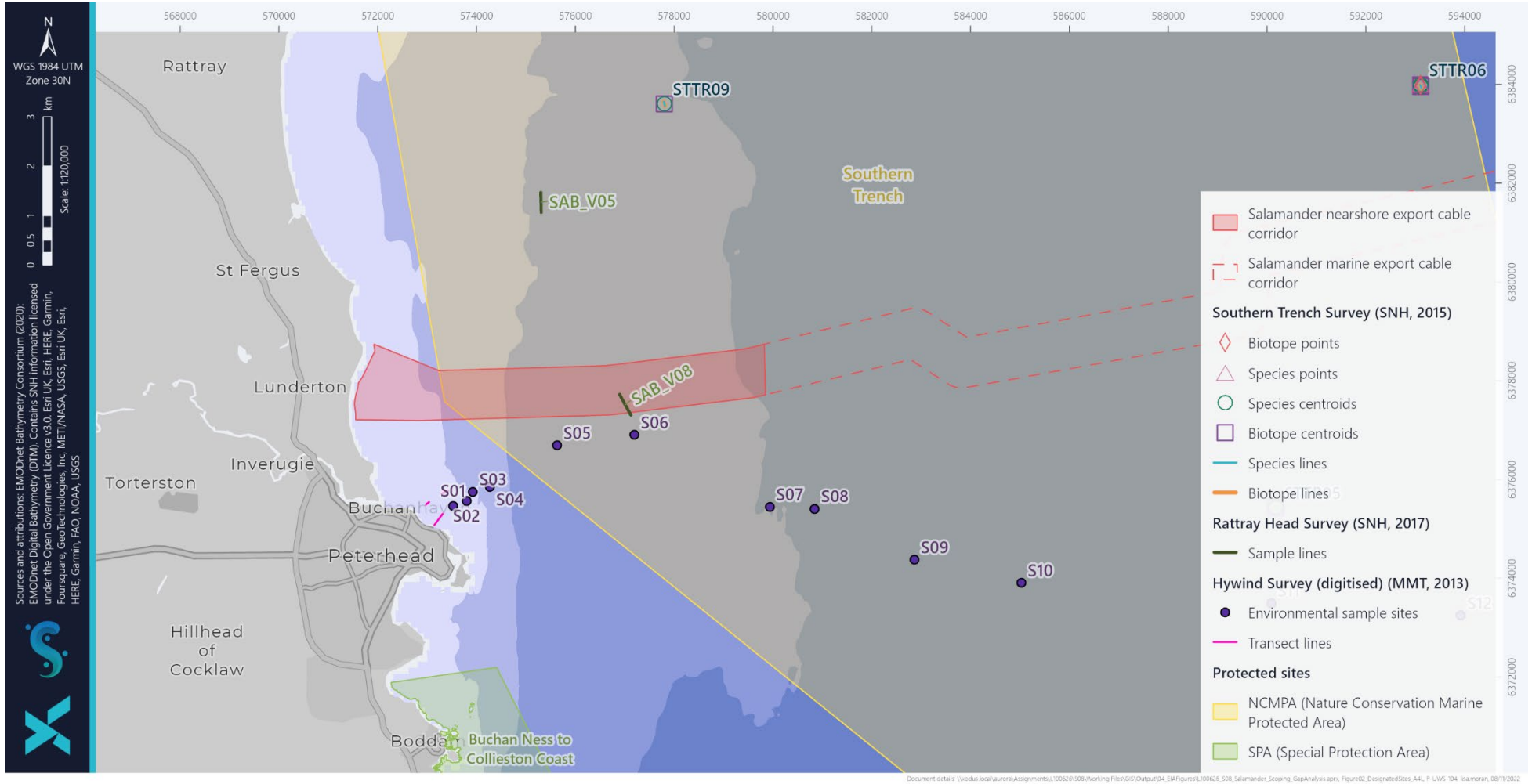



*Figure 3-4 Designated sites in the vicinity of the Salamander nearshore export cable corridor*

*Other protected features and PMF*

There was a potential Ling (*Molva molva)* recorded at SAB_V05 from the 2017 SNH survey (Moore, 2019). In addition Sandeels (*Ammodytes sp.)* were identified along the Hywind export corridor (Stations S02 and S03). To the south, there were the PMFs 'tide swept algal communities' and 'kelp beds', associated with the bedrock habitats close to the landfall site of the Hywind cable corridor survey (MMT, 2013b).

There are no further records of vulnerable or protected benthic features or benthic species within 10 km of the Salamander nearshore export cable corridor that are likely to be adversely impacted by the activities of the Project (NMPI, 2022).

# 4 DISCUSSION

The Benthic Ecology Baseline Data Review identified one habitat assessment video transect, undertaken by SNH at Rattray Head (SAB_V08) that occurred within the Salamander nearshore export cable corridor (SNH, 2017; Moore, 2019). This transect was taken at 49.9 m water depth, approximately 4.9 km from shore. The seabed comprised predominantly of rippled fine sand with scattered cobbles and boulders making up ~20% of the seabed substrate which was considered consistent with the predicted EUNIS habitat 'coarse circalittoral sediment' present across this area of the Salamander nearshore export cable corridor. The biotopes allocated within this area were Circalittoral fine sands (SS.SSa.CFiSa) and *Sabellaria spinulosa* encrusted circalittoral rock (CR.MCR.CSab.Sspi.ByB) (Moore, 219). *Sabellaria* are known to build tubes from sand or shell fragments that can form thin crusts or large reefs up to several metres across. They are typically found on hard substrata on exposed open coasts where sand is available (MarLIN, 2022). Despite the elevation of the *Sabellaria* crusts being relatively low (2- 5 cm), there was the potential for these features to fall within the definitions of *Sabellaria* reefs on OSPAR's List of Threatened and/or Declining Species and Habitats (OSPAR, 2013) and as an Annex I biogenic reef habitat under the EC Habitats Directive. Based on this observation, the possibility of the *Sabellaria* reefs (or stony reef) being present within the Salamander nearshore export cable corridor cannot be ruled out. Therefore there is the potential that there could be potential *Sabellaria* and/or stony reef features present within the cable corridor, particularly the sections that fall within the 'coarse sediment' EUNIS habitat that occurs from the 1°40 line to approximately 4.6 km west within the Salamander nearshore export cable corridor. It should also be noted that the relative 'reefiness' score (high, medium and low) does not correspond well with the ecological value of the reefs and therefore areas of 'low' reef should not be discounted as having no conservation value (Pierce and Kimber, 2020). Thus, any *Sabellaria* reef present within the Salamander nearshore export cable corridor could be considered to have a conservation value.

There was no other direct overlap with the adjacent survey data and the Salamander nearshore export cable corridor. However more information on the expected habitats present were screened against the data obtained from the Hywind cable corridor environmental survey undertaken in 2013, particularly at the stations close by (S05 and S06) (MMT, 2013b). The predicted EUNIS broad sediment type of 'circalittoral coarse sediment' is consistent with the observations at the Hywind nearshore export cable corridor sample stations which were dominated by sand and gravel interspersed (often to a high degree) by boulders, cobbles and pebbles, potential annex I stony reef and also high levels of *Sabellaria*. These observations were also consistent with the results from the SNH (2017) survey as discussed above. Therefore, is it likely that the associated habitats and biota observed in the surveys will be similar to the adjacent areas of Salamander nearshore export cable corridor along the ~4.6 km section that occurs within the 'coarse sediment' habitat. However, the results indicate a high level of heterogeneity across relatively short distances which makes it difficult to draw any clear predictions on what biotopes are present in the Salamander nearshore export cable corridor, with respect to features of conservation interest.

The Hywind landfall area within 2 km of shore is located within the predicted EUNIS habitat 'Infralittoral coarse sediment' and 'infralittoral rock', whereas the Salamander nearshore export cable corridor is predominantly 'fine or muddy sand'. Therefore, the habitats and associated biota observed at the Hywind landfall may not be representative of the Salamander export cable corridor landfall, thus presenting a data gap. Whilst is it not thought that this habitat is of particular conservation significance, the variability of the seabed habitats observed across the wider area make the EUNIS predictions uncertain without site specific geophysical data which has been adequately ground truthed.

All of the surveys undertaken within the vicinity of the Salamander nearshore export cable corridor are greater than 5 years old, with the most recent survey undertaken at the end of 2017. The seabed in the Salamander nearshore

export cable corridor area is a highly dynamic environment exposed to strong currents, even up to 50 m water depth. It can be expected that the associated sediment transport and accretion are important factors in the aggregation of *Sabellaria* crusts and reef. As such, there is likely to be temporal as well as spatial variation, which makes it very difficult to predict the extent of any potential biogenic reefs in the area.

# 5 CONCLUSIONS

Following this Benthic Ecology Baseline Data Review the following conclusions can be drawn:

- There is good representation of the circalittoral coarse sediment habitats that occur along the Salamander nearshore export cable corridor, up to approximately 4.6 km immediately to the west of the 1°40 line, drawn from the SNH 2017 survey and the 2013 Hywind cable corridor survey.
- The data indicates the presence of heterogenous mix of sand and gravel interspersed with boulders, cobbles and pebbles with patches of potential Annex I stony reef and *Sabellaria* biogenic reef.
- The *Sabellaria* aggregations identified from the nearby survey data were predominantly described as low level crusts. This tentatively implies that any *Sabellaria* aggregations present in the nearshore cable corridor will be relatively low lying and of limited conservation interest.
- However, the data is 5 to 10 years old at the time of writing and considered indicative only. The seabed is highly dynamic and considered to be subject to temporal as well as spatial variation. Therefore, it cannot be ruled out that more extensive reef formations occur within the Salamander nearshore cable corridor.
- Using existing data it is not possible to determine the extent and quality of potential Annex I features that may occur within the Salamander nearshore export cable corridor.
- There is a lack of site specific data available to confirm the nearshore habitats present at the landfall location out to approximately 3.1 km which are expected to represent the EUNIS habitat fine/muddy sand.

# 6 RECOMMENDATIONS

In light of the limitations of existing data, and the inability to conduct geophysical (SSS and MBES) surveys in the short to medium term, the following recommendations have been made:

- It is suggested that drop down video transects (including quality still images) are acquired where possible within the nearshore export cable corridor to gain indicative site-specific photographic evidence of the seabed habitats present;

- Selection of the transect locations should account for the expected broad scale EUNIS habitats present and include targeting areas of expected fine/muddy sand, bedrock, coarse sediment and any potential Annex I Reef habitats across the range of depths of the nearshore survey area landward from the 1°40 line.

- Where potential Annex I habitats are identified, the video transects should include an assessment on any potential stony or biogenic (*Sabellaria*) reef based on the protocols and criteria set out by Irving (2009), Gubbay (2007) and Jenkins *et al.* (2018) as appropriate.

- This survey would need to be undertaken by competent marine ecologist/s familiar with the range of offshore and nearshore marine habitats and species listed above.

- It is anticipated that this data would sufficiently close the existing data gap and provide enough information to adequately inform the impact assessment on benthic ecology.

- It is recommended that the camera habitat assessment carried out above would be corroborated at a later date (following the impact assessment) through pre-construction surveys which will include appropriate geophysical data (MBES and SSS) and any further ground truthing (video analysis/grab sampling) where applicable.

- This additional data acquisition will inform detailed design and potential micro-siting of the export cable.

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# APPENDIX A BENTHIC SEDIMENTS

The benthic sediments observed across the three surveys have been outlined in Table 7-1.

*Table 7-1 Benthic sediment description from surveys*

| SURVEY NAME | DESCRIPTION OF SEDIMENT |
|---|---|
| **2015 Southern Trench (Moore, 2017)** | • STTR09: medium sand (45%) with gravel (20%), pebbles (15%), cobbles (15%) and boulders (5%).<br>– Site described as SS.SMx.CMx.FluHyd<br>• STTR10: mixed sediment of silty sand (25%) and gravel (65%) with scattered pebbles (5%), shells (5%) and occasional cobbles (<1%) and boulders (<1%).<br>– Site described as SS.SMx.CMx |
| **2017 Rattray Head (Moore, 2019)** | • SAB_V08: predominantly fine sand (70%), mostly rippled with patches of fairly dense gravel (5%) and pebbles (5%), and scattered cobbles (15% and boulders.<br>• SAB_V05: Heterogeneous seabed with gravelly sand, locally with dense pebbles,<br>• apparently widely supporting an uneven sandy crust; scattered cobbles and boulders also with crust<br>• SAB_V10.1: Rippled medium sand (95%) with surface coarse shell sand (5%), possibly in megaripples.<br>• SAB_V10.2: Scattered boulders (25%) and cobbles (25%) on fine-medium sand (50%)<br>• SAB_V10.3: Rippled medium sand (90%) with surface coarse shell sand (10%) concentrated in troughs. |
| **Hywind Survey (MMT, 2013b)** | • The landfall area (located approximately 2 km south-east of the Salamander export cable landfall) is dominated by outcropping bedrock that is affected by strong tidal waves.<br>• S02 and S04 the area comprised of varying sizes of boulders and blocks<br>• S05 sand and gravel area with frequent boulder occurrence.<br>• S06 (the closest sample site to the salamander nearshore export cable corridor) was located showing an area with larger blocks in clast and matrix supported pattern that arose from the seabed.<br>• S07 sand and gravel area where trawl marks were frequent. A mixture of sediment substrates that comprised all of the fractions from sand, pebbles, and cobbles to occasional boulders. |

# APPENDIX B BENTHIC SPECIES

The benthic species observed across the three surveys have been outlined in Table 7-2.

*Table 7-2 Benthic species description from surveys*

| SURVEY NAME | DESCRIPTION OF BIOTA OBSERVED | | PMF SPECIES OBSERVED |
|---|---|---|---|
| 2015 Southern Trench (Moore, 2017) | STTR09:<br>• stones encrusted with serpulid worms,<br>• *Balanus balanus*, and bryozoans and support sparse hydroids including *Tubularia indivisa* and *Rhizocaulus verticillatus*,<br>• *Alcyonium digitatum* and *Flustra foliacea*,<br>• *Urticina sp.*,<br>• *Lanice conchilega*,<br>• *Chaetopterus variopedatus*,<br>• *Munida rugosa, Galathea spp.*,<br>• *Paguridae spp., Caridea sp.*,<br>• *Calliostoma zizyphinum*,<br>• *Aequipecten opercularis*,<br>• *Pecten maximus*,<br>• *Cellaria sp.*,<br>• *Bugula sp.*,<br>• *Antedon bifida*,<br>• *Luidia ciliaris*,<br>• small *solitary ascidians*,<br>• *teleost spp.* (Moore, 2017). | STTR10:<br>• stones encrusted with serpulid worms and support very sparse hydroids,<br>• *Alcyonium digitatum* and *Flustra foliacea*,<br>• *Urticina sp.*,<br>• *Chaetopterus variopedatus*,<br>• *Munida rugosa*,<br>• *Ebalia sp.*,<br>• *Inachus sp.*,<br>• *Cancer pagurus*,<br>• Pectinidae sp. juvenile,<br>• *Ophiuroidea sp.*,<br>• *Henricia sp., Echinus esculentus*,<br>• small solitary ascidians,<br>• teleost spp. (P). | No PMF species/habitat or Annex I habitats were observed at this sample point (Moore, 2017). |
| 2017 Rattray Head (Moore, 2019) | SAB_V08:<br>• *Alcyonium digitatum* and hydroid and bryozoan turf dominated by *Flustra foliacea* with *Securiflustra securifrons*,<br>• anemone Urticina felina,<br>• shrimp (Caridea sp.),<br>• squat lobsters (Munida rugosa),<br>• crabs (Ebalia sp.),<br>• echinoderms Crossaster papposus, Luidia ciliaris and Echinus esculentus.<br><br>SAB_V10:<br>• Small teleost sp., | SAB_V05:<br>• widespread crust of *Sabellaria spinulosa*,<br>• unencrusted areas of larger stones with *Spirobranchus spp.*,<br>• *Alcyonium digitatum*,<br>• hydroid/bryozoan tur,<br>• *Flustra foliacea*, particularly well developed on boulders<br>• *Securiflustra securifrons*,<br>• *Urticina spp.*,<br>• *Munida rugosa*,<br>• *Caridea sp.*, | No PMF species/habitat or Annex I habitats were observed at this sample point (Moore, 2019). |

| SURVEY NAME | DESCRIPTION OF BIOTA OBSERVED | | PMF SPECIES OBSERVED |
|---|---|---|---|
| | • much red algal debris,<br>• Rock supporting patches of hydroid/bryozoan turf,<br>• Urticina sp.,<br>• Asterias rubens. | • *Necora puber*,<br>• *Crossaster papposus*,<br>• *Asterias rubens*,<br>• *Henricia sp.*,<br>• *Ophiura albida*,<br>• teleost sp.,<br>• Gadidae sp.,<br>• *Molva molva*,<br>• Cottidae sp. | |
| **Hywind Survey (MMT, 2013b)** | • T102, 102, 103: Bedrock covered with large kelp (*Laminaria hyperborea*) and different species of red seaweed<br>• "*Laminaria hyperborean* with dense foliose red seaweed on exposed infralittoral rock" and Faunal and algal crusts on exposed to moderately wave-exposed circalittoral rock"<br>• At depth greater than 12 m, habitat changed to "Foliose red seaweed with dense *Dictyota dichtoma* and/or *Dictyopteris membranacea* on exposed lower infralittoral rock"<br>• S02 and S04: Large amounts of the moss animal *Securiflustra securifrons* and the soft coral *Alcyonium digitatum* were attached to these hard substrates. Starfish, anemones and squat lobsters observed.<br>• S01 and S03 and classified as "Infralittoral fine sand" habitat.<br>• S05: several moss animals, hydrozoans and anthozoans that together formed the habitat "*Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment" (SS.SMx.CMx.FluHyd).<br>• S06: moss animals *F. foliacea* and *S. securifrons* was abundant. Species of fish, crabs and lobsters were associated with these blocks and boulders<br>• S06: "Medium graded stony reef" (Irving, 2009) supporting the habitat "*F. foliacea* on slightly scoured silty circalittoral rock". Near to the stony reef, there was an area with larger blocks and bedrock that was classified as the same habitat but only considered to be a potential stony reef due to that there was no sampling performed at that location (MTT, 2013b).<br>• S07: 65 varying infaunal species were identified (highest number within this survey). Several worms, mussels and numerous species of small crustaceans. *Sabellaria spinulosa* was present with high abundance in the sediment, but no reef structures were observed.<br>• S07 was classified as "Polychaeterich deep Venus community in offshore mixed sediments" (MTT, 2013b). | | All landfall bedrock areas fulfilled the criteria of a "Bedrock reef" and fall under the Annex I of the EC Habitats Directive (The Council of the European Communities, 1992).<br><br>At sites S02 and S04 the habitat was classified as "*A. digitatum* with *S. securifrons* on tide-swept moderately wave-exposed circalittoral rock". This habitat was scored, in accordance with Irving (2009), to a "Medium graded stony reef" which falls under the Annex I of the EC Habitats Directive (The Council of the European Communities, 1992) (MTT, 2013b). |

# APPENDIX C HABITAT IMAGES (MMT, 2013B; MOORE, 2017; MOORE, 2019)