# DEEPOCEAN

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# RONDESLOTTET ENVIRONMENTAL SURVEY - DNV VISUAL SURVEY REPORT

# DEEPOCEAN

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# RONDESLOTTET ENVIRONMENTAL SURVEY - DNV VISUAL SURVEY REPORT

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# survey at alve nord, shrek, rondeslottet and ørn Visual survey report - Rondeslottet

DeepOcean AS

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## **1 EXECUTIVE SUMMARY**

On behalf of Aker BP, DNV in cooperation with DeepOcean have performed bathymetric and environmental surveys at the exploration site Rondeslottet located 100km west of the Njord field (Equinor) and approximately 80km North of Ormen Lange (Shell). The water depth is approximately 1100m. The aim of the survey was to obtain bathymetric and environmental data for further planning of drilling operations.

The site survey was conducted between the 16<sup>th</sup> and 30<sup>th</sup> of September 2021 from the IMR vessel Volantis.

The seafloor was surveyed with multibeam echo sounder (MBES), and side scan sonar (SSS) mounted on the ROV. Preliminary interpretations of SSS data in combinations with the MBES data collected during the high-fly survey, was used to identify targets, seabed features and changes in reflectivity which could be subject for further visual survey.

## 1.1 Conclusions / Results

The hydrographic survey was finished the 30<sup>th</sup> of September and covered an area of ~3000\*2340m. Depth was on average - 1119 m slightly sloping from east to west. The seafloor was found to consist of mainly homogenous, flat mud/sand with some smaller depressions/ pockmarks and some highly reflective areas.

The visual survey was successfully executed with bowtie transects visually inspected for both PWL and alternative well location. In addition, larger cross transects of the site survey area was visually surveyed covering depth gradients and high reflectivity areas. In total more than 10.7 km was surveyed in just over 11 hours.

In general, most of the seabed consisted of mud flats, but there were also identified numerous large clay mounds and clayblocks in the north-eastern part of the site area, corresponding to the high reflectivity areas detected with MBES. These were classified as two distinct habitats:

- Continental slope mud flats. High densities of tube dwelling bristle worms (*Polychaeta*), brittle stars (*Ophiuroidea*), and sea anemones (Figure 4-2). The mud flat habitat is not considered as especially valued and stretches over vast areas.
- 2) Clay outcrop areas. These areas arise up from the seabed and constitutes of harder substrate and could have its origin from the Storegga Slide. In some parts, the clay outcrops could create small cliffs with sharp edges reaching up to 5-10m height from the surrounding sea floor. Consequently, it creates a habitat for sessile hard bottom species and other species utilising the slightly higher water transport. Common seen on the ridges were the glass sponge cf. Farrae, soft coral Gersemia, hydroids, sea spider cf. Collossendeis, and the basket star Gorgonocephalus sp (Figure 1-2). In accordance with OSPAR and M300, Deep Sea Sponge aggregation and the single coral species such as Gersemia are addressed and could qualify as an especially vulnerable habitat.

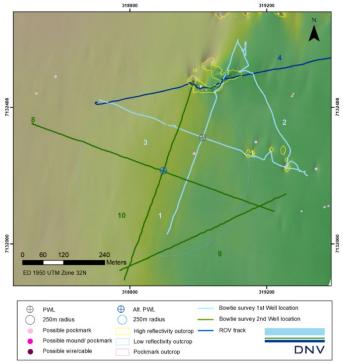


Figure 1-1 PWL and Alt. PWL location with the ROV survey tracks and delineated seabed features.



The "clay- outcrop" areas may qualify as a habitat that could require mitigation to minimize disturbance from planned activities in the area. Given the distinctive shape and reflection characteristics of the clay blocks it was decided that all conspicuous targets delineated from multibeam data would, in a first assessment, be treated as vulnerable clay outcrop habitats. Based on findings from the initial visual survey of the PWL and the site survey area, as well as results from the MBES/SSS survey, it was decided to perform a visual survey of a bowtie transect at the alternative well location. The clay outcrops closest to the well are summarised in Table 1-1

Figure 1-2 Examples of fauna identified on a clay outcrop; In the centre, a Gorgons head (Gorgonocephalus sp), left a sea spider (cf. Collossendeis) and scattered across are glass sponges cf. *Farraea occa* and soft corals (*Gersemia sp.*)



#### Table 1-1 Overview of the clay outcrops closest to the Alt.PWL.

ObjectID	Туре	Area (m <sup>2</sup> )	Distance from Alt. PWL (m)	X (ED 50, UTM 32N)	Y (ED 50, UTM 32N)
8	Clay outcrop	5766	249	319042	7132485
27	Clay outcrop	380	248	319150	7132264
29	Un-surveyed feature	270	350	319247	7132274
34	Clay outcrop	182	358	319260	7132220
40	Clay outcrop	107	322	319212	7132276
47	Clay outcrop	68	309	318990	7132508
50	Clay outcrop	62	359	319258	7132246



# 2 INTRODUCTION

On behalf of Aker BP, DNV in cooperation with DeepOcean have performed bathymetric and environmental surveys at the exploration site Rondeslottet.

## 2.1 Scope

The aim of the survey was to obtain bathymetric data for further planning of drilling operations and possible development of the field. In addition, documenting potential vulnerable and/or valuable habitats in proximity to the PWL as well as within the site survey area. The area has never been surveyed before, as represented in data collected from Mareano surveys (Figure 2-1).



## 2.2 Survey area

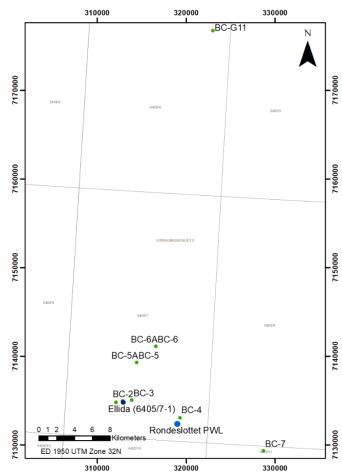
Rondeslottet is in the area of the Ellida discovery (6405/7-1) in the Norwegian Sea. The discovery is located in blocks 6405/7 and 6405/10, approximately 100km west of the Njord field (Equinor) and approximately 80km North of Ormen Lange (Shell). The water depth is approximately 1100m.

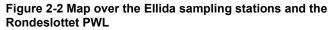
Ellida was discovered in 2003, by an exploration well encountering a 52m high oil column in the Late Cretacous Nise Formation. Ellida was never developed due to tight reservoirs and in addition it is located in very deep waters (1200m). However, due to technological progress in later years, Aker BP now wants to revisit the discovery.

# 2.3 Ellida basline survey

The Ellida well is located 6.7 km west of the Rondeslottet PWL and sediment grab samples were collected in conjunction with the site survey in 2003, providing physical and chemical sediment characteristics as well as benthic fauna composition (DNV, 2003). Environmental baseline surveys data are in general valid for 6 years (can be extended by the Environmental Agency). However, given the stable conditions on the deep continental slope the information from the Ellida survey is still of value. In total 14 stations were sampled, with the closest, BC-4, located approx. 800 m north of the Rondeslottet PWL (Figure 2-2). Grain size analysis at BC-4 showed that the seafloor consisted of primarily clay (98.3%) and some sand (1.7%). However, only one of the three boxcorer samples was successfully sampled; one came up empty and one with only a small sample with clay and gravel, indicating a

Figure 2-1 Map of the survey area (from mareano.no)





patchy seafloor with areas of harder substrates (thus more difficult to sample) (. Analysis of macrobenthic fauna showed low diversity, as expected in homogenous areas dominated by fine sediments. Most common functional groups are deposit and



filter feeders like bivalves, bristle worms and brittle stars. . *T. equalis, P. jeffreysii, C fauveli. T. pygmaea* making up approx. 65 % of the fauna. The 10 most common species at BC-4 are shown in Table 2-2

			_	Grain size distribution (% dry weight)			
Station	Depth (m)	Median	Classification	% silt and	% sand	% gravel	
		diameter		clay			
BC-1	1240	5.97	Silt and clay	98.3	1.7	0.00	
BC-2	1207	5.96	Silt and clay	98.0	2.0	0.00	
BC-3	1177	5.97	Silt and clay	98.4	1.6	0.00	
BC-4	1100	5.96	Silt and clay	97.9	2.1	0.00	
BC-5	1220	5.96	Silt and clay	98.3	1.7	0.00	
BC-6	1170	5.96	Silt and clay	98.2	1.8	0.00	
BC-7	965	5.97	Silt and clay	98.6	1.4	0.00	
BC-8	707	3.24	Fine sand	42.2	48.8	8.96	
BC-G11	736	5.76	Silt and clay	89.3	10.0	0.73	
Average		5.64	Silt and clay	91.0	7.9	1.08	
Standard deviation		0.90		18.5	15.6	2.96	

Table 2-1 Grain size distribution, Ellida sediments 2003 (% dry weight)

#### Table 2-2 From the sediment sampling log (DNV, 2003)

BC-4	609838.98	7129708.86		6cm layer very soft dark greyish brown (2.5Y 4/2) slightly clayey SILT overlying very soft olive grey (5Y 4/2) silty CLAY. SV on lower layer = 2/1 kPa
BC-4A	609811.61	7129605.64		Small sample from side of corer: soft to firm very dark greyish brown (2.5Y 3/2) slightly silty CLAY inc. occasional subrounded (fm) Gravel.
BC-4B	609787.80	7129617.85	1102	No sample

Table 2-3 "Top ten" list with the ten mos	t
dominating taxa at BC-4 (DNV, 2003)	

DC 1		0/
BC-4	No.	%
Thyasira equalis	40	26.1 %
Paramphinome jeffreysii	27	17.6 %
Chone fauveli	21	13.7 %
Thyasira pygmaea	11	7.2 %
Myriochele oculata	5	3.3 %
Ophiura affinis	5	3.3 %
Harpinia antennaria	4	2.6 %
Pherusa falcata	3	2.0 %
Myriochele heeri	3	2.0 %
Yoldiella lucida	3	2.0 %
Sum	2	79.7 %

## **3 SURVEY**

The site survey was conducted between the 16<sup>th</sup> and 30<sup>th</sup> of September 2021. DeepOcean had the main lead, providing survey personnel, ROV and equipment for bathymetry, while DNV, represented by marine biologists Amund Ulfsnes, Eirik Færøy Sæbø and Lars Ulvestad, was responsible for visual survey and fauna registration.

The survey was performed from the IMR vessel Volantis (Figure 3-1), on charter by DeepOcean from Volstad Maritime. The ROV used for the survey was mounted with a multibeam echo sounder and side scan sonar for bathymetric survey and for the visual survey the ROV was equipped with sonar for seabed feature identification and High-Definition video camera for video. The visual survey followed specification given for "Mapping" in the visual mapping standard NS-EN 16260:2012.

Technical survey details are further described in the geophysical survey report (DeepOcean, 2022).



## 3.1 Survey Strategy

A survey program was developed to survey all potential corals of interest and/or other habitats of interest and to comply with the requirements given by the Norwegian Environment Agency's guidelines for environmental monitoring of petroleum activities – M300/M408 (MDIR, 2015). The program is summarized in the task plan (DeepOcean, 2021) and described in the following subchapters.



Figure 3-1 The IMR vessel Volantis (from www.volstad.com)

Initially a seabed mapping survey by

using multibeam echo sounder and side scan sonar was planned prior to visual inspection. However, due to technical issues with equipment the survey proceeded with visual mapping prior to seabed mapping. Results from both surveys was then compiled to assess the quality of the initial visual survey and evaluate whether additional visual surveying should be carried out.

## 3.1.1 Seabed Mapping Survey (Multibeam and side scan sonar)

The seafloor was surveyed with multibeam echo sounder (MBES), and side scan sonar (SSS) mounted on the ROV, the data was then processed "on the fly" when gathered (0.5m grid). Preliminary interpretations of SSS data in combinations with the MBES data collected during the high-fly survey, was used to identify targets, seabed features and changes in reflectivity which could be subject for further visual survey. Final and post possessed bathymetric maps and delineated seabed features were delivered to DNV office upon completion and are further used in this report.

## 3.1.2 Visual inspection

#### 1. Bowtie transect at PWL 1

Bowtie transect crossing the PWL1 by 600 m x 600 m. Actively using sonar for identification of seabed features. Marine biologists were continuously registering benthic megafauna and substrate along the seabed.

#### 2. Site survey area-crossing transects

Transect lines crossing the site survey area from east to west (2300), then northeast (1900), before heading southeast (1900) – forming a triangular shape across the site survey area. In total covering 6200 meters. While visually surveying the transects the sonar was watched closely for identification of potential seabed features. Marine biologists were continuously registering benthic megafauna and substrate along the seabed.

#### 3. Bowtie transect at alternative well location

A bowtie transects crossing an alternative well location (AWL) by 600 m x 600 m, was performed after assessment of the results from visual inspection of PWL1 and the site survey area-crossing transects. Marine biologists were continuously registering benthic megafauna and substrate along the seabed.



## 3.1.3 Video registrations

An electronic registration form (DNV video log) was used to log events during each ROV dive. The log included date, time, type of seabed substratum and mega-fauna observations. In parallel, the ROV position was recorded every second with heading, depth and altimeter in a navigation log. By merging the ROV track log with the registrations form, all registrations from the video were given a coordinate to be used for analysis of interpretations. In areas consisting of various substrates the coarsest fraction was recorded, and assessments of proportion from each category were not carried out. All megafauna species and habitat types encountered during the survey were registered.

## 4 **RESULTS**

### 4.1 Bathymetry

The hydrographic survey was finished the 30<sup>th</sup> of September and covered an area of ~3000\*2340m. Depth was on average -1119 m slightly sloping from east to west (max; 1139 m min; 1095 m) The seafloor was found to consist of mainly homogenous, flat mud/sand with some smaller depressions/ pockmarks and some highly reflective areas. A summary of delineated seabed features from MBES/SSS is found in Table 4-1 and shown in Figure 4-1.

Seabed feature	Shape	Identified	
Possible debris/mound	Point	20	
Possible wire/cable	Point	2	
Possible pockmark	Polygon	51	
High sonar reflectivity	Polygon	59	
Low sonar reflectivity	Polygon	2	



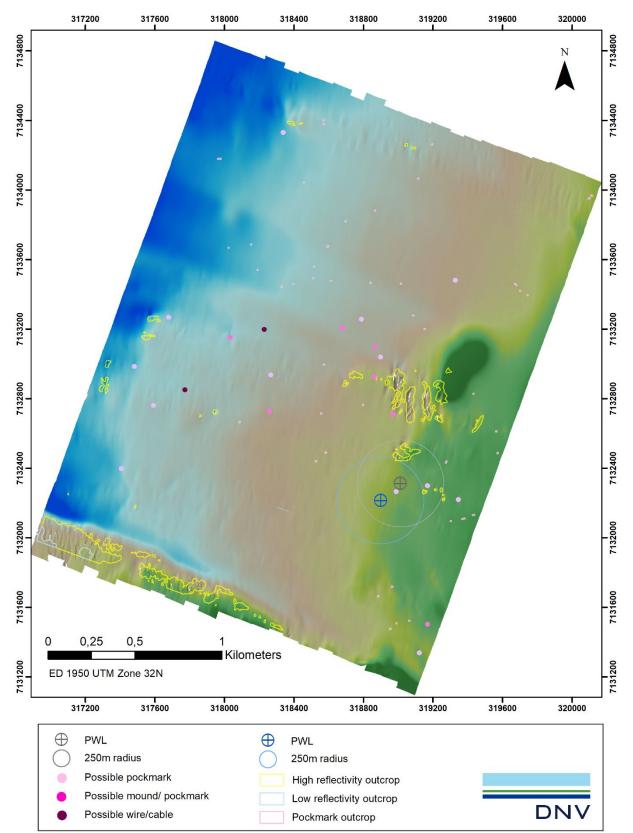


Figure 4-1 Bathymetry and the delineated seabed features at Rondeslottet



## 4.2 Visual survey

The visual survey was successfully executed with bowtie transects visually inspected for both PWL and alternative well location. In addition, larger cross transects of the site survey area was visually surveyed. In total more than 10.7 km was surveyed in just over 11 hours (see Figure 4-4 and Table 4-2 for details)

In general, most of the seabed consisted of mud flats, but there were also identified numerous large clay mounds and clayblocks in the north-eastern part of the site area, corresponding to the high reflectivity areas detected with MBES. These were classified as two distinct habitats:

- 3) Continental slope mud flats. High densities of tube dwelling bristle worms (*Polychaeta*), brittle stars (*Ophiuroidea*), and sea anemones (Figure 4-2). The mud flat habitat is not considered as especially valued and stretches over vast areas.
- 4) Clay outcrop areas. These areas arise up from the seabed and constitutes of harder substrate and could have its origin from the Storegga Slide. In some parts, the clay outcrops could create small cliffs with sharp edges reaching up to 5-10m high from the surrounding sea floor. Consequently, it creates a habitat for sessile hard bottom species and other species utilising the slightly higher water transport. Common seen on the ridges were the glass sponge cf. *Farrae*, coral cf. *Gersemia*, hydroids, sea spider cf. *Collossendeis*, and the brittle star *Gorgonocephalus* sp (Figure 4-1). In accordance with OSPAR and M300, Deep Sea Sponge aggregation and the single coral species such as Gersemia are addressed and could qualify as an especially valued habitat.

The "clay- outcrop" areas may qualify as a habitat that could require mitigation to minimize disturbance from planned activities in the area. Given the distinctive shape and reflection characteristics of the clay blocks it was decided that all conspicuous targets delineated from multibeam data would, in a first assessment, be treated as vulnerable clay outcrop habitats. Based on findings from the initial visual survey of the PWL and the site survey area, as well as results from the MBES/SSS survey, it was decided to perform a visual survey of a bowtie transect at the alternative well location.

No sea pen communities were registered in densities classified as a vulnerable habitat by OSPARt; neither sublittoral species (*Funiculina quadrangularis, Virgularia mirabilis, Pennatula phosforea and Kophobelemnon stelliferumor*) nor bathyal (*Umbellula encrinus*).



Figure 4-2 Typical mud flat area with dominance of tube dwelling bristle worms and brittle stars.



Figure 4-3 Typical fauna on the clay outcrops, with the glass sponge cf. *Farrae*, soft coral *Gersemia* sp. and the basket star; Gorgons head (Gorgonocephalus sp).



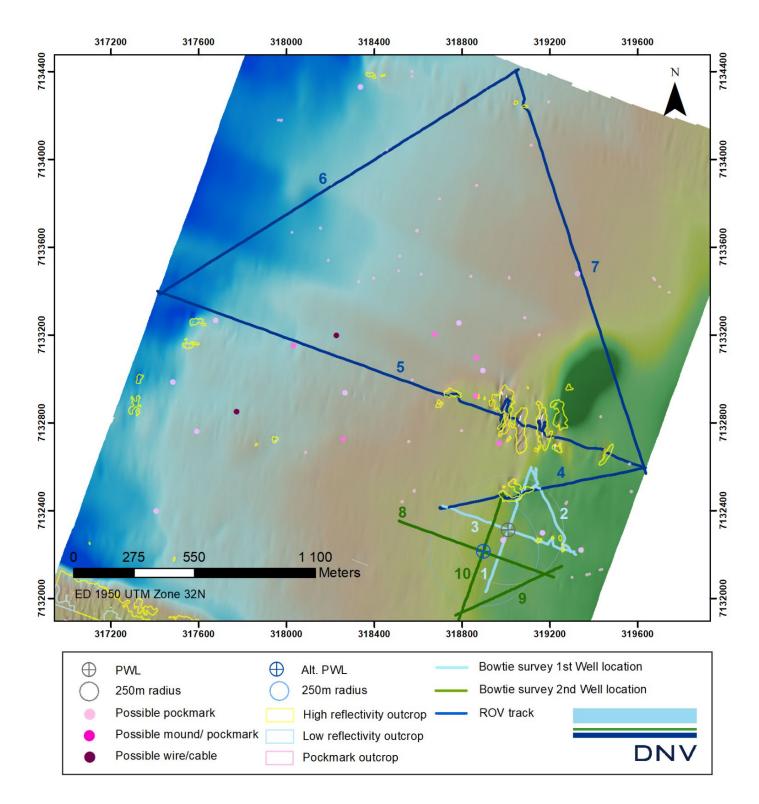


Figure 4-4 Map Showing surveyed lines and delineated targets from MBES/SSS.



Survey	Surveyline	Start X/Y (UTM32N ED50)	Stop X/Y (UTM32N ED50)	Date (dd.mm.yyyy)	Start (hh:mm:ss)	Stop (hh:mm:ss)	Time (hh:mm:ss)	Length (m)
PWL Bowtie	1	318909 7132028	319115 7132597	19.09.2021	10:35:23	11:14:31	00:39:08	600
	2	319116 7132591	319297 7132213	19.09.2021	11:31:17	12:09:18	00:38:01	450
	3	319314 7132202	318723 7132429	19.09.2021	12:13:36	12:46:22	00:32:46	650
Cross transect	4	318708 7132415	319635 7132594	19.09.2021	12:48:41	14:01:36	01:12:55	950
	5	319624 7132600	317421 7133396	19.09.2021	14:14:50	16:45:57	02:31:07	2370
	6	317424 7133389	319058 7134410	19.09.2021	16:48:10	18:41:56	01:53:46	1930
	7	319045 7134406	319638 7132570	19.09.2021	18:52:50	20:34:22	01:41:32	1930
Alt. PWL Bowtie	8	318514 7132352	319220 7132095	30.09.2021	05:31:20	06:16:00	00:44:40	750
	9	319255 7132146	318771 7131922	30.09.2021	06:30:52	07:07:08	00:36:16	520
	10	318785 7131894	318987 7132476	30.09.2021	07:24:25	08:02:41	00:38:16	620
Total							11:08:27	10770

#### Table 4-2 Summary of the length, location and survey time for the ROV visual mapping transects.

## 4.3 PWL – Bowtie Transect

The PWL location was surveyed the 19<sup>th</sup> of September and approx.1.7 km of seabed was mapped. Due to the absence of bathymetric data prior to the visual survey, the ROVs avoidance sonar was actively used detect potential high reflectively targets outside the visual range (see example in Figure 4-5). The seafloor was found to consist of mainly soft mud, homogenous fauna consisting of mainly tube dwelling bristle worms (*Polychaeta*) and brittle stars (*Ophiuroidea*) Some high reflective areas were detected by the sonar, east and north of the PWL and were found to be clay outcrops and boulders that differed distinctively from the otherwise flat surrounding seafloor. When the MBES/SSS data was later gathered, 7 high reflectivity areas were delineated within the vicinity of the PWL, 5 of these were visually surveyed, and all were found to consist of clay outcrops with associated fauna (Table 4-3). Anthropogenic impact was present with 2 debris artifacts logged (plastic garbage).



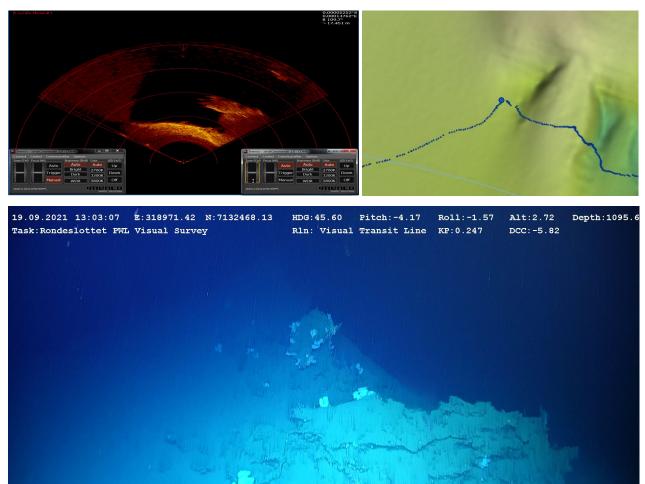


Figure 4-5 Upper left: ROV sonar detecting a clay outcrop (Object ID 8). Upper right: Same outcrop detected from MBES. Visual survey of the outcrop area.

Object ID	Туре	Area (m²)	Distance from PWL (m)	Ground-truthing	
8	High sonar reflectivity	5766	131	Clay outcrop	
27	High sonar reflectivity	380	137	Clay outcrop	
29	High sonar reflectivity	270	230	Not surveyed	
34	High sonar reflectivity	182	256	Clay outcrop	
40	High sonar reflectivity	107	199	Clay outcrop	
50	High sonar reflectivity	62	249	Clay outcrop	

#### Table 4-3 List of the, from MBES, delineated high reflectivity areas closest to the PWL.



## 4.4 Cross Transects of Site Survey Area

After completing the PWL bow tie the longer cross line transects were visually mapped the same evening. The survey covered the site survey area from east to west and up north, providing detailed coverage to detect potential gradients along the seafloor. In total the cross transect survey covered more than 6200 m of seafloor. The sediment was dominated by flat mud except for a larger area with clay outcrops approx. 500 m north of the PWL and a small area in the far north of the survey area (Figure 4-4). In total 9 high reflectivity areas were surveyed and were all found to house clay outcrops. Anthropogenic impact was present with 8 debris /garbage logged (Figure 4-8 and Table 4-4).

Object ID	Туре	Area (m²)	Distance from PWL (m)	Ground-truthing	
3	High sonar reflectivity	10570	429	Clay outcrop	
4	High sonar reflectivity 8898		358	Clay outcrop	
5	High sonar reflectivity	8193	401	Clay outcrop	
8	High sonar reflectivity	5766	135	Clay outcrop	
12	High sonar reflectivity	1982	670	Clay outcrop	
13	High sonar reflectivity	1979	509	Clay outcrop	
23	High sonar reflectivity	612	469	Clay outcrop	
59	High sonar reflectivity	19	468 Smaller mound		
28	High sonar reflectivity	275	1926 Clay outcrop		

Table 4-4 Summary	of the of the survey	ed outcron areas alon	q the cross transects.
Table 4-4 Summary	y of the of the Survey	eu outciop aleas alon	$\mathbf{y}$ the closs hansels.

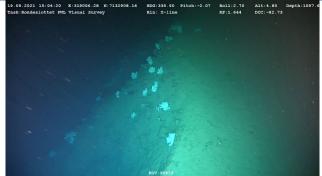


Figure 4-6 Clay outcrop ridge (ObjectID 3) with glass sponge cf *Farrae* 



Figure 4-7 Examples of fauna identified on a clay outcrop (Object ID 3); In the centre, a Gorgons head (*Gorgonocephalus* sp), left a sea spider (cf. *Collossendeis*) and scattered across are glass sponges cf. *Farraea occa* and soft corals (*Gersemia sp.*)



## 4.5 Alternative Well Location – Bowtie Transect

The alternative well location (AWL) was surveyed the 30<sup>th</sup> of September, and approx. 1.6 km of seabed was mapped. The seafloor comprised of soft mud with same associated fauna as the prior transects (Figure 4-9). Only a few boulders were logged in the north, at the outskirt of the clay outcrop area (ObjectID 8).



Figure 4-8 Anthropogenic garbage, a pierogi wrap paper.



Figure 4-9 Typical seafloor from the Alt. PWL survey - mud flat area with dominance of tube dwelling bristle worms and brittle stars.

## **5 MITIGATING MEASURES**

To prevent potential damage from drilling discharges on the vulnerable fauna on the closest clay outcrops, the following mitigating measures have been implemented.

1<sup>st</sup> Modelled Norkyst800 current data (from the Institute of Marin Research (HI)) in the period 2018-2021, was gathered and analysed to check the current speed and direction, and thus the potential direction of released drilling discharges. The modelled current show a clear southern direction on average thru the water column (Figure 5-1), however at 1000m, the deepest modelled depth, the current regime was not as unidirectional, but a eastern and southern current directions were the most common (Figure 5-2), away from the clay outcrops..

2<sup>nd</sup> The proposed well location was moved as far as possible, within the geo-technical constraints (150 m), southwest to Alt. PWL



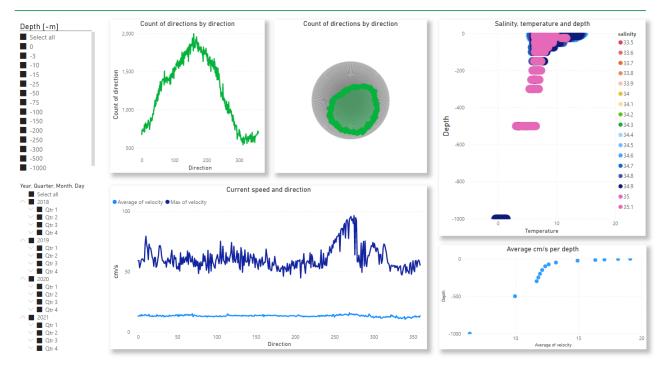


Figure 5-1 Average current and water parameters for the entire water column (from digital delivery Aker BP, data can be explored online at https://insight.dnv.com/EnvironmentalRiskManagement/report/1186)

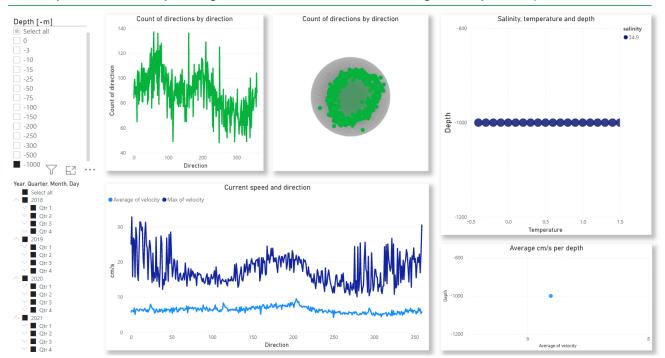


Figure 5-2 Modelled current and water parameters at 1000 m depth (from digital delivery Aker BP, data can be explored online at https://insight.dnv.com/EnvironmentalRiskManagement/report/1186)



# **6** CONCLUSIONS

The survey of Rondeslottet was successfully performed between the 16<sup>th</sup> and 30<sup>th</sup> of September 2021, in total more than 11 km of seafloor was visually mapped with the ROV.

Average water depth was 1119 m and most of the seabed consisted of mud flats. However, from the MBES/SSS 59 high reflectivity areas were delineated, covering approx. 2% of the site survey area. From visual inspections on a selection of these, they were found to be clay outcrop areas.

The seafloor and fauna characteristics were clearly different and was classified as two distinct habitats:

- 1) **Continental slope mud flats.** High densities of tube dwelling bristle worms (*Polychaeta*), brittle stars (*Ophiuroidea*), and sea anemones. The mud flat habitat is not considered as especially vulnerable and stretches over vast areas.
- 2) Clay outcrop areas. These areas arise up from the seabed and constitutes of harder substrate and could have its origin from the Storegga Slide. In some parts, the clay outcrops could create small cliffs with sharp edges reaching up to 5-10m high from the surrounding sea floor. Consequently, it creates a habitat for sessile hard bottom species and other species utilising the slightly higher water transport. Common seen on the ridges were the glass sponge cf. *Farrae*, coral cf. *Gersemia*, hydroids, sea spider cf. *Collossendeis*, and the basket star *Gorgonocephalus* sp (Figure 4-6 and Figure 4-7). In accordance with OSPAR and M300, Deep Sea Sponge aggregation and the single coral species such as Gersemia are addressed and could qualify as an especially vulnerable habitat.

To reduce the risk of damaging the outcrop associated fauna an alternative well location was decided and surveyed, some 150m south of the original PWL. Closest clay outcrops are shown Figure 6-1 and summarized Table 6-1 and further details are given in Appendix A.

ObjectID	Туре	Area (m²)	Distance from Alt. PWL (m)	X (ED 50, UTM 32N)	Y (ED 50, UTM 32N)
8	Clay outcrop	5766	249	319042	7132485
27	Clay outcrop	380	248	319150	7132264
29	Unsurveyed featured	270	350	319247	7132274
34	Clay outcrop	182	358	319260	7132220
40	Clay outcrop	107	322	319212	7132276
47	Clay outcrop	68	309	318990	7132508
50	Clay outcrop	62	359	319258	7132246

#### Table 6-1 Delineated clay outcrops closest to the Alternative PWL.



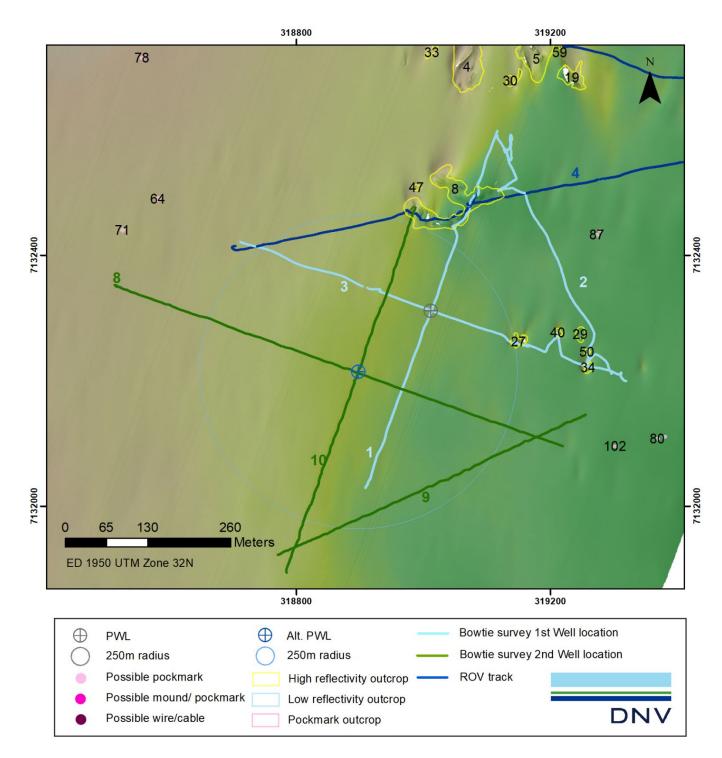


Figure 6-1 PWL and Alt. PWL location with the ROV survey tracks and clay outcrops.



## 7 **REFERENCES**

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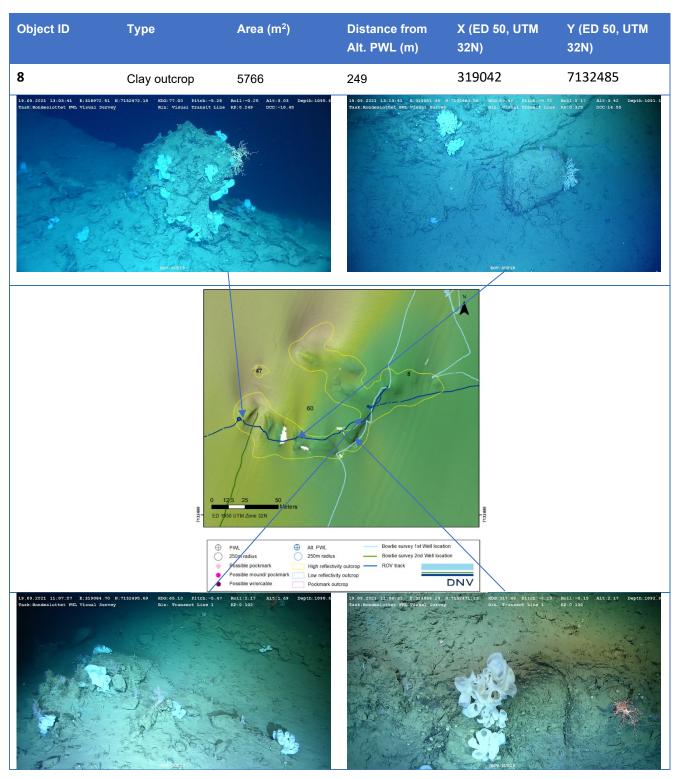
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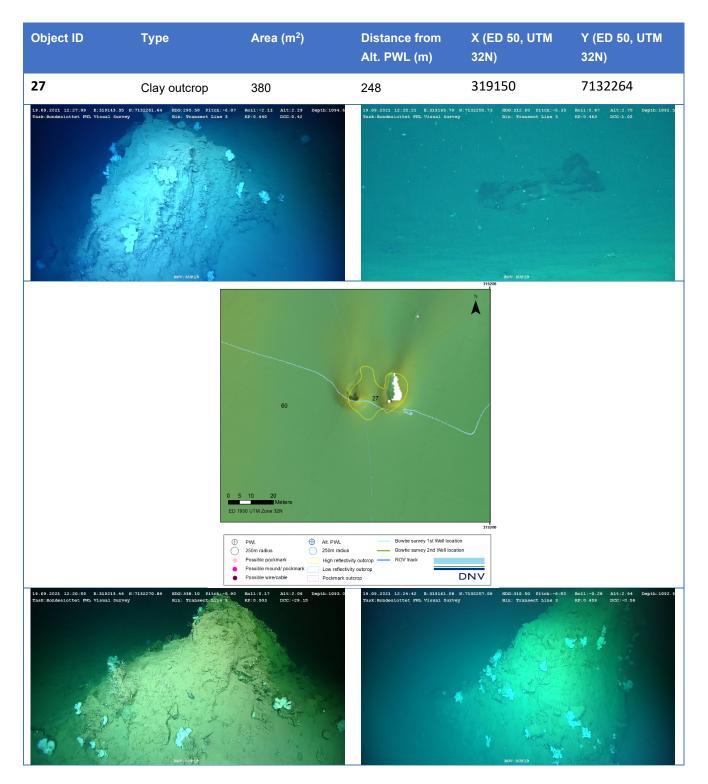


### **APPENDIX A**

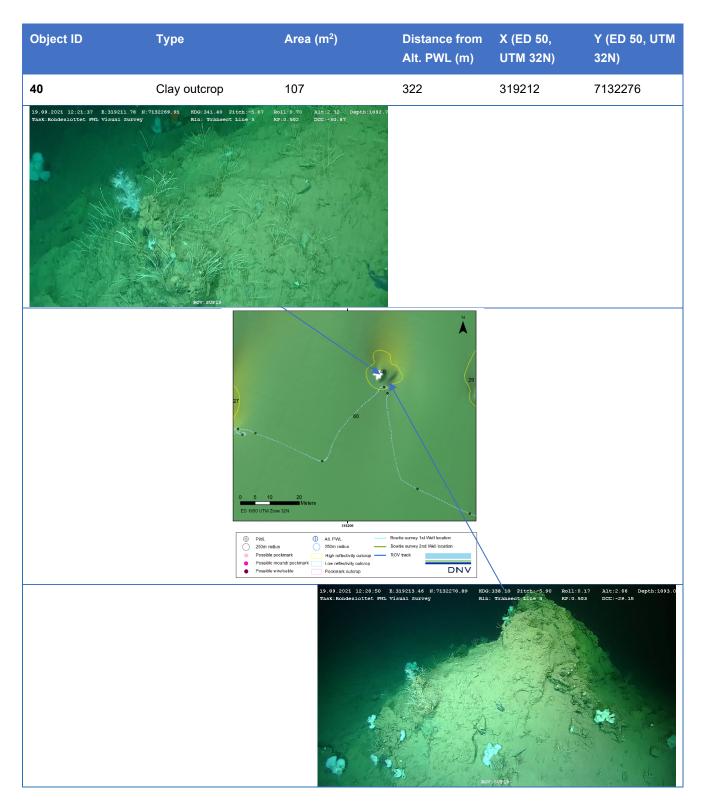
Pictures and maps from the clay outcrops closest to the Alt. PWL



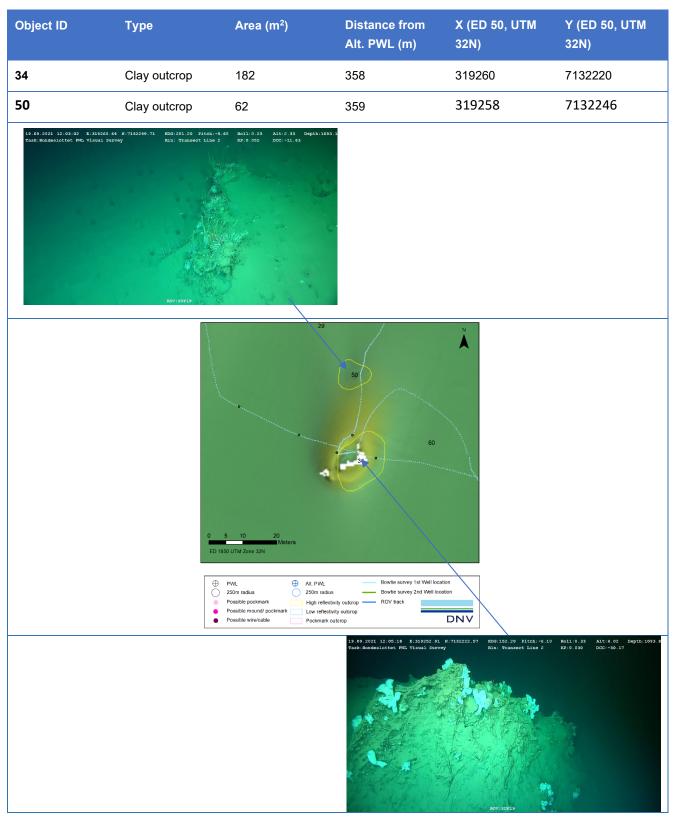
















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