SCOPE OF SERVICES

ENERGINET

Project		Energy Island Baltic Sea					
Assignment		UXO consultancy					
Document Title		Energy island - UXO consultant - Scope of services - Baltic Sea					
Document No.		21/05835-2					
Audience		Tenderers					
Version	Document status	Owner		Reviewer		Approved	
		Name	Date	Name	Date	Name	Date
1	For tender	XTVSO	2021-07-19	JCO	2021-07-19	JCO	2021-07-19

TABLE OF CONTENTS

1. Introduction

1.1 Political background

Following a decision in the Danish Parliament June 2020 Denmark is on the path to establish offshore energy infrastructure in the Danish North Sea and in the Danish Baltic Sea to connect respectively 3 GW and 2 GW offshore wind energy to the Danish mainland and to neighbouring countries via offshore energy hubs.

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

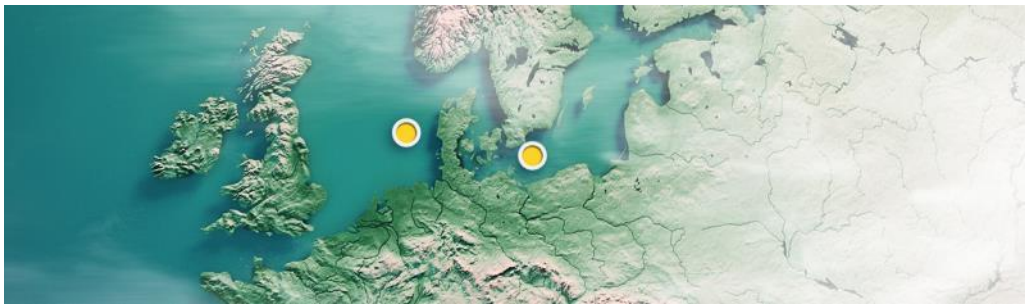

Figure 1-1. Project locations for the North Sea and the Baltic Sea.

1.2 The project

The offshore part of the project includes the following main parts in the Baltic Sea:

- 2 offshore wind farms, each of 1 GW.
- Subsea cables from energy island (Bornholm) to the offshore wind farms.

The project site parts in the Baltic Sea are illustrated in **Fejl! Henvisningskilde ikke fundet.** below.

Figure 1-2. Conceptual illustration of the project site parts in the Baltic Sea.

The areas of investigation subject to the present assignment spans an area of ca. 255km2 and 298km2 for the Baltic Sea Bornholm I and II sites respectively.

1.3 Scope of Service for this assignment

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

The Scope of Service for the present assignment include

- a UXO risk assessment (desk study) for the OWF project, Bornholm I and Bornholm II including export cables connecting the wind farms to the island of Bornholm.

1.4 Status on project development

The Client has contracted a marine survey supplier for the following investigations for the offshore wind farm sites

- Geophysical site survey, ongoing.

- Magnetometry box survey, preparation for geotechnical investigations 2022, commencement planned February - March 2022.

The magnetometry box survey cover geotechnical positions for the 255+298 km2 OWF project A high-resolution magnetometry box survey is performed at rectangular areas subject to future geotechnical drilling work following the geophysical survey. In addition to magnetometry the scope also includes high-resolution acoustic survey (multibeam echo-sounding and dual frequency side scan sonar).

1.5 Project development organisation

The Client is acting on the instruction of the Danish Energy Agency to develop the described project. However, the Client will not be the builder of the offshore wind farms.

The builders of these project elements will be found later via concession tenders from the Danish Energy Agency.

As such, all deliverables associated with this assignment will be made available to the tenderers of the project concessions. This is typically done via public websites.

2. Scope of Services

2.1 Work Packages

The Scope of Services for the assignment includes the following:

- Work Package A – UXO desk study *(only one work package)*

A short outline of the activities and associated deliverables is described below.

2.2 Activities

For the present project the following activities must be performed:

A. Produce a **background study** of the potential UXO threats. The study must characterise the UXO polluting activities, when and where the pollution took place and provide a physical characterization of the threat objects.
B. Provide a **risk assessment** based on expected seabed conditions and the expected offshore construction activities.
C. Presentation of background study and risk assessment at a **UXO seminar**.
D. Provide a **risk mitigation strategy** that covers all activities during the development and construction phase with mechanical seabed interaction.

2.3 Deliverables

The results must be provided as UXO desk study reports and supplemented with digital data to allow for displaying the study results in GIS:

- Report no 1, OWF site Bornholm I including export cable routes to Bornholm.
- Report no 2, OWF site Bornholm II including export cable routes to Bornholm.

The two desk study reports will be published at the Danish Energy Agency website to inform concession Tenderers about the site UXO risk.

Furthermore, the Consultant shall submit

- Report no 3, OWF sites Bornholm I and II, UXO risk related to grab sampling

The report is required to enable safe grab sampling to be performed by the Clients surveyor scheduled to commence by October 2021. This report will not be published.

3. Time schedule

It is assumed that the contract commences by end of August 2021.

The Client has the following requirements to the time schedule for Work Package A:

1. Report no 1 and no 2 including charts and digital deliverables are provided in **draft issue** before end of November 2021.

2. UXO seminar performed before end of November 2021.

3. The Client will spend up to 3 weeks for review of the draft deliverables.

4. Report no 1 and no 2 including charts and digital deliverables are provided in **revised issue** before end of January 2022.

5. Report no 3 is provided before end of September 2021.

4. Area of investigation

The geographical location subject to the present desk study is defined by

- The area of investigation

4.1 Project area

The project area is described in Table 4-1 and illustrated in Figure *4-1* and include

- OWF, Bornholm I ca, 255 km2
- OWF, Bornholm II, ca. 298 km2
- Export cable routes between OWFs and the island of Bornholm. Landfalls are assumed to be on the Southern coast of Bornholm.

Details about the routes between the offshore wind farms and the landfalls will be provided to Consultant at commencement of contract.

The project area delimits the geographical location subject to the actual construction activities.

The project area - as described in this section - is subject to change. The Client has the right to modify the project area to implement instructions from the Danish Energy Agency. At time of contract signature, the Client will confirm the project area.

4.2 Area of investigation

Due to the possibility that UXO's are being scattered on the seabed the *area of investigations* for the desk study covers an area larger than the *project area.* It is required that warfare activities adjacent to the project area are addressed in the desk study.

The Consultant must propose a definition of the *area of investigation* for the desk study according to best practice.

Site	Region	Area Km^2	Length Km	Work package
Bornholm I OWF	Baltic Sea	255		A
Bornholm II OWF	Baltic Sea	298		A
Export cable route Bornholm I	Baltic Sea		30 – 40	A
Export cable route Bornholm I	Baltic Sea		30 – 40	A

Table 4-1 Overview of project parts and aerial coverage.

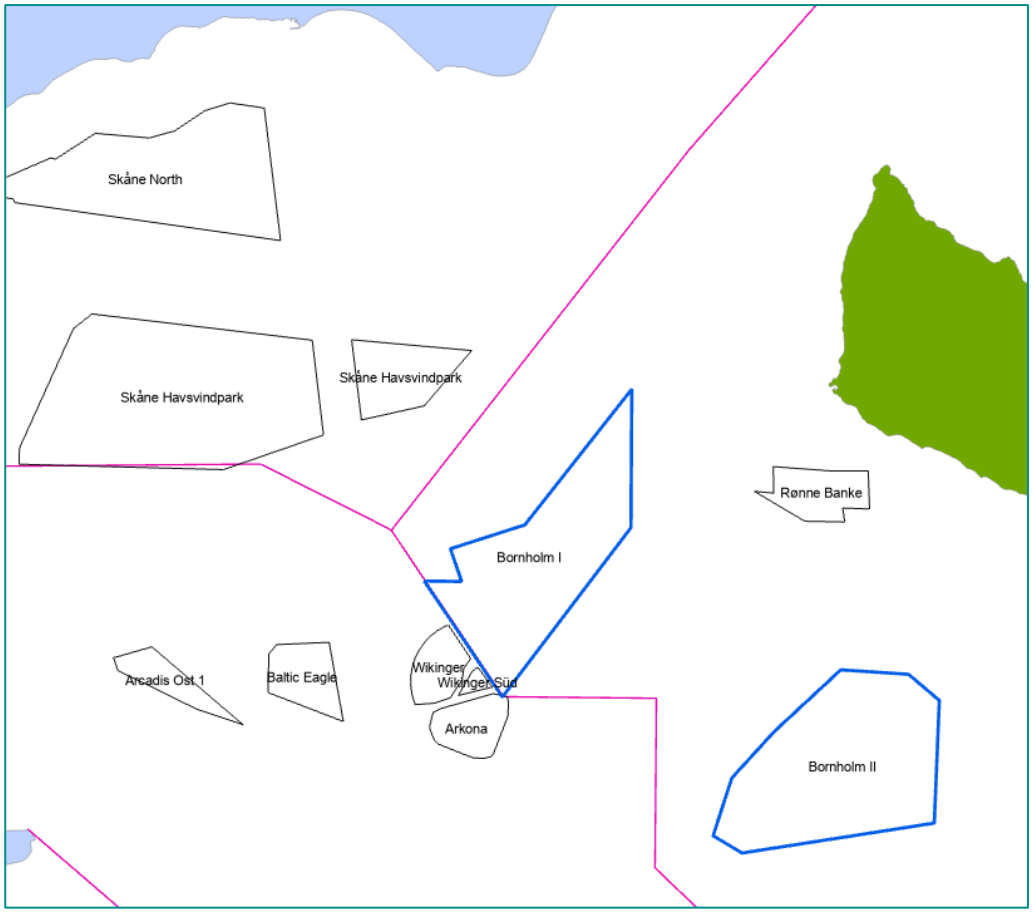

Figure 4-1. The project area located in the Baltic Sea west of the island of Bornholm: **BLUE POLYGONS**: Project areas for 2 offshore wind farms each of 1 GW. **BLACK POLYGONS**: Existing wind farms in operation or development.

5. Detailed requirements

The requirements described in this section shall apply for the completion of the Scope of Services.

The performance of the desk study must be consistent with principles and guidelines expressed in /1/.

5.1 Desk study

In the areas of investigation, the Consultant shall clarify any UXO contamination activities. Any identified or potential UXO pollutions must be characterized by the following information:

1. The nature of the polluting activity (e.g. bombings, mine activity, shells from marine war activities, firings from land, dumping, etc.).

2. When the polluting activity took place.

3. Where geographically the UXO pollution took place. Pollutions that are not relevant to the area of investigation should not be addressed in the Desk Study.

4. The UXO items subject to the polluting activities. The UXO items need to be physically characterized in terms of e.g. object dimensions, weight, ferromagnetic mass, explosive mass and other information relevant for mitigation.

5. An estimate of possible migration and burial of the UXO items based on the anticipated seabed conditions.

The Client expects that the Consultant will carry out the investigation of UXO pollutions by means of a search in relevant archives, databases and literature combined with interview of relevant key persons.

5.2 Risk assessment

Based on the background study the Consultant must prepare a detailed assessment of the UXO risk.

The risk assessment shall be expressed using a probability x consequence risk matrix.

The risk assessment must be applicable to operations expected in relation to the development and construction of an offshore wind farm such as site investigations, subsea cable installation, construction of platforms and installation of foundations and turbines.

As such the risk assessment must cover at least the following activities:

- Performance of boreholes, geotechnical tests with CPTs and vibrocores and grab sampling.
- Anchoring and Jack-up operations.
- Seabed interactions with (prelay) grapnel run, dredging, ploughing, trenching or jetting.
- Cable lay operations.

- Protection activities with placement of rock berms and matrasses.

The specific activities subject to the risk assessment shall be confirmed by the Consultant and approved by the Client.

The risk assessment must address if it is feasible to split the *area of investigation* into separate geographical regions that reflects substantial variances in the UXO risk. Factors may involve spatial extent of UXO pollution, water depth, seabed geology and stability of seabed. The assessment should derive a segmentation of the *areas of investigation* if justified by the analysed factors.

The risk assessment must be adapted to the seabed conditions and address the potential for objects being buried. As such the seabed geology and seabed morphology must be included in the desk study.

To allow the present contract to progress, the Client requests that the study is performed on basis of archive information about the seabed. The specific seabed conditions applicable for this study shall be proposed by the Consultant and approved by the Client.

5.3 Mitigation strategy

The Consultant must prepare a strategy for mitigating the risks identified in the risk assessment.

The mitigation strategy shall be coordinated with the Client and aiming to lower the risk to ALARP using within the industry practice for offshore wind (see /1/).

The mitigation strategy must be feasible to be used by either the Client or future wind farm developers, to price the UXO mitigation activities and to integrate mitigation plans within time schedules for further development and construction.

Minimum UXO threat item

If a UXO survey is included as a part of the mitigation strategy, then it is required to also identify and describe the UXO item which the Consultant asses to be the smallest UXO item to be considered by the UXO survey to prepare for risk sign-off.

The *minimum UXO threat item* must be selected as a balance between the actual risk posed by the UXO item and the efforts required to detect the item by the UXO survey.

The mitigation strategy must for the UXO survey describe the quality parameters applicable for geophysical data acquisition to enable detection of the *minimum UXO threat item*. The description could provide details of sensor specifications, measurement densities - such as e.g. distance between sensors during survey - and noise levels.

5.4 Meetings

The Client requests the following meetings:

- Contract kick-off meeting. After award of contract an initial planning meeting facilitated by the Client via teleconference

- UXO desk study seminar. As a part of the delivery a meeting is held where the Consultant presents the background study, the risk assessment, and the mitigation strategy. The meeting must be planned and organized by the Consultant, but the venue is by the Client in Fredericia, Denmark.

The Client may decide to arrange the meetings as videoconferences.

Additional meetings may be agreed if required.

6. Deliverables

At the Contract kick-off meeting the Consultant shall propose a plan for reporting.

The following requirements apply for the reports:

1. Each report shall be prepared as a single digital Optical Character recognition (OCR) PDF-file including all charts and appendices. All charts shall also be provided separately in native formats.

2. Each report shall be prepared in English.

3. Each report shall include an Executive Summary that explains the key findings and conclusions for non-technical persons and managers.

4. Each report shall describe the sources of information consulted during the investigation.

5. Each report shall be attached relevant charts that indicate the geographical locations of UXO polluting activities and any risk-based segmentation of the areas of investigations.

6. All UXO charts shall be provided as ArcGIS map documents (MXD-files) including relevant Shapefiles:

    a. Warfare activities such as mine fields, naval battle areas, air force bombings, wrecks, shooting practice areas and dumping sites.
    b. UXO risk class segmentation of the area of investigation. The segmentation shall follow the Consultants methodology.

7. The ArcGIS maps shall be provided with the geodetic system

    a. ETRS89 UTM33N for Work Package A as spatial reference

8. Digital data files shall be named in a logical and systematic way.

9. The reports and GIS data must be provided for review by the Client. The reports shall be provided in a revised version no later than two weeks after the feedback has been provided by the Client.

10. The Client reserves the right to distribute the deliverables to any partner, stakeholder, contractor, authority or other party relevant to the project.

7. References

/1/ CIRIA C754. *Assessment and management of unexploded ordnance (UXO) risk in the marine environment.* Cooper, N. and Cooke, S. London 2015.