

# SCOPE OF SERVICES – LOT 2

<b>Project</b>	Danish offshore wind 2030						
<b>Assignment</b>	Geophysical surveys for Danish offshore wind 2030						
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# 1. Introduction

## 1.1 Political background

Following a decision in the Danish Parliament 2022 Denmark is on the path to establish offshore energy and related infrastructure in the Danish North Sea, in the Danish inner sea (*Kattegat*) and Danish Baltic Sea to connect further offshore wind energy to the Danish mainland.

Figure 1-1 illustrates the regional locations of the project.

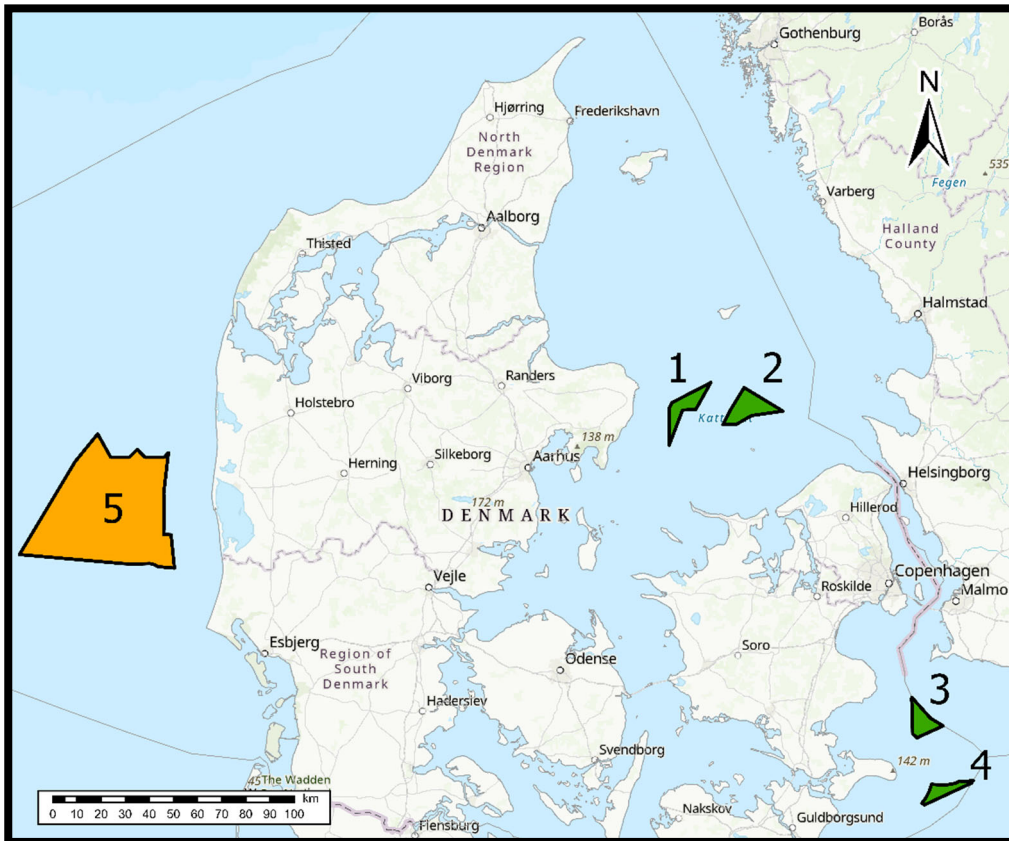


Figure 1-1. Project locations for Kattegat, the Baltic Sea and the North Sea. Numbers identify different parts of the project and colours the LOTs. LOT 1 in green comprises four OWF project sites, LOT 2, LOT 3 and LOT 4 in orange all covers the development area North Sea 1.

## 1.2 The project

The offshore elements of the project comprises the following main characteristics:

- Two offshore wind farms in Kattegat.
- Two offshore wind farms in the Southern Baltic Sea.
- Multiple offshore wind farms in the North Sea.
- Offshore platforms for substations.
- Export cables between offshore wind farms and the Danish mainland.

The offshore wind farm (OWF) areas are shown in Figure 1-1. It is anticipated that the North Sea 1 development area at a later stage will be divided into multiple offshore wind farm project sites.

### 1.3 Site investigations

The Danish Energy Agency has instructed the Client to initiate site investigations, environmental and metocean studies for the above mentioned main project elements.

On the basis of the instruction from the Danish Energy Agency the Client requests the Consultant to commence OWF geophysical survey activities primo 2023 for the project parts listed in Table 1-1.

For the project parts, Table 1-1 shows how the areas are combined into contract lots and which work packages are requested. Work packages cover:

- WP A: Geological site survey with 2D UHR seismic spread
- WP B: Magnetometry box survey
- WP C: Geophysical survey

Surveys for the subsea cables and substations are not included in the present scope of services.

*Table 1-1. Overview of project parts included in the scope of services, the associated work packages (see section 2.2), areal extent and contract lots.*

Part	Site	Region	Work package	Area Km2	Contract Lot
1	Kattegat II	Kattegat	A, B C	123	1
2	Hesselø South	Kattegat	A, B C	166	1
3	Kriegers Flak II North	Baltic Sea	A, B C	99	1
4	Kriegers Flak II South	Baltic Sea	A, B C	76	1
5	North Sea 1	North Sea	A	2200	2
5	North Sea 1	North Sea	B	2200	3
5	North Sea 1	North Sea	C	2200	4

This document covers services related to LOT 2, the development area : North Sea 1 work package A.

## 2. Scope or Services

To support the development of the project the Consultant must provide geophysical surveys covering the areas of investigation described in Chapter 5.

### 2.1 Purpose of assignment

The results of the survey should be suitable for use as basis for

- Planning of initial geotechnical investigations.
- Decision of foundation concept and preliminary foundation design.
- Assessment of installation conditions for foundations and inter-array cables.
- Site information enclosed in the tender for the offshore wind farm concession.

The LOT 3 services, box survey, depends on LOT 2 results, see section 4.5 for related requirements.

### 2.2 Scope of assignment

To accommodate the above mentioned purposes the assignment includes the following work package:

- **Work Package A – Geological survey with 2D UHR seismic spread**  
A geological site survey including 2D UHR seismic is performed with completion in 2023. The survey should cover the entire area with a line spacing of 250 m and cross lines every 1000 m. It must map the bathymetry and the sub-surface geological soil layers to at least 100m below seabed.

The work package includes, that the data acquired from the offshore investigations shall be processed, interpreted and supplied as reports, charts and a set of digital deliverables.

The work package is split into two tasks each with a related deliverable.

#### 2.2.1 Baseline program

The baseline survey must provide a general understanding of main geological structures in the area of investigations and propose a program for geotechnical locations.

Deliverable: Report no.1 baseline program with deliverables as described in enclosures including geotechnical planning, cf. enclosure 1, section 4.3.

The baseline survey should cover the area of investigations with a line spacing of 10 km in perpendicular directions. Thus, comprising approximately 500-600 line-km.

#### 2.2.2 Main program

The main program covers the entire scope of work package A including the baseline data.

Deliverable: Report no. 2 main program is in accordance with deliverables listed in this document with enclosures, but excluding the geotechnical planning.

Water depth ranges and aerial coverage is shown in the Table 5-1 The geography of the area of investigation is described in chapter 5.

This document - including enclosures - describe the requirements for the scope of services.

### 3. Time Schedule

In order to speed up the pre-investigations the area of investigation is split into two subareas, see possible division in Figure 5-2. The Subarea 1 should be conducted and reported before Subarea 2.

#### 3.1 Requirements to time schedule

The requirements to the time schedule for the provision of the services are driven by the following key conditions:

- **Survey permits.** The Client will apply for survey permits to be available by 2023-03-31. Therefore, the Consultant may assume that marine activities can commence from April 2023. No marine activities are allowed commencement before all permits are available.
- **Geotechnical investigations.** Marine borehole drilling and seabed testing commences 2024 Q1. Therefore, a magnetometry box survey (LOT 3) is required before Feb. 2024. This survey depends partly on results of the Geological site survey. For that reason the Consultant is requested to complete the Geological site survey before 2024-01-01.

The Client requests that the services are performed with respect to the following requirements:

##### 3.1.1 WP A – Geological site survey with 2D UHR seismic spread

1. No Marine activities prior to **2023-04-01**.
2. Marine survey activities are commenced no later **2023-04-30**.
3. Report no. 1 baseline program, draft issue, is provided no later than **2023-07-01**.
4. All marine survey activities are completed no later than **2023-12-31**.
5. Report no. 2 main program, revised issue, is provided no later than **2024-12-01**.
6. The Consultant must allow for the following amount of time for the Client to review and comment the draft work package deliverables: **4 weeks**.

#### 3.2 Contract milestones

As part of the Consultants tender response, the Consultant supplied milestone dates for the performance of the Scope of Services based on the template displayed in Figure 3-1.

Together with the Consultants detailed time schedule (Gantt style) the provided milestone dates constitutes the contracted time schedule. It appear from Table 3-1, that some selected milestones are subject to liquidated damages (LD) as described in the Service Agreement.

Table 3-1. Overview of contract milestones subject to liquidated damages.

Milestone	WP	Event	Project Part	Contract Lot
5001	A	Premob deliverables provided	5	2
5002	A	Marine operations commenced		
5004	A	Report no 1 baseline program provided, draft issue		
5007	A	Report no 2 main program, provided, revised issue		

Item	Event	Note	Due date	LD	Milestone
1	Commencement of contract		2022-10-18		
2	Project execution and QHSE plans provided				
3	Kick-off meeting				
4	Premob deliverables provided	3, 4		YES	5001
5	<b>Work Package A - Geological site survey</b>				
6	Marine operations commenced	1, 3		YES	5002
7	All marine operations completed				5003
8	Report no 1 baseline program, provided, draft issue	2, 3		YES	5004
9	Report, Client review		(4 weeks)		
10	Report no 1 baseline program, provided, revised issue	2			5005
11	Report no 2 main program, provided, draft issue	2			5006
12	Report, Client review		(4 weeks)		
13	Report no 2 main program, provided, revised issue	2,3		YES	5007
Note 1	Event has occurred at first day with working time recorded as OPERATIONAL TIME.				
Note 2	Event has occurred when report, including all charts and all digital deliverables have arrived at the Clients' office in Fredericia, Denmark.				
Note 3	Milestones marked with "YES" in the table column "LD" are subject to potential delay damages acc. to contract.				
Note 4	Premobilization deliverables must be provided within 20 calendar days of contract signature. Premobilization deliverables include evidence for meeting the insurance requirements and the performance guarantee. See the Consultancy Agreement for detailed requirements.				

Figure 3-1. Template for contract milestones that must be completed by Consultant as part of his proposal. The milestones regarding provision of the draft reports are subject to liquidated damages (LD) as described in the Service Agreement. The template apply for LOT 2.

## 4. Requirements

For the areas of investigation described in section 5 the Consultant must provide data acquisition, data processing, data interpretation and reporting that satisfies the requirements described in section 4.

### 4.1 Functional Requirements

#### 4.1.1 Work Package A – Geological site survey with 2D UHR seismic spread

The Consultant must carry out mapping of the subsurface in a sufficient level of detail to:

- Map all major geological layers and structures to at least 100m below seabed.
- Accurate bathymetric data and charts in the surveyed area.
- The morphology and natural features of the seabed surface such as e.g. mega-ripples and sand-waves.
- Locate structural complexities or geohazards within the imaged geological succession e.g. faulting, accumulations of shallow gas, buried channels, soft sediments, boulders, mobile sediments etc.

### 4.2 Technical Requirements

To meet the functional requirements the following technical requirements described in this section shall apply.

Detailed technical requirements applying for the scope of services are described in Enclosure 1.

#### 4.2.1 Work Package A – Geological survey with 2D UHR seismic spread

The Geological survey includes the following:

- **Multi-Beam Echo-Sounding** including **backscatter**
- **Seismic investigations** using multiple systems
  - Single-channel, high-resolution sub-bottom profiler for mapping of shallow soils in the area of investigation.
  - 2D Ultra High Resolution Seismic (2D UHRS) system for mapping of soil units to at least 100m below seabed in the area of investigation.

### 4.3 Reporting and Data delivery

Two reports are required (cf. section 2.2):

- Report no 1 baseline survey
- Report no 2 main survey

The Consultant shall process and interpret all data acquired during surveying as well as carry out all necessary reporting according to the requirements specified in the documents

- Enclosure 1 - Technical Specifications and
- Enclosure 2 - Standards of Deliverables.



The consultant is requested to present a plan for survey lines, order of data collection as well as timing of deliverables.

The LOT 2 results must be applied for planning of geotechnical investigations. Geotechnical investigations requires a box-survey (LOT 3) prior to commencement. The box survey is planned to start up July 2023.

#### 4.4 UXO risk mitigation

Some parts of the investigation area are likely to have elevated probability for encountering UXO objects. The Client has not yet conducted a UXO desk study.

#### 4.5 Simultaneous operations

Please note that the scope of services of the present assignment is a part of a general site investigation program with multiple tasks, some possibly performed by other contractors. The LOT 2 work in the area will be carried out in parallel with other geophysical surveys.

A very coarse preliminary estimate of the distribution of survey activities is shown in Figure 4-1.

Survey activity	2023	2024	2025
WP A (LOT 2) : Geological survey, 2D UHR			
WP B (LOT 3) : Box survey			
WP C (LOT 4) : Geophysical survey			
Geotechnical investigations			

Figure 4-1 Very coarse scale preliminary distribution of OWF site survey activity. Red represents North Sea area 1 and blue North Sea area 2, see. Figure 5-2.

It should be anticipated that this simultaneous presence of several campaigns will require additional communication and coordination of survey plans.

Energinet envisage following priority of the Right of ways :

1. Geotechnical investigations

1.2. WP A (LOT 2) : Geological survey, 2D UHR

2.3. WP C (LOT 4) : Geophysical survey

3.4. WP B (LOT 3) : Box survey

The final decision on Right of ways is pending and will be agreed upon post contracting.

#### 4.6 HSE requirements

To manage the Health, the Safety and the Environmental risks under the assignment a number of requirements attached as Enclosure 3 must apply for the Consultants provision of the services.

#### 4.7 Quality requirements

To manage the Quality under the assignment a number of requirements attached as Enclosure 4 must apply for Consultants provision of the services.

## 5. Areas of investigation

The coordinates for the area of investigations subject to this assignment are provided by the Danish Energy Agency as part of their instruction to Energinet. The LOT 2 covers the area shown in orange, Figure 5-1, where the location of nearby wind farms in production and development are also shown.

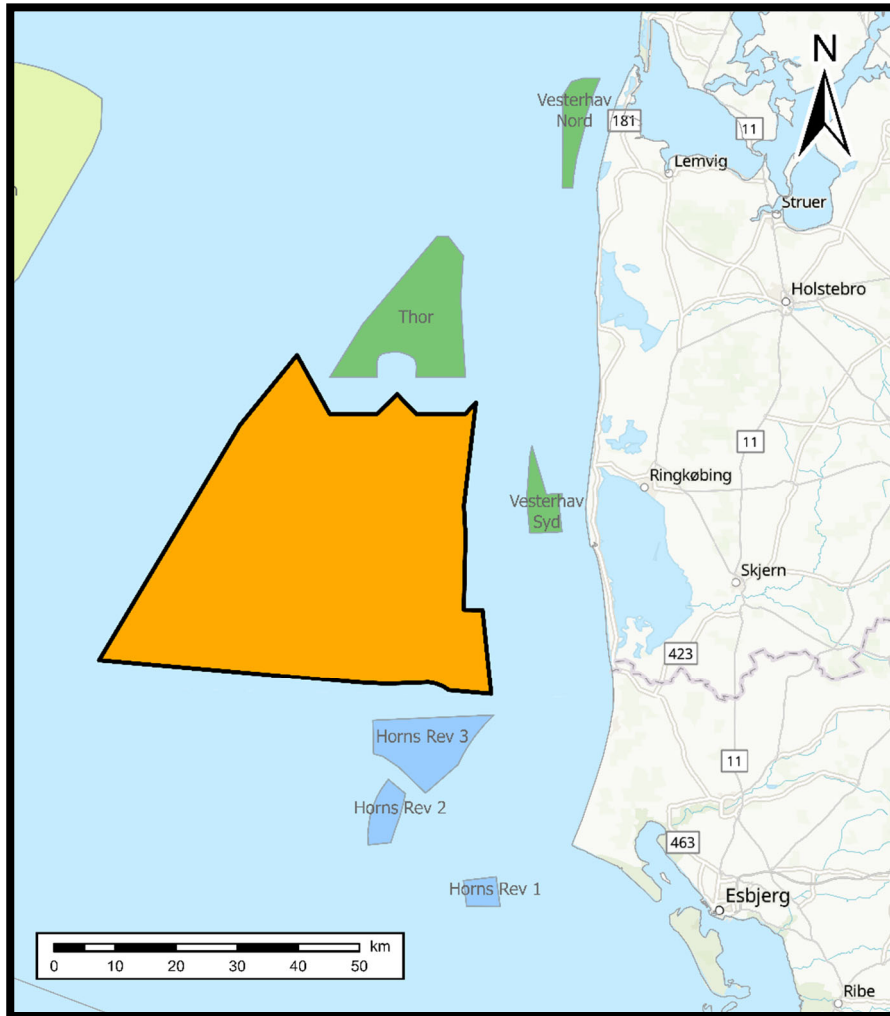


Figure 5-1 North Sea 1 development area in orange shown with neighbouring wind farms either in operation (blue) or under construction (green)

In order to speed up the process and to enter concession as soon as possible the area will be split into two subareas for survey reporting. Thus, one part will need to be surveyed and reported first. Final decision on outline of the area is pending but initial thoughts area shown in Figure 5-2.

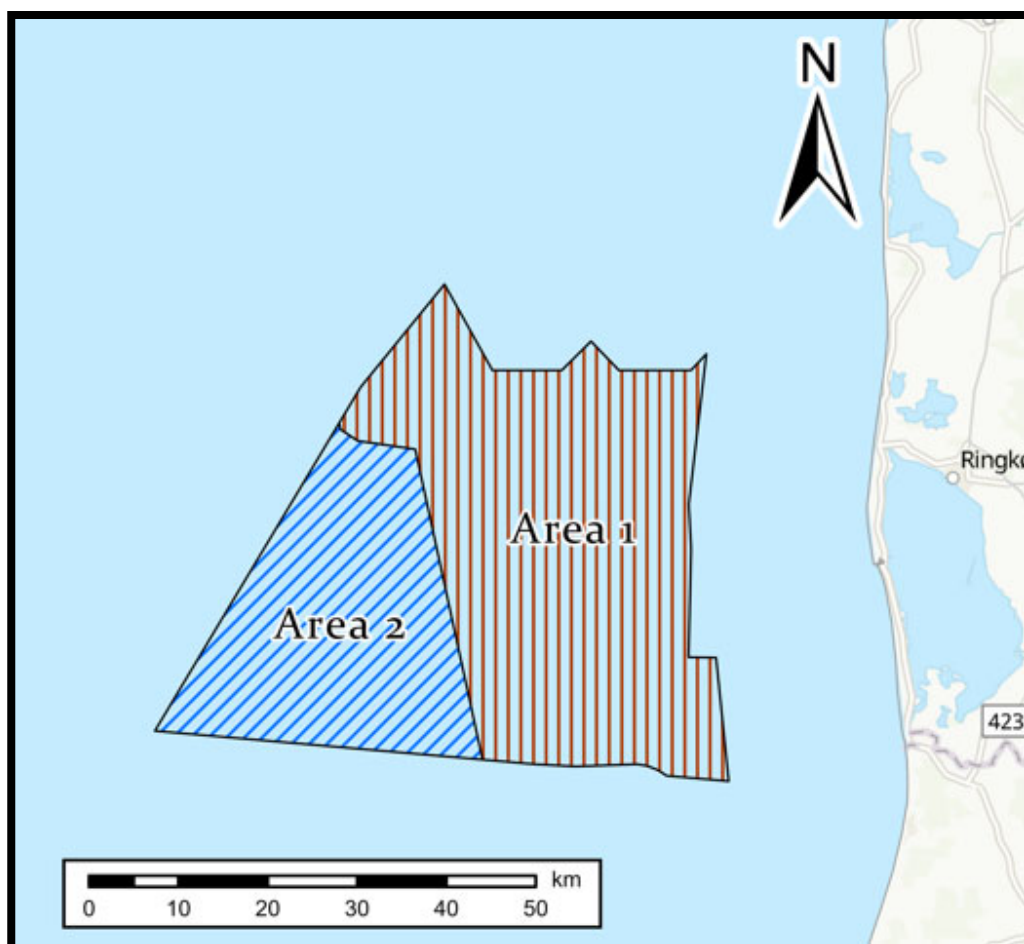


Figure 5-2 Possible sub-area distribution for the North Sea 1 development area.

### 5.1 Admiralty charts

Figure 5-3 shows the area of investigation together with the relevant admiralty chart 93. Ca. 8 known wrecks are found within the development area North Sea 1. Further, several cables intersect the area. At least 5 cables are seen in the map. 3 pipes are located south of the area, one close to its southern rim.

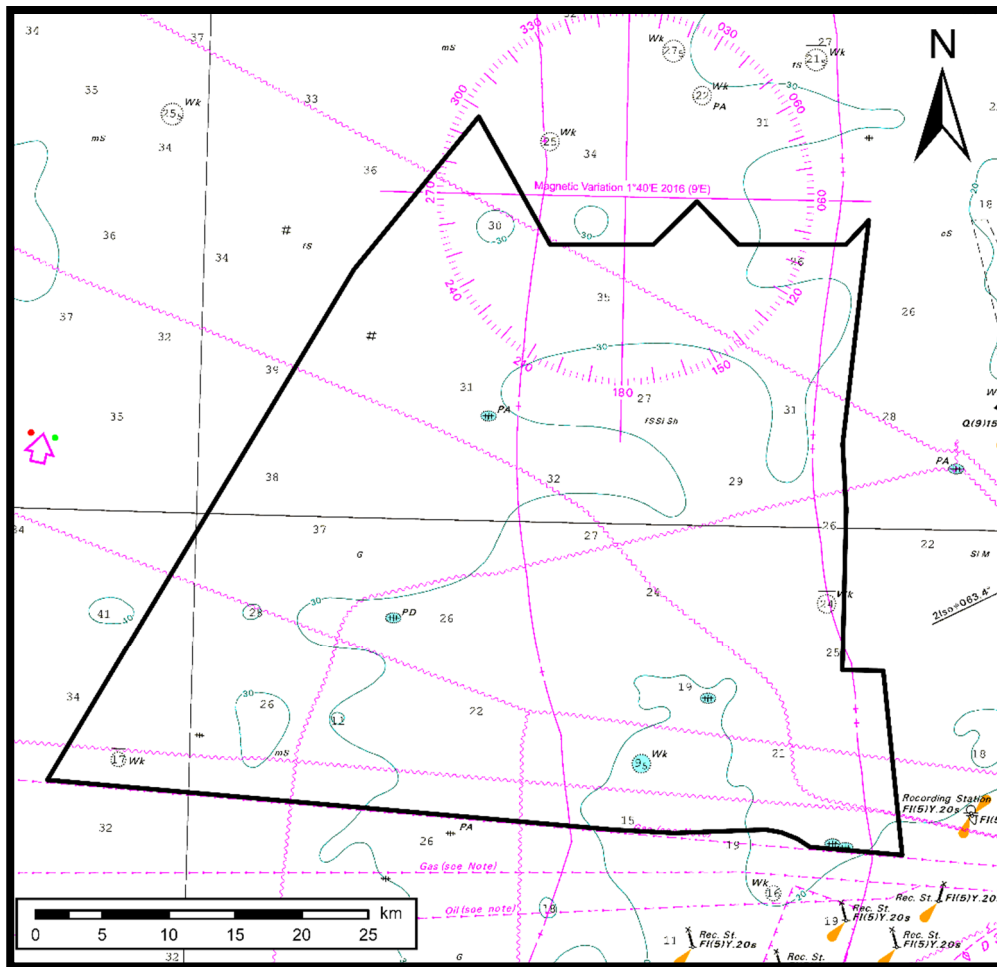


Figure 5-3. Area of investigation (black polygon) for North Sea 1 displayed with admiral chart 93 © Danish Geodata Agency.

## 5.2 Water depths

The Clients expectations to the water depths in the area of investigation are seen in Figure 5-4. The bathymetrical DTM information in the figures is based on regional models of ca. 100m spatial resolution (Emodnet 2018 MSL). From the figures the following expectations to the minimum/maximum water depths may be assumed:

Table 5-1 Water depth ranges expected

Part	Site	Water depth ranges
5	North Sea 1	10m to 40m

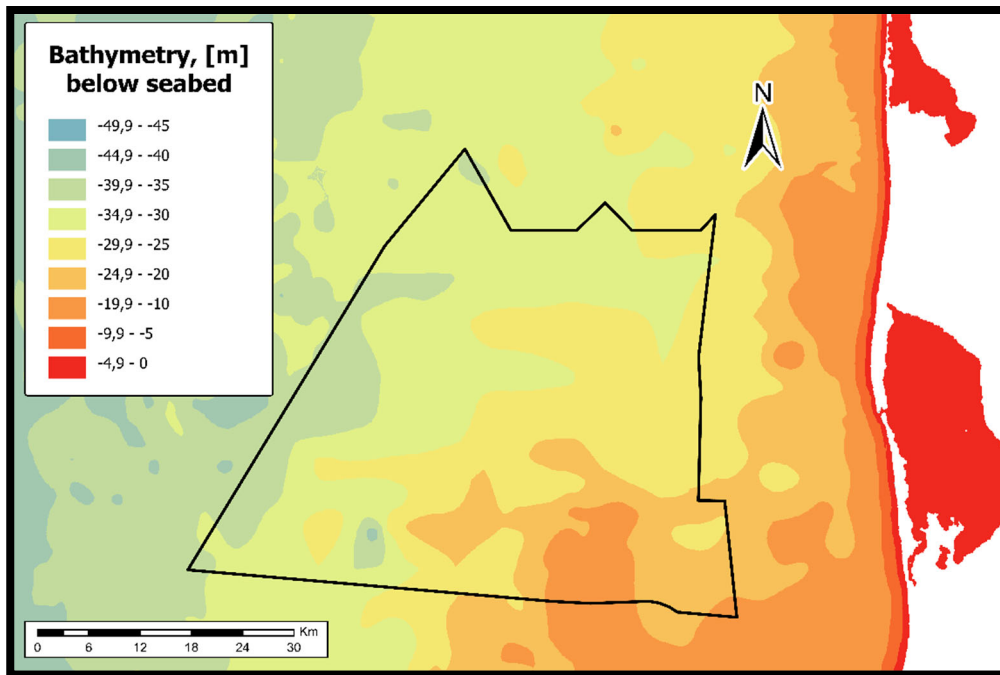


Figure 5-4. Water depths (Emodnet 2018 MSL). BLACK POLYGONS show the areas of investigation for project LOTs 2, 3 and 4.

### 5.3 Geology

Figure 5-5 shows the surface geology in the area of investigation based on models from GEUS (Danish Geological Survey) 2015.

For the general project development area North Sea 1, the seabed surface sediments primarily consist of sand and gravel. To the southeast some muddy sand is present. These sediments are considered to be of marine and postglacial origin. Minor spots of outcropping glacial till / diamicton indicate potential presence of glacial deposits with shallow burial below the postglacial coarse sediments.

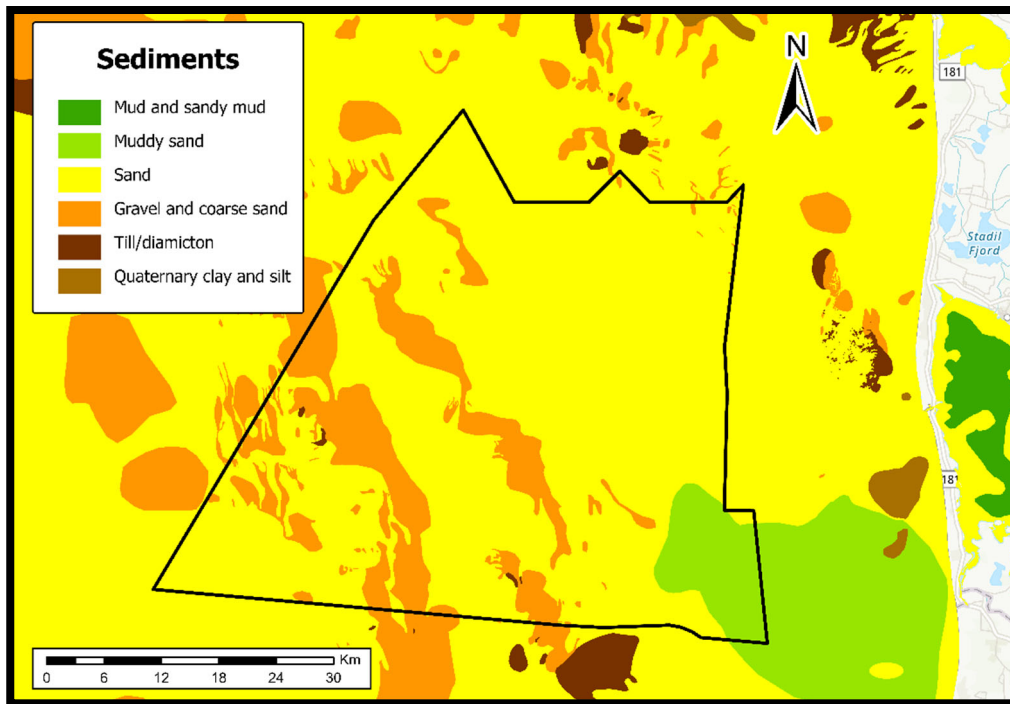


Figure 5-5. Geology, seabed surface (GEUS 2015). BLACK POLYGON shows the area of investigation.

COWI has produced an integrated 3D geomodel for Energinet and the Danish Energy Agency for the Thor site located immediately north of the tendered area, see Figure 5-1.

Figure 5-6 shows the conceptual understanding from this model. According to this, buried paleo-valleys and deformed sediments are likely to be found within the investigation area.

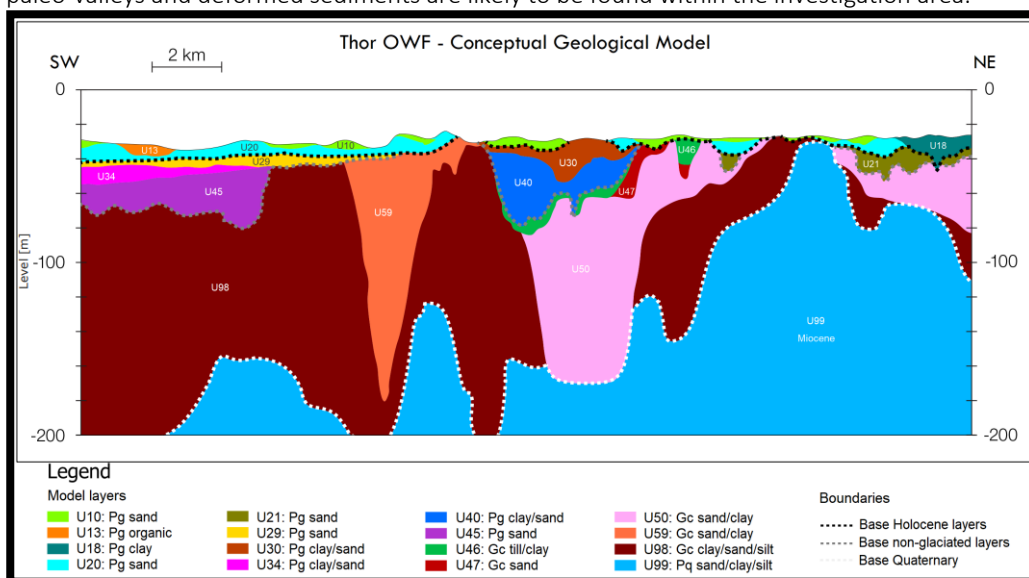
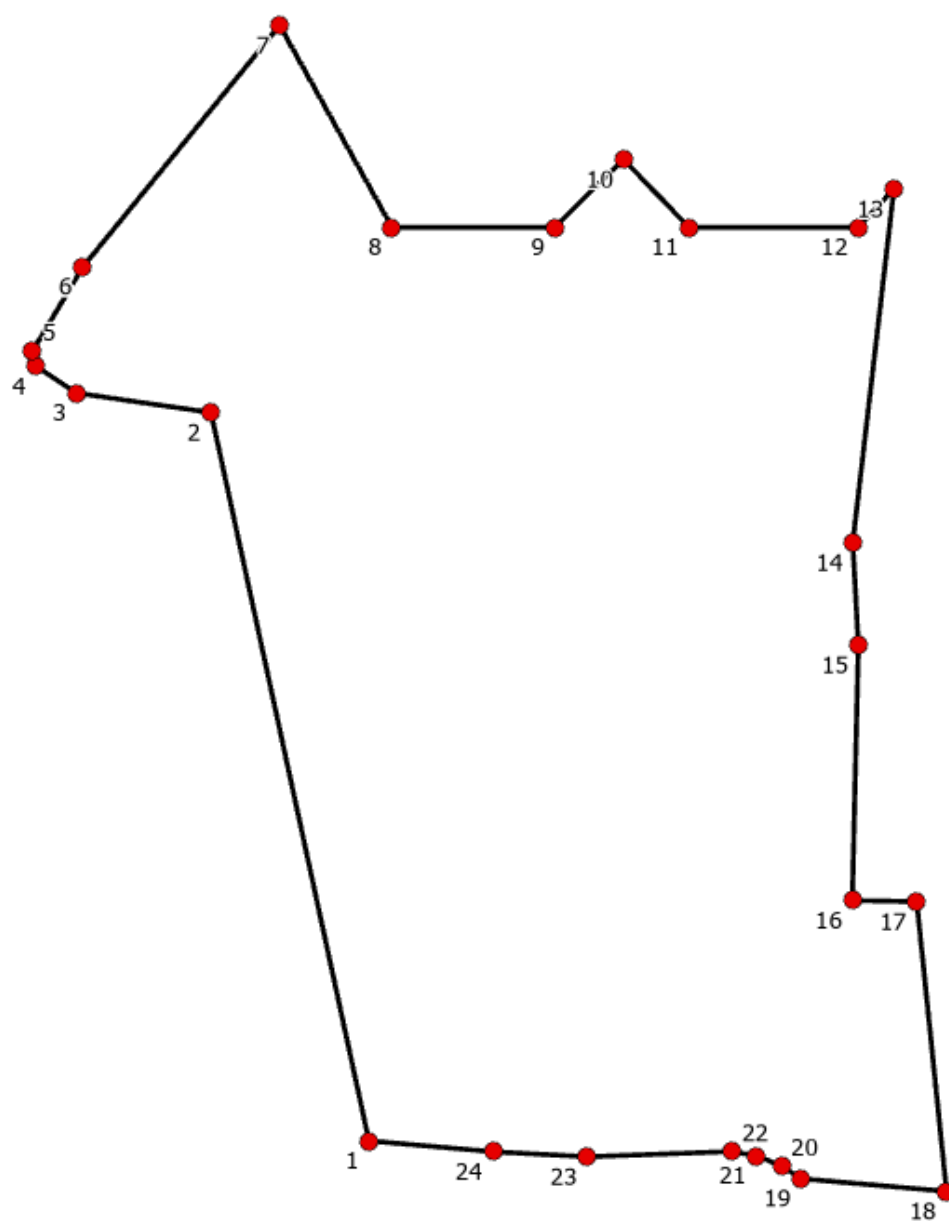


Figure 5-6 Conceptual model for the Thor site from integrated 3D geomodel report based on seismic and geotechnical data. Pg identifies post glacial deposits, Gc glacial deposits and Pq prequaternary deposits.

[https://ens.dk/sites/ens.dk/files/Vindenergi/309\\_integrated\\_geomodel\\_report\\_2\\_0\\_with\\_appendices.pdf](https://ens.dk/sites/ens.dk/files/Vindenergi/309_integrated_geomodel_report_2_0_with_appendices.pdf)

## Annex 1 – Subarea 1

Shape file with points as received from the Danish Energy Agency is supplied in the attached Shp\_coordinates\_DEA\_202206.zip

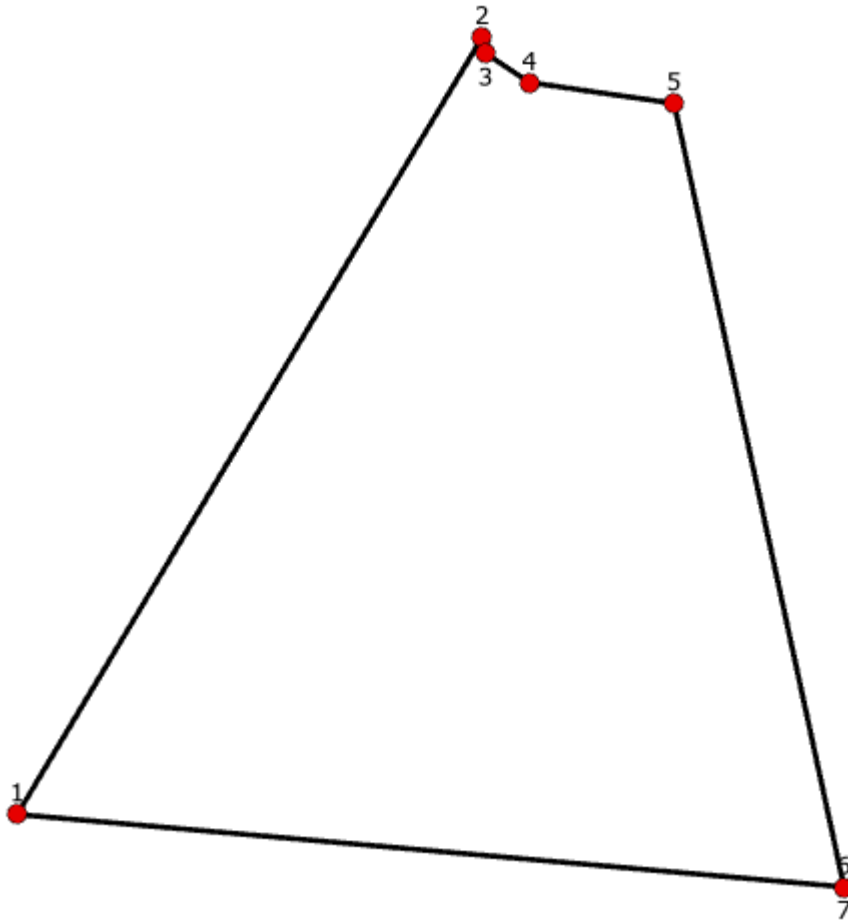


Point ID	Easting Euref89 Zone32N [meter]	Northing Euref89 Zone 32N [meter]	Longitude Euref89	Latitude Euref89
1	400729	6184536	7° 24.993' E	55° 47.774' N
2	393196	6219289	7° 16.961' E	56° 06.405' N
3	386773	6220223	7° 10.744' E	56° 06.819' N
4	384849	6221503	7° 08.855' E	56° 07.482' N
5	384692	6222242	7° 08.684' E	56° 07.877' N
6	387083	6226239	7° 10.890' E	56° 10.065' N
7	396471	6237771	7° 19.687' E	56° 16.407' N
8	401832	6228128	7° 25.093' E	56° 11.279' N
9	409592	6228128	7° 32.592' E	56° 11.371' N
10	412868	6231383	7° 35.694' E	56° 13.162' N
11	415992	6228128	7° 38.778' E	56° 11.441' N
12	424056	6228128	7° 46.572' E	56° 11.522' N
13	425775	6229959	7° 48.203' E	56° 12.526' N
14	423811	6213091	7° 46.594' E	56° 03.416' N
15	424076	6208194	7° 46.932' E	56° 00.779' N
16	423789	6196004	7° 46.862' E	55° 54.206' N
17	426863	6195954	7° 49.813' E	55° 54.208' N
18	428283	6182124	7° 51.394' E	55° 46.766' N
19	421336	6182731	7° 44.740' E	55° 47.029' N
20	420399	6183345	7° 43.833' E	55° 47.350' N
21	419196	6183822	7° 42.674' E	55° 47.596' N
22	418033	6184025	7° 41.557' E	55° 47.693' N
23	411158	6183775	7° 34.985' E	55° 47.485' N
24	406633	6184016	7° 30.652' E	55° 47.564' N



## Annex 2 – Subarea 2

Shape file with points as received from the Danish Energy Agency is supplied in the attached Shp\_coordinates\_DEA\_202206.zip



Point ID	Easting Euref89 Zone32N [meter]	Northing Euref89 Zone 32N [meter]	Longitude Euref89	Latitude Euref89
1	364060	6187754	6° 49.827' E	55° 48.972' N
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6	400729	6184536	7° 24.993' E	55° 47.774' N
7	400730	6184534	7° 24.993' E	55° 47.773' N

# SCOPE OF SERVICES – LOT 3

<b>Project</b>		Danish offshore wind 2030					
<b>Assignment</b>		Geophysical surveys for Danish offshore wind 2030					
<b>Document Title</b>		Scope of Services - Lot 3					
<b>Document No.</b>		22/02940-13					
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# 1. Introduction

## 1.1 Political background

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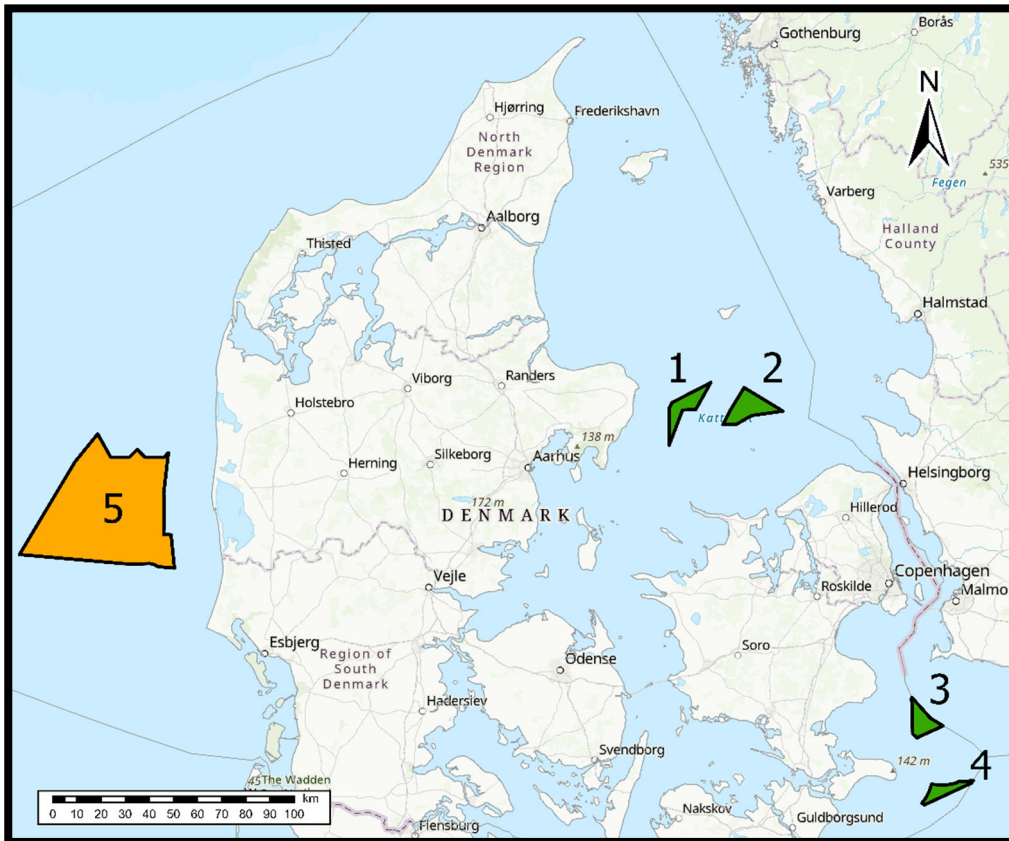


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The Danish Energy Agency has instructed the Client to initiate site investigations, environmental and metocean studies for the above mentioned main project elements.

On the basis of the instruction from the Danish Energy Agency the Client requests the Consultant to commence OWF geophysical survey activities primo 2023 for the project parts listed in Table 1-1.

For the project parts, Table 1-1 shows how the areas are combined into contract lots and which work packages are requested. Work packages cover:

- WP A: Geological site survey with 2D UHR seismic spread
- WP B: Magnetometry box survey
- WP C: Geophysical survey

Surveys for the subsea cables and substations are not included in the present scope of services.

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Part	Site	Region	Work package	Area Km2	Contract Lot
1	Kattegat II	Kattegat	A, B C	123	1
2	Hesselø South	Kattegat	A, B C	166	1
3	Kriegers Flak II North	Baltic Sea	A, B C	99	1
4	Kriegers Flak II South	Baltic Sea	A, B C	76	1
5	North Sea 1	North Sea	A	2200	2
5	North Sea 1	North Sea	B	2200	3
5	North Sea 1	North Sea	C	2200	4

This document covers services related to LOT 3, the development area: North Sea 1, work package B.

## 2. Scope or Services

To support the development of the project the Consultant must provide geophysical surveys in the area of investigation described in Chapter 5.

### 2.1 Purpose of assignment

The survey results are applied by the geotechnical campaign using ALARP principles regarding UXO risk at planned CPT and borehole locations. The results will be used by the geotechnical contractor to locate seabed interaction away from geophysical anomalies.

### 2.2 Scope of assignment

To accommodate the above mentioned purpose the assignment includes the following work package:

- **Work Package B – Magnetometry box survey**

A high-resolution magnetometry box survey is performed at rectangular areas containing locations planned to subsequently be subject to geotechnical drilling work. In addition to magnetometry the scope includes a high-resolution acoustic survey (multibeam echo-sounding and dual frequency side scan sonar).

The work comprises ~~4800~~ rectangles, Table 2-1, planned amounts:

- 144 (=120+20%) Borehole ~~and~~ CPT locations (150 m x 200 m)
- 336 (=280+20%) CPT locations (150m x 100m)

Table 2-1 Expected scope for WP B magnetometry box survey for individual project parts of LOT ~~31~~. Amounts correspond to planned geotechnical positions ~~may vary~~ plus/minus 20%

Part	Site	No of locations 200m x 150m	No of locations 150m x 100m
5	North Sea 1	<del>144</del> <u>20</u>	<del>280</del> <u>336</u>

Thus in total ~~4800~~ locations. 90-95 % of the ~~positions~~locations will be located based on prior knowledge of the geology in the investigation area, at planned cross-line locations of the 2D ultra high resolution seismic lines, LOT 2-~~work~~. These 90-95% spatially distributed positions will be located along the roughly north-south oriented 2D-survey lines (planned in LOT2), related to the dominant current direction. Based on the size of the area and planned amounts, this corresponds to location distances of ca. 2-3 km (deviations related to e.g. infrastructure must be expected). The remaining locations will be selected based on LOT 2 results.

The data acquired shall be processed, interpreted and supplied as a number of reports, charts and a set of digital deliverables.

Expected water depth ranges and aerial coverage for the site is shown in the Table 5-1. The geography of the area of investigation is described in chapter 5.

This document - including enclosures - describe the requirements for the scope of services.

### 3. Time Schedule

The requirements to the time schedule for the provision of the services are driven by the following key conditions:

- **Program planning.** The Client determines 90% to 95% of the locations for box survey during 2023 Q1 for both Subarea 1 and Subarea 2. The remaining 5% to 10% of the locations are determined by the Client during 2023 Q3.
- **Geotechnical investigations.** Marine borehole drilling and seabed testing commences during 2024 Q1 (Subarea 1) and during 2024 Q4 (Subarea 2). Therefore, the Consultant is requested to complete marine activities with magnetometry box survey in advance.

The following formal requirements to the time schedule are derived from the abovementioned key conditions.

#### 3.1 Requirements to time schedule

The Client requests that the services are performed with respect to the following requirements:

##### 3.1.1 WP B – Magnetometry box survey

1. No Marine activities prior to **2023-04-01**.
2. Commencement of marine operations no later than **2023-06-30**.
3. To allow for the subsequent geotechnical activities, preliminary results must be provided with a 48 hour turn around unless otherwise agreed. These should include:
  - a. Pdf charts imagery for MBES, SSS, MAG and anomalies
  - b. GIS files containing outline of boxes
  - c. GIS files containing interpreted anomalies

3.4. To allow for the subsequent geotechnical activities, a complete delivery package, revised issue for the entire Subarea 1 and 2 should be provided no later than **2024-02-15**.

4.5. The Consultant must allow the following amount of time for the Client to review and comment the draft work package deliverables for: **2 weeks**.

#### 3.2 Contract milestones

As part of the Consultants tender response, the Consultant supplied milestone dates for the performance of the Scope of Services based on the template displayed in Figure 3-1.

Together with the Consultants detailed time schedule (Gantt style) the provided milestone dates constitutes the contracted time schedule. It appear from Table 3-1, that some selected milestones are subject to liquidated damages (LD) as described in the Service Agreement.

Table 3-1. Overview of contract milestones subject to liquidated damages.

Milestone	WP	Event	Project Part	Contract Lot
5008	B	Premob deliverables provided	5	3
5009	B	Marine operations commenced		
5010	B	All marine operations completed		

Item	Event	Note	Due date	LD	Milestone
1	Commencement of contract		2022-10-18		
2	Project execution and QHSE plans provided				
3	Kick-off meeting				
4	Premob deliverables provided	3, 4		YES	5008
5	<b>Work Package B - Magnetometry box survey</b>				
6	Marine operations commenced	1, 3		YES	5009
7	All marine operations completed	3		YES	5010
8	Report provided, draft issue	2			5011
9	Report, Client review		(2 weeks)		
10	Report provided, revised issue	2			5012
Note 1	Event has occurred at first day with working time recorded as OPERATIONAL TIME.				
Note 2	Event has occurred when report, including all charts and all digital deliverables have arrived at the Clients' office in Fredericia, Denmark.				
Note 3	Milestones marked with "YES" in the table column "LD" are subject to potential delay damages acc. to contract.				
Note 4	Premobilization deliverables must be provided within 20 calendar days of contract signature. Premobilization deliverables include evidence for meeting the insurance requirements and the performance guarantee. See the Consultancy Agreement for detailed requirements.				

Figure 3-1. Template for contract milestones that must be completed by the Consultant as part of his proposal. The milestones regarding provision of the draft reports are subject to liquidated damages (LD) as described in the Service Agreement.

## 4. Requirements

For the areas of investigation described in section 5 the Consultant must provide data acquisition, data processing, data interpretation and reporting that satisfies the requirements described in section 4.

### 4.1 Functional Requirements

#### 4.1.1 Work Package B – Magnetometry box survey

Within the areas of investigation for this work package (see section 5 and table 1-1) the Consultant must carry out a detailed mapping of the seabed surface to:

- Identify and locate any man-made or natural objects on the seabed larger than 0.5 m.
- Identify and locate any buried objects with a ferrous mass larger than 50 kg that are buried up to 2 m below the seabed surface.
- Provide a complete data set for target interpretation in the surveyed area.
- Chart any findings and observations relevant to the geotechnical contractor (e.g. boulders, wrecks and other Man-Made-Objects), in an appropriate chart format suggested by the Consultant.

### 4.2 Technical Requirements

To meet the functional requirements the following technical requirements described in this section shall apply.

Detailed technical requirements applying for the scope of services are described in Enclosure 1.

#### 4.2.1 Work Package B – Magnetometry box survey

The magnetometry box survey include the following:

- An appropriate **multi magnetometer / gradiometer** setup, proposed by the Consultant, that can identify ferrous objects placed on the seabed, partly buried and with a shallow burial within a given accuracy.
- **High-resolution multibeam echo-sounding** and dual frequency **Side Scan Sonar**, complete coverage within the area of investigation.
- An equipment verification test over a known object as part of the Consultants offshore mobilization.

#### Important note:

The Client recognizes that the acoustic spread (MBES and SSS) will cover seabed that is also surveyed in work related to LOT 4 with these methods. The purpose of Work Package B is to achieve a more detailed object resolution on and below the seabed surface and map areas for geotechnical investigations. Therefore MBES and SSS acquisition are required for Work Package B. Detailed requirements are specified in Enclosure 1.

### 4.3 Reporting and Data delivery

The Consultant shall process and interpret all data acquired during surveying as well as carry out all necessary reporting according to the requirements specified in the documents



- Enclosure 1 - Technical Specifications and
- Enclosure 2 - Standards of Deliverables.

LOT 3 results are needed prior to seabed interaction of the geotechnical investigations. For this reason preliminary deliverables with a turn-around of 48 hours may be needed depending on time schedule and progress of the geotechnical investigations. If needed these should include:

- a. Pdf charts imagery for MBES, SSS, MAG and anomalies
- b. GIS files containing outline of boxes
- c. GIS files containing interpreted anomalies

#### 4.4 UXO risk mitigation

Some parts of the investigation area are likely to have an elevated probability for encountering UXO objects. The Client has not yet conducted a UXO desk study.

#### 4.5 Simultaneous operations

Please note that the scope of services of the present assignment is a part of a general site investigation program with multiple tasks, some possibly performed by other contractors. The LOT 3 work in the area will be carried out in parallel with other geophysical surveys and geotechnical investigations.

A very coarse preliminary estimate of the distribution of survey activities is shown in Figure 4-1.








Survey activity	2023	2024	2025
WP A (LOT 2) : Geological survey, 2D UHR			
WP B (LOT 3) : Box survey			
WP C (LOT 4) : Geophysical survey			
Geotechnical investigations			

Figure 4-1 Very coarse scale preliminary distribution of OWF site survey activity. Red represents North Sea, Subarea 1 and blue North Sea, Subarea 2, see. Figure 5-2.

It should be anticipated that this simultaneous presence in the investigation area of several campaigns will require additional communication and coordination of survey plans.

Energinet envisage following Right of ways :

1. Geotechnical investigations
- ~~1-2.~~ WP A (LOT 2) : Geological survey, 2D UHR
- ~~2-3.~~ WP C (LOT 4) : Geophysical survey
- ~~3-4.~~ WP B (LOT 3) : Box survey

The final decision on Right of ways is pending and will be agreed post contracting.

#### 4.6 HSE requirements

To manage the Health, the Safety and the Environmental risks under the assignment a number of requirements attached as Enclosure 3 must apply for the Consultants provision of the services.

#### 4.7 Quality requirements

To manage the Quality under the assignment a number of requirements attached as Enclosure 4 must apply for Consultants provision of the services.

## 5. Areas of investigation

The coordinates for the area of investigation subject to this assignment are provided by the Danish Energy Agency as part of their instruction to Energinet. The LOT 2 covers the area shown in orange, Figure 5-1, where the location of nearby wind farms in production and development are also shown.

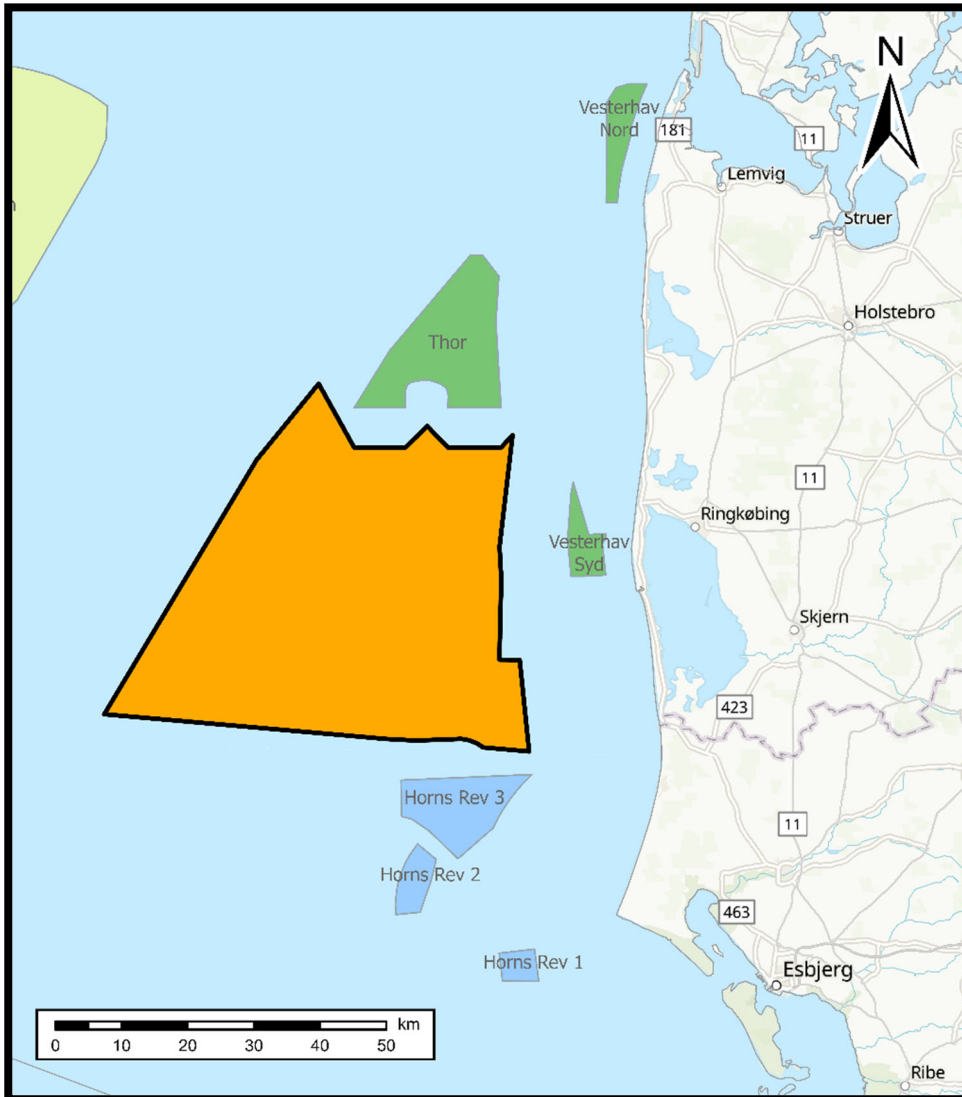


Figure 5-1 North Sea 1 development area in orange shown with neighbouring wind farms either in operation (blue) or under construction (green)

In order to speed up the process and to enter concession as soon as possible the area will be split into two subareas for survey reporting. Thus, one part will need to be surveyed and reported first. Final decision on outline of the area is pending but initial thoughts area shown in Figure 5-2.

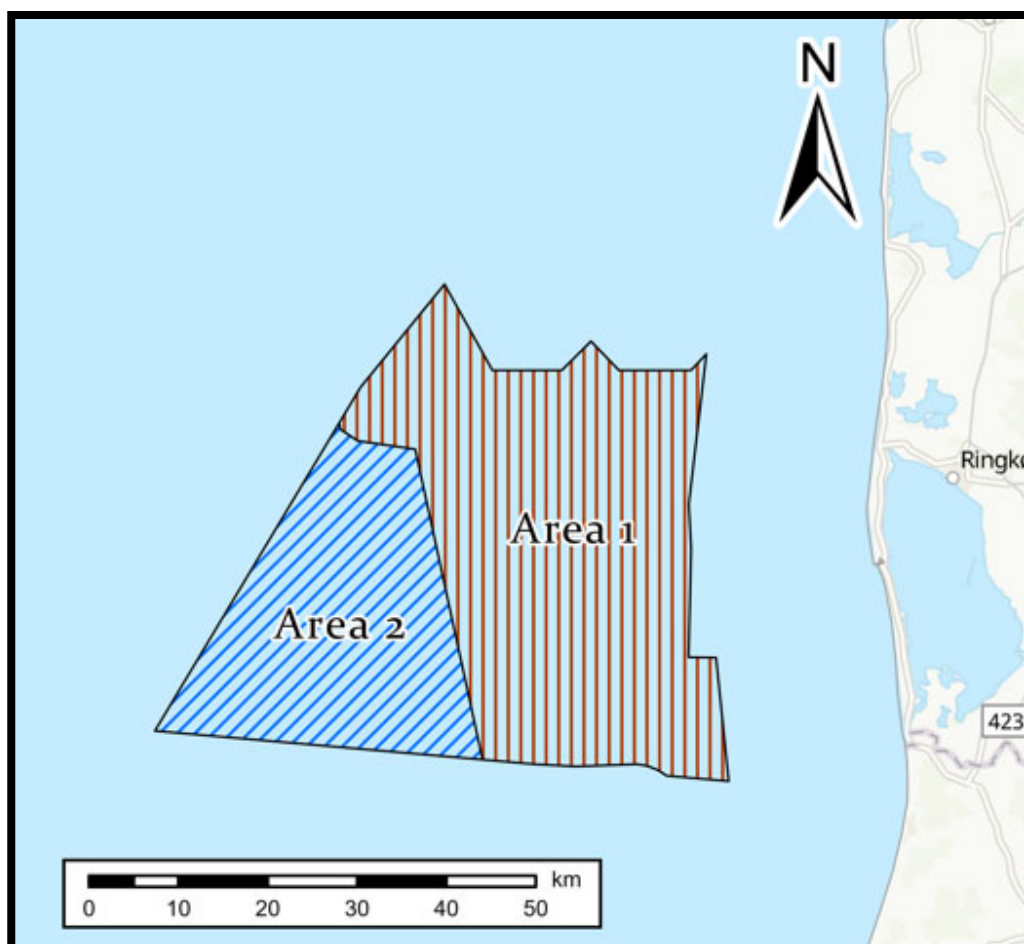


Figure 5-2 Possible sub-area distribution for the North Sea 1 development area

### 5.1 Admiralty charts

Figure 5-3 shows the area of investigation together with the relevant admiralty chart 93. Ca. 8 known wrecks are found within the development area North Sea 1. Further, several cables intersect the area. At least 5 cables are seen in the map. 3 pipes are located south of the area, one close to its southern rim.

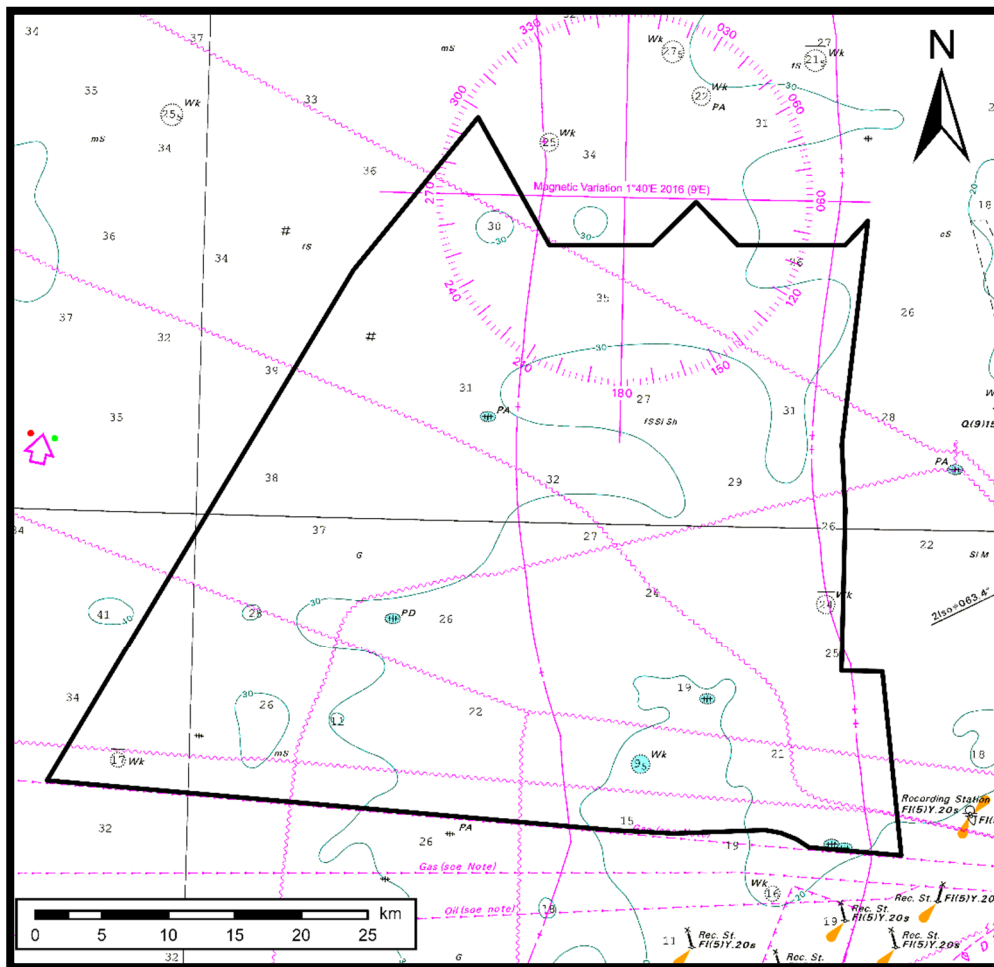


Figure 5-3. Area of investigation (black polygon) for North Sea 1 displayed with admiral chart 93 © Danish Geodata Agency.

## 5.2 Water depths

The Clients expectations to the water depths in the area of investigation are seen in Figure 5-4. The bathymetrical DTM information in the figures is based on regional models of ca. 100m spatial resolution (Emodnet 2018 MSL). From the figures the following expectations to the minimum/maximum water depths may be assumed:

Table 5-1 Water depth ranges expected

Part	Site	Water depth ranges
5	North Sea 1	10m to 40m

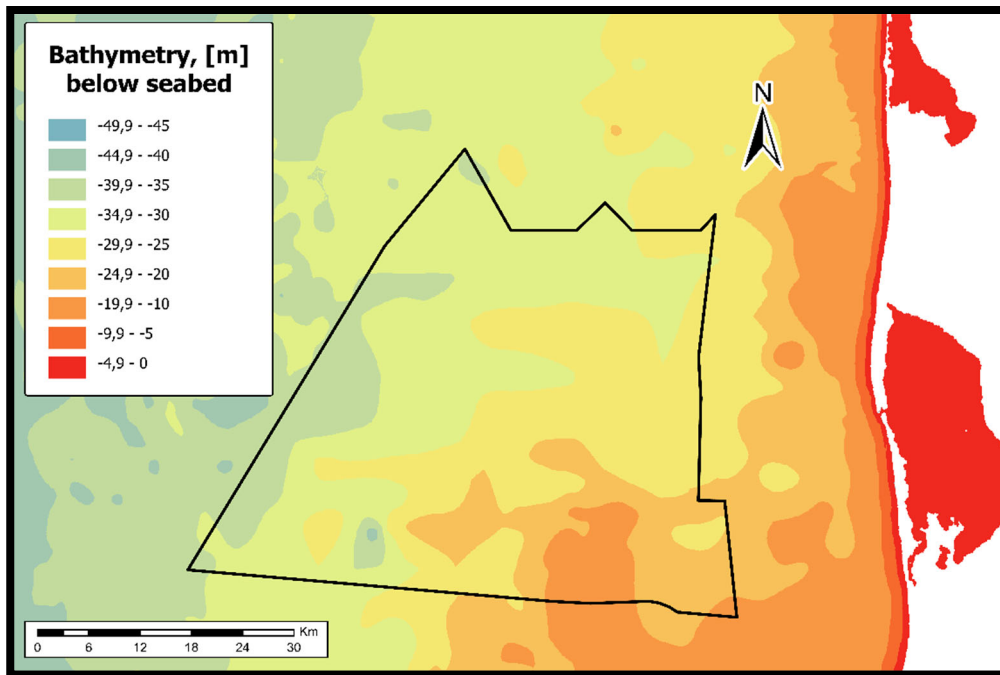


Figure 5-4. Water depths (Emodnet 2018 MSL). BLACK POLYGONS show the areas of investigation for project LOTs 2, 3 and 4.

### 5.3 Geology

Figure 5-5 shows the surface geology in the area of investigation based on models from GEUS (Danish Geological Survey) 2015.

For the general project development area North Sea 1, the seabed surface sediments primarily consist of sand and gravel. To the southeast some muddy sand is present. These sediments are considered to be of marine and postglacial origin. Minor spots of outcropping glacial till / diamicton indicate potential presence of glacial deposits with shallow burial below the postglacial coarse sediments.

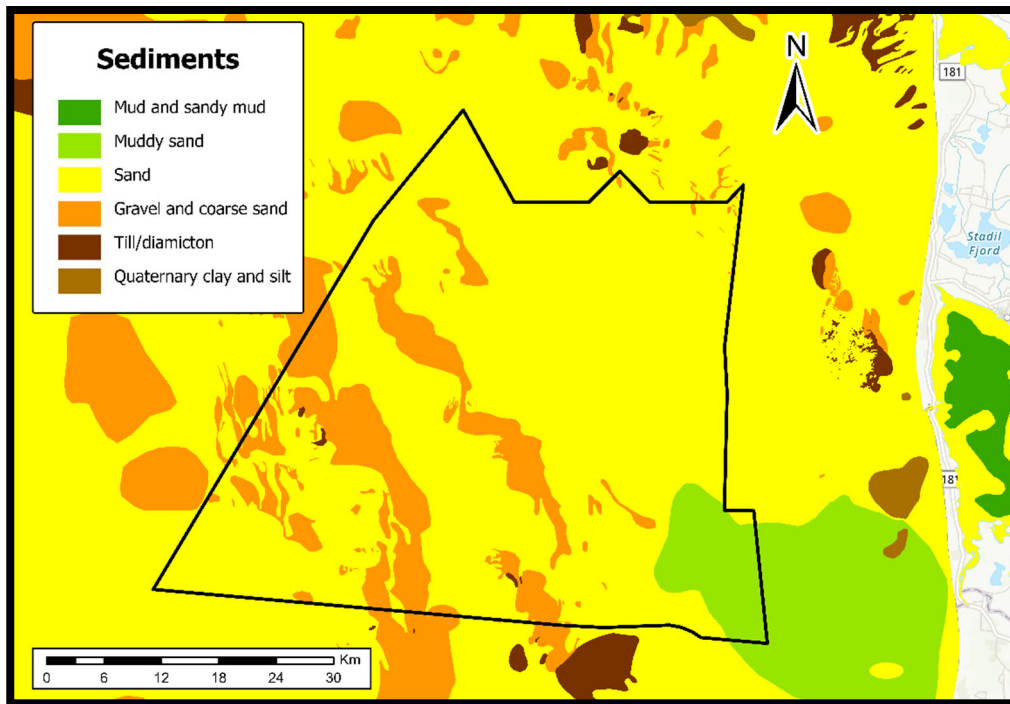


Figure 5-5. Geology, seabed surface (GEUS 2015). BLACK POLYGON shows the area of investigation.

COWI has produced an integrated 3D geomodel for Energinet and the Danish Energy Agency for the Thor site located immediately north of the tendered area, see Figure 5-1.

Figure 5-6 shows the conceptual understanding from this model. According to this, buried paleo-valleys and deformed sediments are likely to be found within the investigation area.

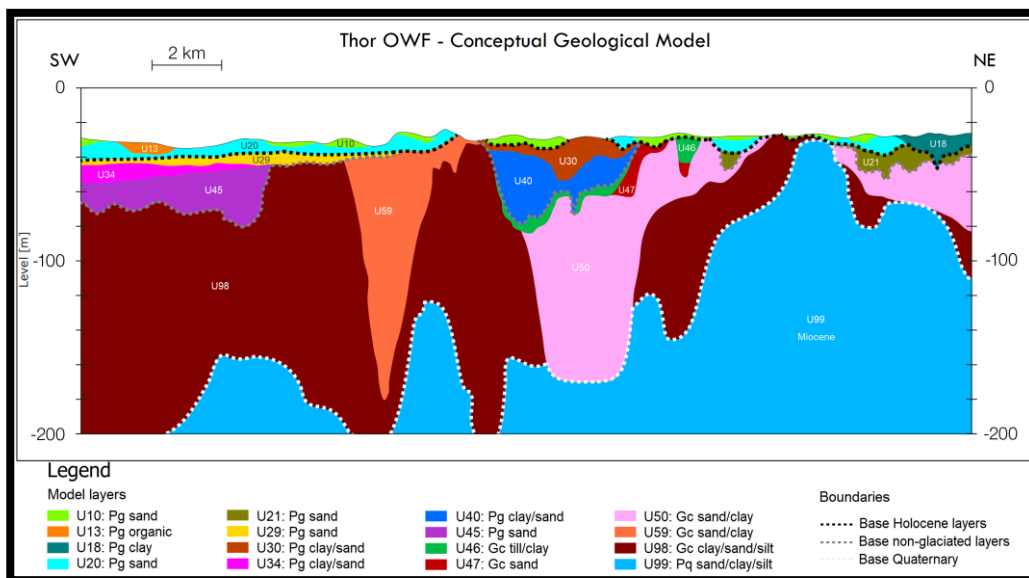
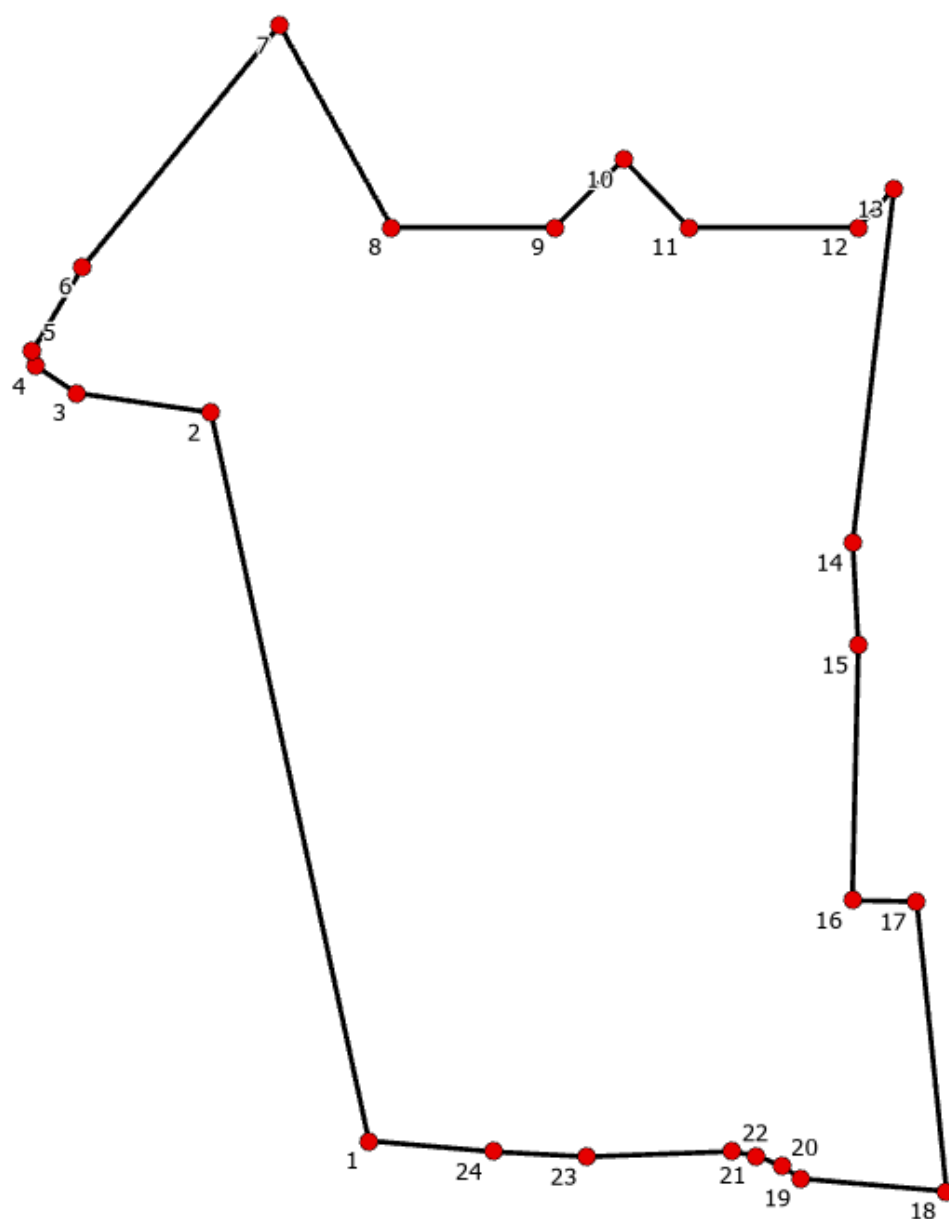


Figure 5-6 Conceptual model for the Thor site from integrated 3D geomodel report based on seismic and geotechnical data, . Pg identifies post glacial deposits, Gc glacial deposits and Pq prequaternary deposits.

[https://ens.dk/sites/ens.dk/files/Vindenergi/309\\_integrated\\_geomodel\\_report\\_2\\_0\\_with\\_appendices.pdf](https://ens.dk/sites/ens.dk/files/Vindenergi/309_integrated_geomodel_report_2_0_with_appendices.pdf)

## Annex 1 – Subarea 1

Shape file with points as received from the Danish Energy Agency is supplied in the attached Shp\_coordinates\_DEA\_202206.zip

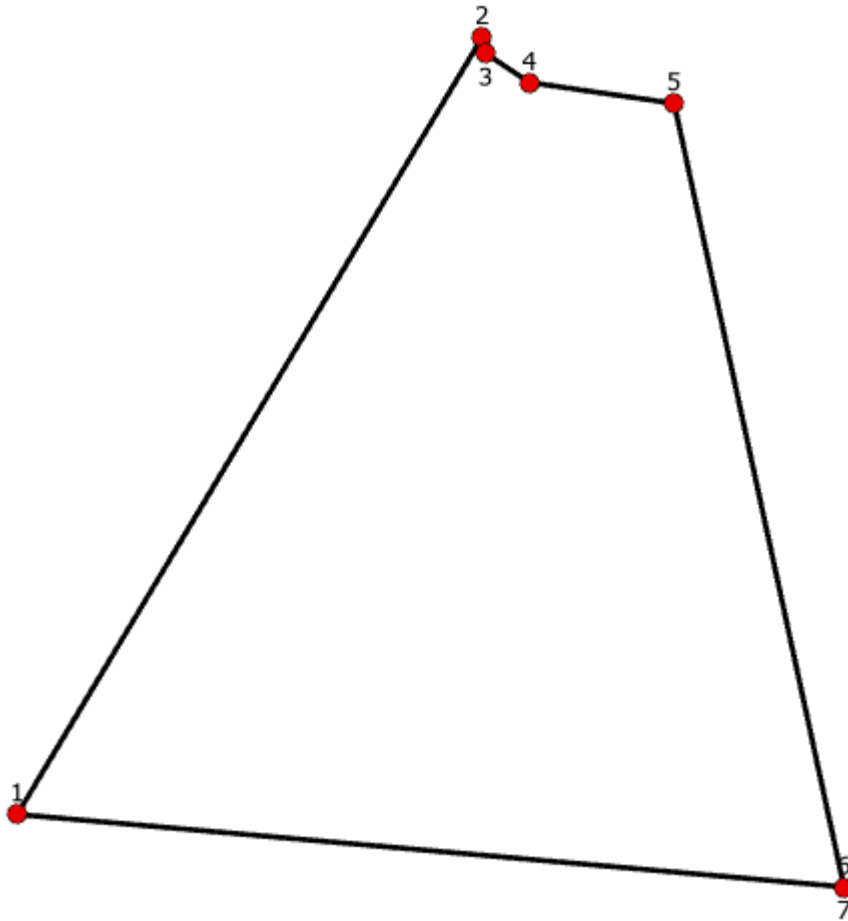




Point ID	Easting Euref89 Zone32N [meter]	Northing Euref89 Zone 32N [meter]	Longitude Euref89	Latitude Euref89
1	400729	6184536	7° 24.993' E	55° 47.774' N
2	393196	6219289	7° 16.961' E	56° 06.405' N
3	386773	6220223	7° 10.744' E	56° 06.819' N
4	384849	6221503	7° 08.855' E	56° 07.482' N
5	384692	6222242	7° 08.684' E	56° 07.877' N
6	387083	6226239	7° 10.890' E	56° 10.065' N
7	396471	6237771	7° 19.687' E	56° 16.407' N
8	401832	6228128	7° 25.093' E	56° 11.279' N
9	409592	6228128	7° 32.592' E	56° 11.371' N
10	412868	6231383	7° 35.694' E	56° 13.162' N
11	415992	6228128	7° 38.778' E	56° 11.441' N
12	424056	6228128	7° 46.572' E	56° 11.522' N
13	425775	6229959	7° 48.203' E	56° 12.526' N
14	423811	6213091	7° 46.594' E	56° 03.416' N
15	424076	6208194	7° 46.932' E	56° 00.779' N
16	423789	6196004	7° 46.862' E	55° 54.206' N
17	426863	6195954	7° 49.813' E	55° 54.208' N
18	428283	6182124	7° 51.394' E	55° 46.766' N
19	421336	6182731	7° 44.740' E	55° 47.029' N
20	420399	6183345	7° 43.833' E	55° 47.350' N
21	419196	6183822	7° 42.674' E	55° 47.596' N
22	418033	6184025	7° 41.557' E	55° 47.693' N
23	411158	6183775	7° 34.985' E	55° 47.485' N
24	406633	6184016	7° 30.652' E	55° 47.564' N

## Annex 2 – Subarea 2

Shape file with points as received from the Danish Energy Agency is supplied in the attached Shp\_coordinates\_DEA\_202206.zip



Point ID	Easting Euref89 Zone32N [meter]	Northing Euref89 Zone 32N [meter]	Longitude Euref89	Latitude Euref89
1	364060	6187754	6° 49.827' E	55° 48.972' N
2	384692	6222242	7° 08.684' E	56° 07.877' N
3	384849	6221503	7° 08.854' E	56° 07.481' N
4	386773	6220223	7° 10.744' E	56° 06.819' N
5	393196	6219289	7° 16.961' E	56° 06.405' N
6	400729	6184536	7° 24.993' E	55° 47.774' N
7	400730	6184534	7° 24.993' E	55° 47.773' N

# SCOPE OF SERVICES – LOT 4

<b>Project</b>		Danish offshore wind 2030					
<b>Assignment</b>		Geophysical surveys for Danish offshore wind 2030					
<b>Document Title</b>		Scope of Services - Lot 4					
<b>Document No.</b>		22/02940-14					
<b>Audience</b>		Tenderers					
Version	Document status	Prepared by		Reviewed by		Approved by	
		Name	Date	Name	Date	Name	Date
1	Template	JCO	2021-01-18				
2	For tender	AEU	2022-05-05	JCO	2022-06-28	SRN	2022-06-28
3	For rev tender	AEU	2022-10-08	JCO	2022-10-09	SRN	2022-10-10

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Annex 2 – Subarea 2.....	16

## Enclosure

## No.

Technical Requirements	1
Standards of Deliverables	2
HSE requirements	3
Quality requirements	4

# 1. Introduction

## 1.1 Political background

Following a decision in the Danish Parliament 2022 Denmark is on the path to establish offshore energy and related infrastructure in the Danish North Sea, in the Danish inner sea (*Kattegat*) and Danish Baltic Sea to connect further offshore wind energy to the Danish mainland.

Figure 1-1 illustrates the regional locations of the project.

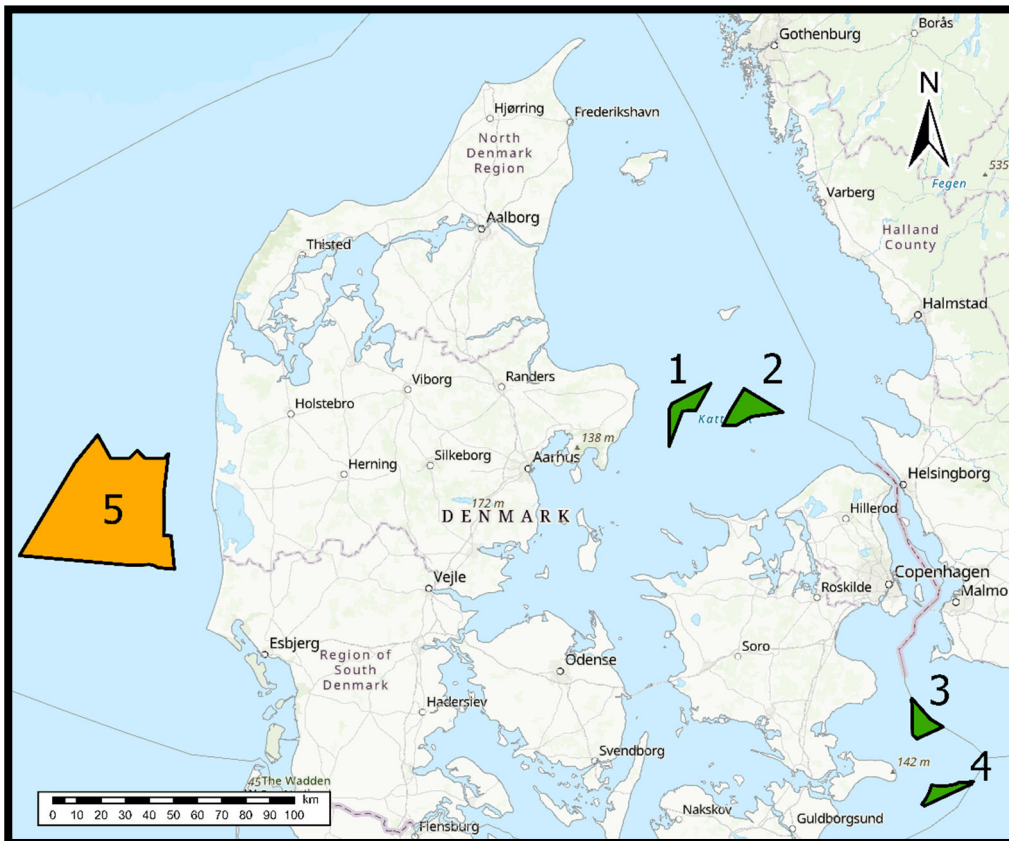


Figure 1-1. Project locations for Kattegat, the Baltic Sea and the North Sea. Numbers identify different parts of the project and colours the LOTs. LOT 1 in green comprises four OWF project sites, LOT 2, LOT 3 and LOT 4 in orange all covers the development area North Sea 1.

## 1.2 The project

The offshore elements of the project comprises the following main characteristics:

- Two offshore wind farms in Kattegat
- Two offshore wind farms in the Southern Baltic Sea
- Multiple offshore wind farms in the North Sea
- Offshore platforms for substations
- Export cables between offshore wind farms and the Danish mainland

The offshore wind farm (OWF) areas are shown in Figure 1-1. It is anticipated that the North Sea 1 development area at a later stage will be divided into multiple offshore wind farm project sites.

### 1.3 Site investigations

The Danish Energy Agency has instructed the Client to initiate site investigations, environmental and metocean studies for the above mentioned main project elements.

On the basis of the instruction from the Danish Energy Agency the Client requests the Consultant to commence OWF geophysical survey activities primo 2023 for the project parts listed in Table 1-1.

For the project parts, Table 1-1 shows how the areas are combined into contract lots and which work packages are requested. Work packages cover:

- WP A: Geological site survey with 2D UHR seismic spread
- WP B: Magnetometry box survey
- WP C: Geophysical survey

Surveys for the subsea cables and platforms are not included in the present scope of services.

*Table 1-1. Overview of project parts included in the scope of services, the associated work packages (see section 2.2), areal extent and contract lots.*

Part	Site	Region	Work package	Area Km2	Contract Lot
1	Kattegat II	Kattegat	A, B C	123	1
2	Hesselø South	Kattegat	A, B C	166	1
3	Kriegers Flak II North	Baltic Sea	A, B C	99	1
4	Kriegers Flak II South	Baltic Sea	A, B C	76	1
5	North Sea 1	North Sea	A	2200	2
5	North Sea 1	North Sea	B	2200	3
5	North Sea 1	North Sea	C	2200	4

This document covers services related to LOT 4, covering the development area North Sea 1.

## 2. Scope or Services

To support the development of the project the Consultant must provide geophysical surveys covering the areas of investigation described in Chapter 5.

### 2.1 Purpose of assignment

The results of the survey should be suitable for use as basis for

- Initial marine archaeological site assessment.
- Planning of environmental investigations.
- Planning of developers geotechnical investigations.
- Decision of foundation concept and preliminary foundation design.
- Assessment of installation conditions for foundations and inter-array cables.
- Site information enclosed in the tender for the offshore wind farm concession.

### 2.2 Scope of assignment

To accommodate the above mentioned purposes the assignment includes the following work package:

- **Work Package C – Geophysical site survey**  
The survey has full coverage in the area of investigation. The survey must map the bathymetry, the static and dynamic elements of the seabed surface and the sub-surface geological soil layers to at least 10 m below seabed.

All data acquired from the offshore investigations shall be processed, interpreted and supplied as a number of reports, charts and a set of digital deliverables.

Water depth ranges and aerial coverage is shown in the Table 5-1. The area of investigations is described in chapter 5.

This document - including enclosures - describe the requirements for the scope of services.

### 3. Time Schedule

Please note that Chapter 5 describes a potential subdivision of the survey area into subareas: Subarea 1 and Subarea 2. The final polygons are pending but as a minimum the first subarea must be reported ultimo 2023.

#### 3.1 Requirements to the time schedule

**Survey permits.** The Client will apply for survey permits to be available by 2023-03-31. Therefore, the Consultant may assume that marine activities can commence from April 2023. No marine activities are allowed commencement before all permits are available.

The Client requests that the services are performed with respect to the following requirements:

##### 3.1.1 WP C: Geophysical site survey

1. No Marine activities prior to **2023-04-01**.
2. Marine survey activities are commenced no later than **2023-04-30**.
3. Complete delivery package, Report no 1 Subarea 1, draft issue, is provided no later than **December 2023**.
4. Complete delivery package, Report no 2 Subareas 1+2, revised issue, provided no later than **December 2024**.
5. The Consultant must allow for the following amount of time for the Client to review and comment the draft work package deliverables: **4 weeks**.

#### 3.2 Contract milestones

As part of the Consultants tender response, the Consultant supplied milestone dates for the performance of the Scope of Services based on the template displayed in Figure 3-1.

Together with the Consultants detailed time schedule (Gantt style) the provided milestone dates constitutes the contracted time schedule. It appears from Table 3-1, that some selected milestones are subject to liquidated damages (LD) as described in the Service Agreement.

Table 3-1. Overview of contract milestones subject to liquidated damages.

Milestone	WP	Event	Project Part	Contract Lot
5013	C	Premob deliverables provided	5	4
5014	C	Marine operations commenced		
5016	C	Report no 2 Subarea 1, provided, draft issue		
5019	C	Report no 2 Subarea 1+2 provided, revised issue		

Item	Event	Note	Due date	LD	Milestone
1	Commencement of contract		2022-10-18		
2	Project execution and QHSE plans provided				
3	Kick-off meeting				
4	Premob deliverables provided	3, 4		YES	5013
5	<b>Work Package C - Geophysical site survey</b>				
6	Marine operations commenced	1,3		YES	5014
7	All marine operations completed				5015
8	Report no 1 Subarea 1, provided, draft issue	2, 3		YES	5016
9	Report no 1 Subarea 1, client review		(4 weeks)		
10	Report no 1 Subarea 1, provided, final issue	2			5017
11	Report no 2 Subarea 1+2, provided, draft issue	2			5018
12	Report no 2 Subarea 1+2, client review		(4 weeks)		
13	Report no 2 Subarea 1+2, provided, revised issue	2, 3		YES	5019
Note 1	Event has occurred at first day with working time recorded as OPERATIONAL TIME.				
Note 2	Event has occurred when report, including all charts and all digital deliverables have arrived at the Clients' office in Fredericia, Denmark.				
Note 3	Milestones marked with "YES" in the table column "LD" are subject to potential delay damages acc. to contract.				
Note 4	Premobilization deliverables must be provided within 20 calendar days of contract signature. Premobilization deliverables include evidence for meeting the insurance requirements and the performance guarantee. See the Consultancy Agreement for detailed requirements.				

Figure 3-1. Template for contract milestones that must be completed by Consultant as part of his proposal. The milestones regarding provision of the draft reports are subject to liquidated damages (LD) as described in the Service Agreement.



## 4. Requirements

For the areas of investigation described in section 5 the Consultant must provide data acquisition, data processing, data interpretation and reporting that satisfies the requirements described in section 4.

### 4.1 Functional Requirements

#### 4.1.1 Work Package C – Geophysical site surveys

The Consultant must carry out a detailed mapping of the seabed surface to provide:

- Accurate bathymetric data and charts in the surveyed area.
- The morphology and natural features of the seabed surface such as mega-ripples, sand-waves, boulders, outcropping geology, seaweed and reefs.
- Possible man-made features such as wrecks, debris, fishing gear, trawl marks, anchor scars and objects of potential archaeological interest.
- Identification of features of potential conservation interest including but not limited to; sandbanks, gravel reef, cobble reef, rocky reef and biogenic reef structures.

The Consultant must carry out mapping of the upper part of the subsurface in a sufficient level of detail to:

- Locate structural complexities or geohazards within the shallow geological succession such as faulting, accumulations of shallow gas, buried channels, soft sediments, hard sediments, mobile sediments etc.

### 4.2 Technical Requirements

To meet the functional requirements the following technical requirements described in this section shall apply.

Detailed technical requirements applying for the scope of services are described in Enclosure 1.

#### 4.2.1 Work Package C – Geophysical survey

The Geophysical survey includes the following:

- **Multi-Beam Echo-Sounding** including **backscatter** for bathymetric mapping, complete coverage within the area of investigation.
- **Side Scan Sonar** (dual frequency) for mapping of the seabed surface. The data must overlap to cover nadir of adjacent survey lines.
- **Magnetometer** for screening of ferrous objects and crossing cables and pipelines.
- **Grab sampling** to support the interpretation of the seabed surface geology.
- **Seismic investigations** using single-channel, high-resolution sub-bottom profiler for mapping of shallow soils in in OWF area.

### 4.3 Reporting and Data delivery

The Consultant shall process and interpret all data acquired during surveying as well as carry out all necessary reporting according to the requirements specified in the documents

- Enclosure 1 - Technical Specifications and
- Enclosure 2 - Standards of Deliverables.

#### 4.4 UXO risk mitigation

Some parts of the area of investigation are likely to be located in areas with elevated probability for encountering UXO objects. The Client has not yet conducted a UXO desk study.

Therefore the Consultant shall include in his Project and QHSE plan a procedure to mitigate this risk related to direct seabed interactions.

The Client accepts that this risk can be minimized within the principles of ALARP if seabed interactions are localized within 5 m of geophysical survey lines free of any anomalies.

#### 4.5 Simultaneous operations

Please note that the scope of services of the present assignment is a part of a general site investigation program with multiple tasks, some possibly performed by other contractors.

The LOT 4 work in the area will be carried out in parallel with both other geophysical surveys and geotechnical investigations.

A very coarse preliminary estimate of the distribution of survey activities is shown in Figure 4-1.

Survey activity	2023	2024	2025
WP A (LOT 2) : Geological survey, 2D UHR			
WP B (LOT 3) : Box survey			
WP C (LOT 4) : Geophysical survey			
Geotechnical investigations			

Figure 4-1 Very coarse scale preliminary distribution of OWF site survey activity. Red represents North Sea, Subarea 1 and blue North Sea, Subarea 2, see. Figure 5-2.

It should be anticipated that this simultaneous presence in the investigation area will require additional communication and coordination of survey plans.

Energinet envisage following Right of ways :

1. Geotechnical investigations

1-2. WP A (LOT 2) : Geological survey, 2D UHR

2-3. WP C (LOT 4) : Geophysical survey

3-4. WP B (LOT 3) : Box survey

The final decision on Right of ways is pending and will be agreed post contracting.

#### 4.6 HSE requirements

To manage the Health, the Safety and the Environmental risks under the assignment a number of requirements attached as Enclosure 3 must apply for the Consultants provision of the services.

#### 4.7 Quality requirements

To manage the Quality under the assignment a number of requirements attached as Enclosure 4 must apply for Consultants provision of the services.

## 5. Areas of investigation

The coordinates for the area of investigations subject to this assignment are provided by the Danish Energy Agency as part of their instruction to Energinet. The LOT 2 includes the area shown in orange, Figure 5-1, together with nearby wind farms in production and development.

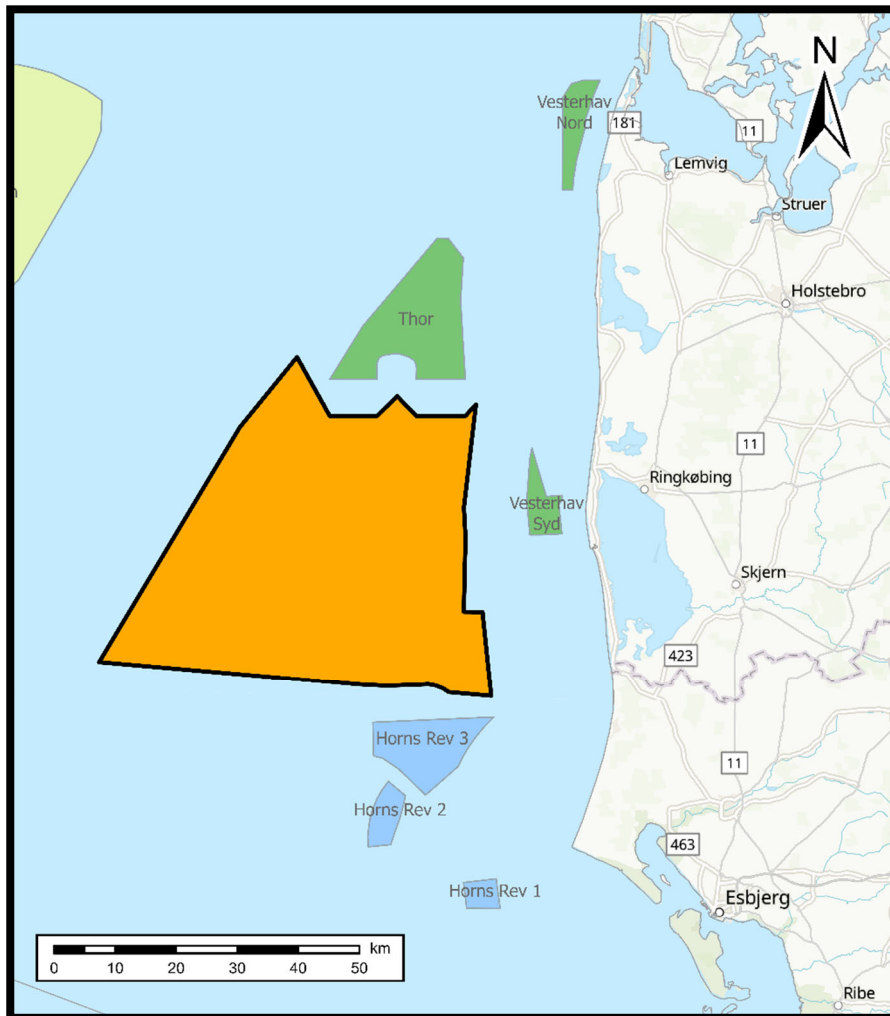


Figure 5-1 North Sea 1 development area in orange shown with neighbouring wind farms either in operation (blue) or under construction (green)

In order to speed up the process and to enter concession as soon as possible the area will be split into two subareas for survey reporting. Thus, one part will need to be surveyed and reported first. Final decision on outline of the area is pending but initial thoughts area shown in Figure 5-2.

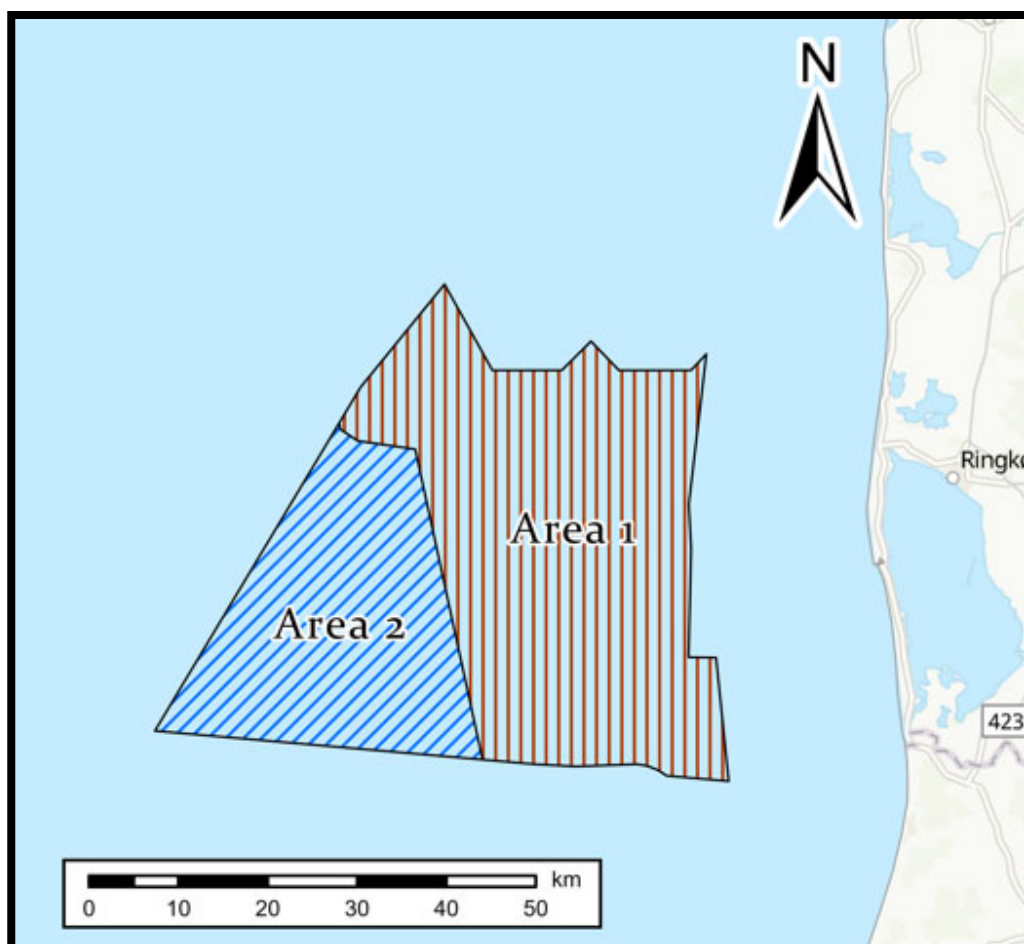


Figure 5-2 Possible sub-area distribution for the North Sea 1 development area

### 5.1 Admiralty charts

Figure 5-3 shows the area of investigation together with the relevant admiralty chart 93. Ca. 8 known wrecks are found within the development area North Sea 1. Further, several cables intersect the area. At least 5 cables are seen in the map. 3 pipes are located south of the area, one close to its southern rim.

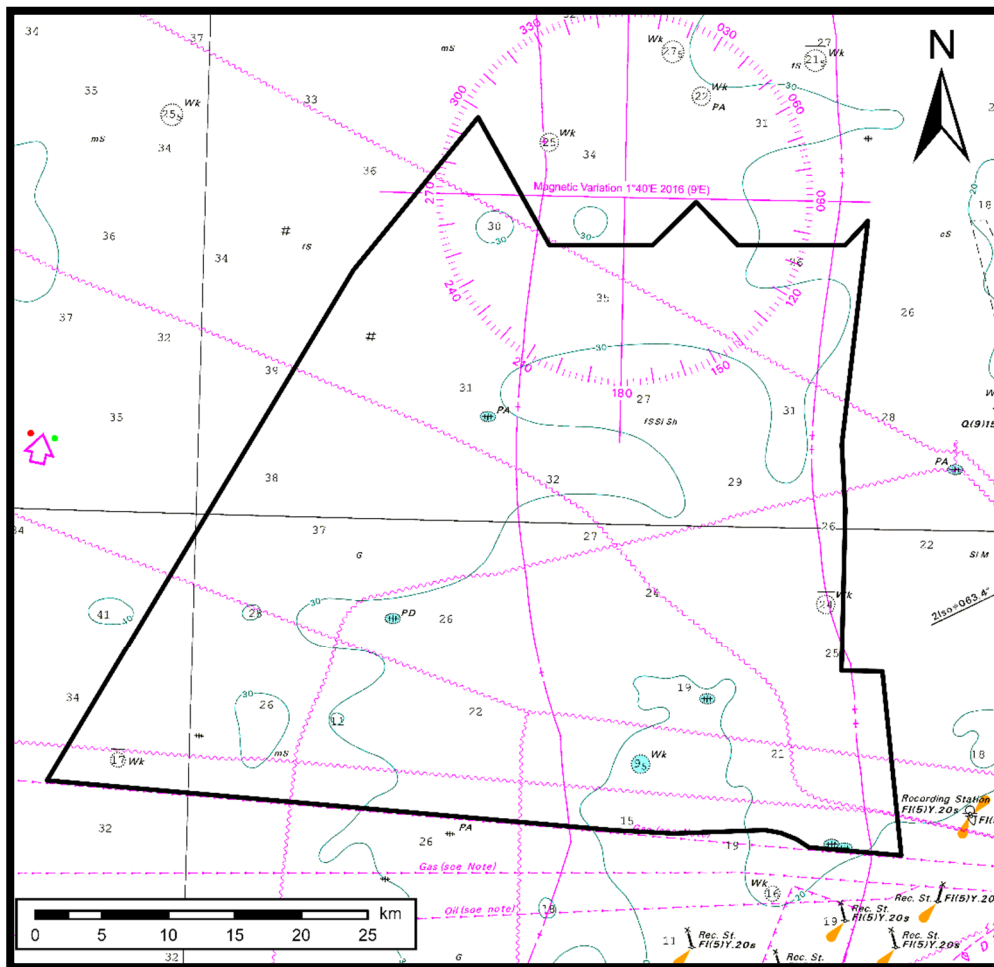


Figure 5-3. Area of investigation (black polygon) for North Sea 1 displayed with admiral chart 93 © Danish Geodata Agency.

## 5.2 Water depths

The Clients expectations to the water depths in the area of investigation are seen in Figure 5-4. The bathymetrical DTM information in the figures is based on regional models of ca. 100m spatial resolution (Emodnet 2018 MSL). From the figures the following expectations to the minimum/maximum water depths may be assumed:

Table 5-1 Water depth ranges expected

Part	Site	Water depth ranges
5	North Sea 1	10m to 40m

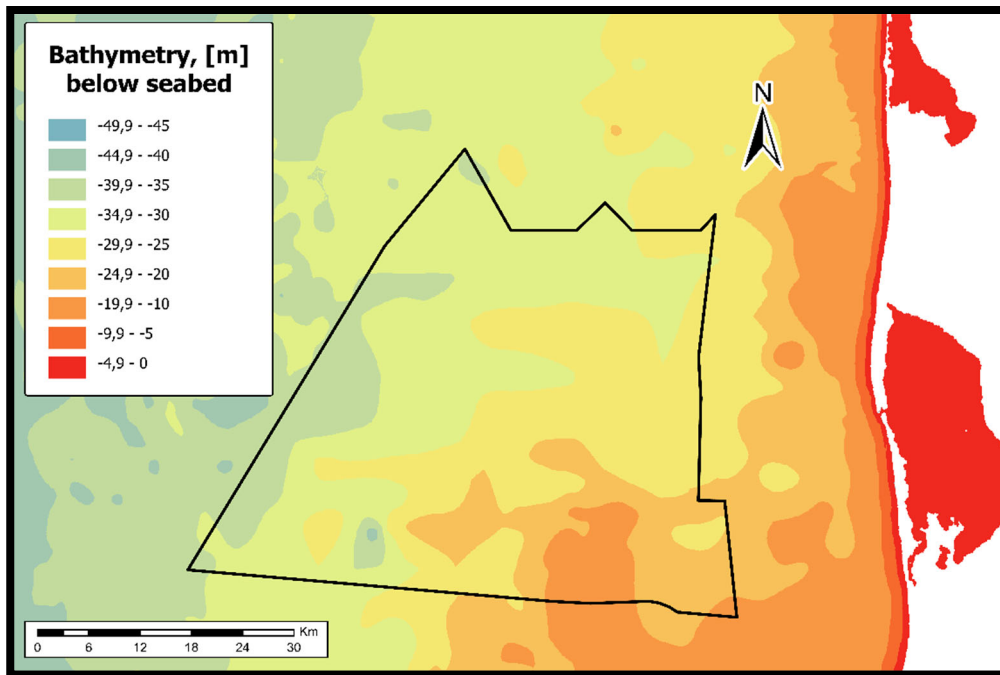


Figure 5-4. Water depths (Emodnet 2018 MSL). BLACK POLYGONS show the areas of investigation for project LOTs 2, 3 and 4.

### 5.3 Geology

Figure 5-5 shows the surface geology in the area of investigation based on models from GEUS (Danish Geological Survey) 2015.

For the general project development area North Sea 1, the seabed surface sediments primarily consist of sand and gravel. To the southeast some muddy sand is present. These sediments are considered to be of marine and postglacial origin. Minor spots of outcropping glacial till / diamicton indicate that glacial deposits with shallow burial below the postglacial coarse sediments may be present.

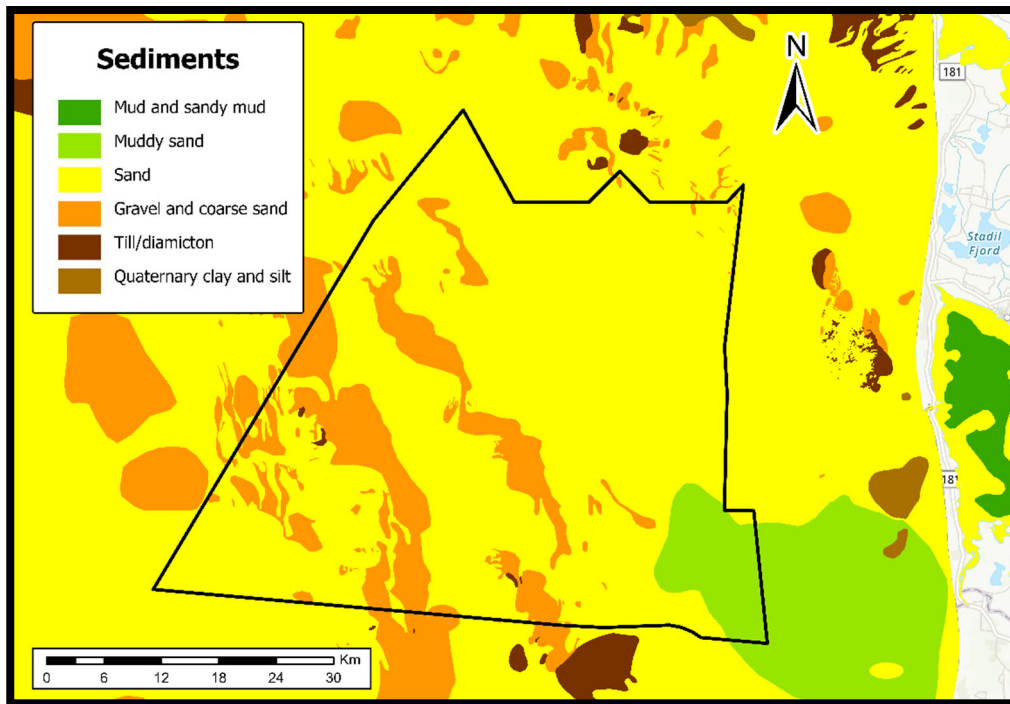


Figure 5-5. Geology, seabed surface (GEUS 2015). BLACK POLYGON shows the area of investigation.

COWI has produced an integrated 3D geomodel for Energinet and the Danish Energy Agency for the Thor site located immediately north of the tendered area, see Figure 5-1.

Figure 5-6 shows the conceptual understanding from this model. According to this, buried paleo-valleys and deformed sediments are likely to be found within the investigation area.

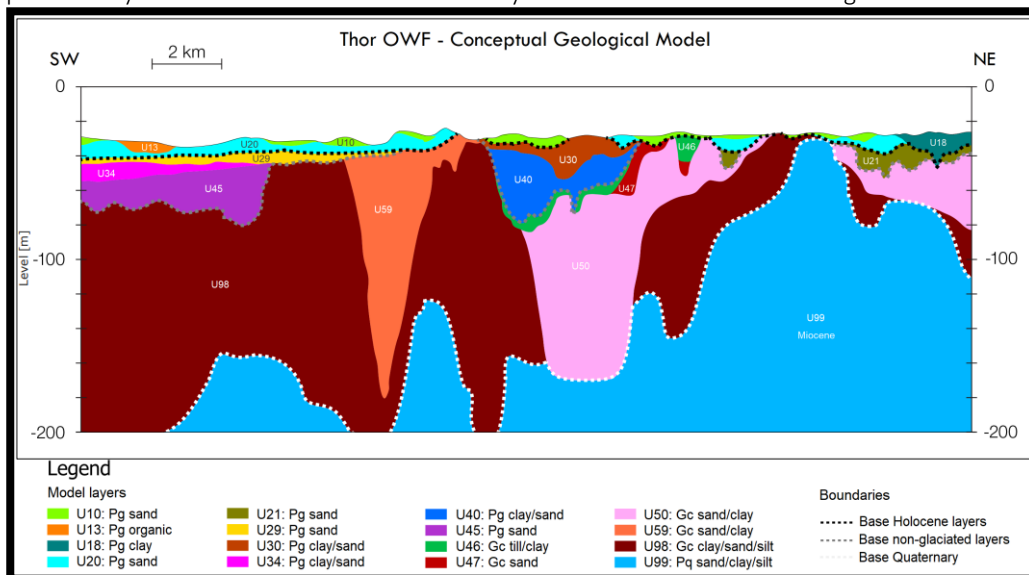
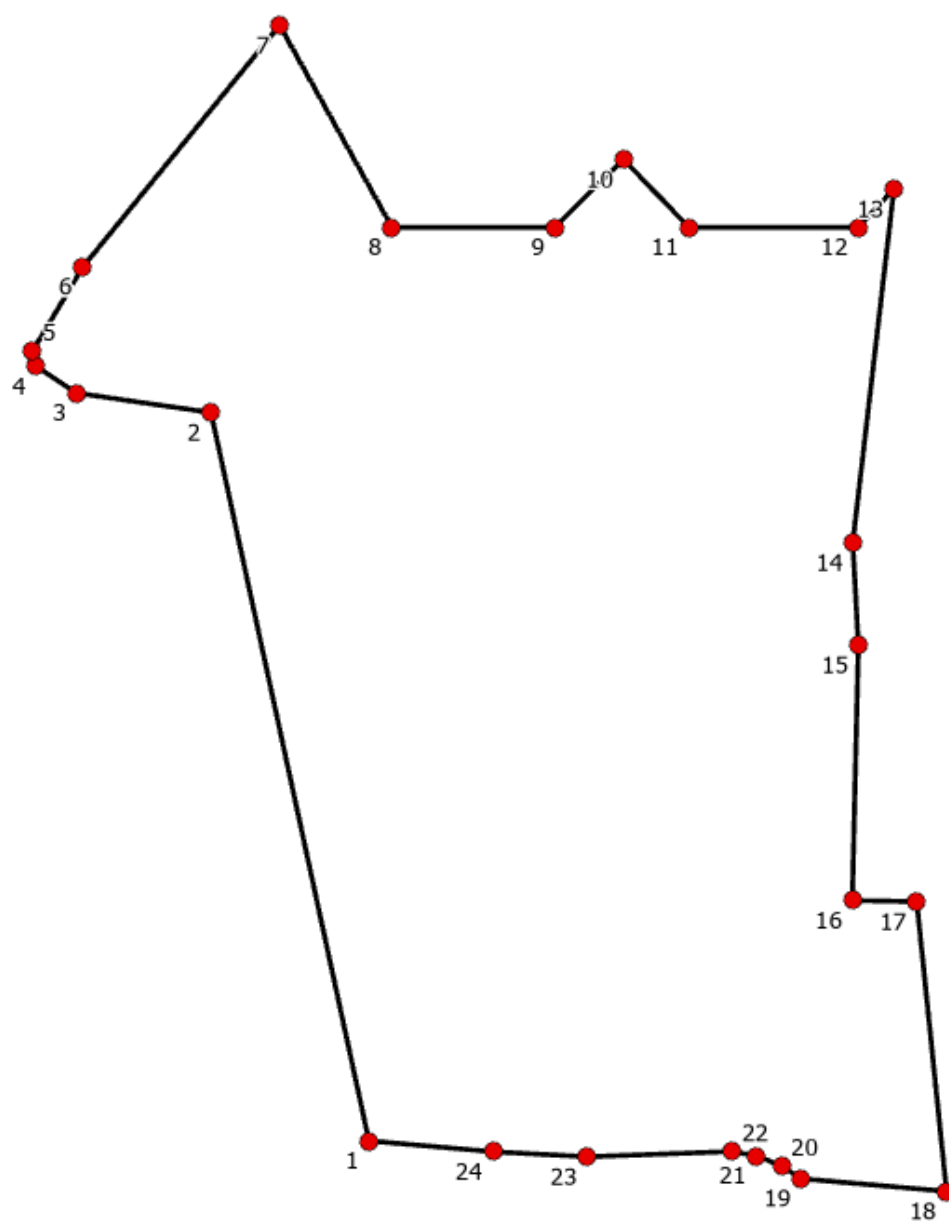


Figure 5-6 Conceptual model for the Thor site from integrated 3D geomodel report based on seismic and geotechnical data, . Pg identifies post glacial deposits, Gc glacial deposits and Pg prequaternary deposits.  
[https://ens.dk/sites/ens.dk/files/Vindenergi/309\\_integrated\\_geomodel\\_report\\_2\\_0\\_with\\_appendices.pdf](https://ens.dk/sites/ens.dk/files/Vindenergi/309_integrated_geomodel_report_2_0_with_appendices.pdf)

## Annex 1 – Subarea 1

Shape file with points as received from the Danish Energy Agency is supplied in the attached Shp\_coordinates\_DEA\_202206.zip

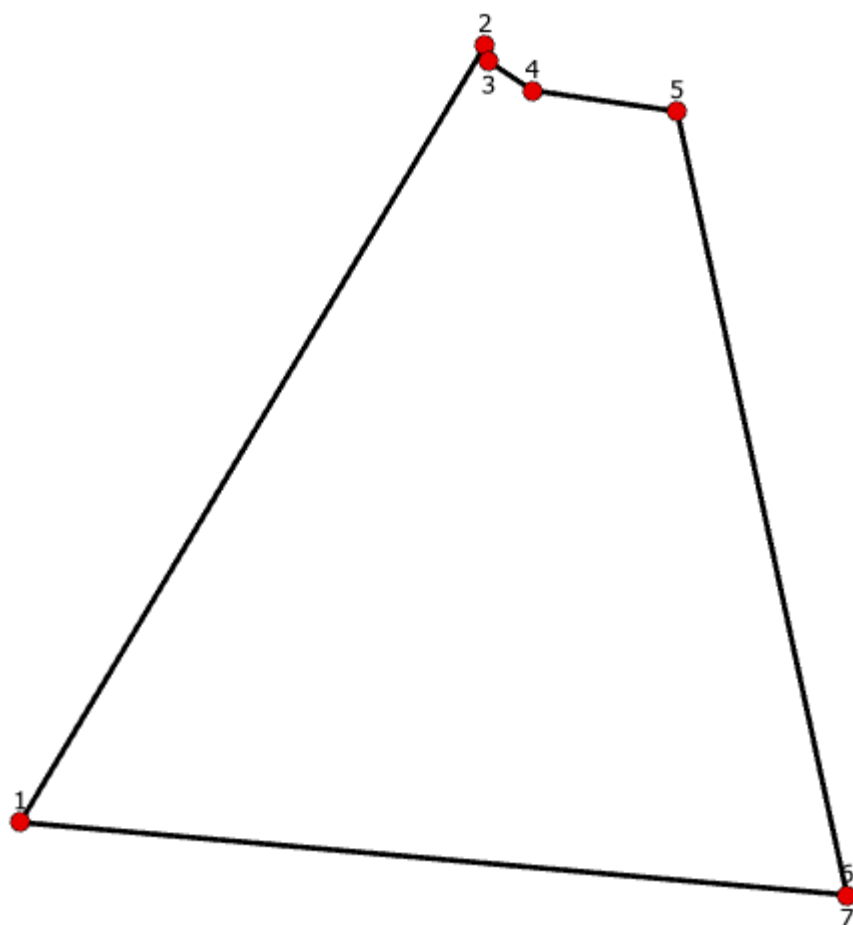




Point ID	Easting Euref89 Zone32N [meter]	Northing Euref89 Zone 32N [meter]	Longitude Euref89	Latitude Euref89
1	400729	6184536	7° 24.993' E	55° 47.774' N
2	393196	6219289	7° 16.961' E	56° 06.405' N
3	386773	6220223	7° 10.744' E	56° 06.819' N
4	384849	6221503	7° 08.855' E	56° 07.482' N
5	384692	6222242	7° 08.684' E	56° 07.877' N
6	387083	6226239	7° 10.890' E	56° 10.065' N
7	396471	6237771	7° 19.687' E	56° 16.407' N
8	401832	6228128	7° 25.093' E	56° 11.279' N
9	409592	6228128	7° 32.592' E	56° 11.371' N
10	412868	6231383	7° 35.694' E	56° 13.162' N
11	415992	6228128	7° 38.778' E	56° 11.441' N
12	424056	6228128	7° 46.572' E	56° 11.522' N
13	425775	6229959	7° 48.203' E	56° 12.526' N
14	423811	6213091	7° 46.594' E	56° 03.416' N
15	424076	6208194	7° 46.932' E	56° 00.779' N
16	423789	6196004	7° 46.862' E	55° 54.206' N
17	426863	6195954	7° 49.813' E	55° 54.208' N
18	428283	6182124	7° 51.394' E	55° 46.766' N
19	421336	6182731	7° 44.740' E	55° 47.029' N
20	420399	6183345	7° 43.833' E	55° 47.350' N
21	419196	6183822	7° 42.674' E	55° 47.596' N
22	418033	6184025	7° 41.557' E	55° 47.693' N
23	411158	6183775	7° 34.985' E	55° 47.485' N
24	406633	6184016	7° 30.652' E	55° 47.564' N

## Annex 2 – Subarea 2

Shape file with points as received from the Danish Energy Agency is supplied in the attached Shp\_coordinates\_DEA\_202206.zip



Point ID	Easting Euref89 Zone32N [meter]	Northing Euref89 Zone 32N [meter]	Longitude Euref89	Latitude Euref89
1	364060	6187754	6° 49.827' E	55° 48.972' N
2	384692	6222242	7° 08.684' E	56° 07.877' N
3	384849	6221503	7° 08.854' E	56° 07.481' N
4	386773	6220223	7° 10.744' E	56° 06.819' N
5	393196	6219289	7° 16.961' E	56° 06.405' N
6	400729	6184536	7° 24.993' E	55° 47.774' N
7	400730	6184534	7° 24.993' E	55° 47.773' N