

# QUOTATION

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TO: Siemens Wind Power A/S  
WP OF PM MAOP  
ATTN: R Mus  
EMAIL: rob.mus@siemens.com  
YOUR REF. No:

DATE: 3-1-2016  
FROM: Joram Bootsma  
EMAIL: JBO@deepbv.nl  
PAGES: 6

SUBJECT: Object detection MBES / SSS / Drone  
Denemarken

Dear Mr. Mus,

With reference to your enquiry, we hereby submit our revised proposal for a combined Bathymetric / Side Scan object detection Survey near Thyboron Harbor, Denmark. We thank you for your inquiry.

This proposal does include the following items:

1. Introduction;
2. Project Description;
3. Objective of Work;
4. Scope of Work;
5. Personnel, Equipment and Vessel;
6. HSE;
7. Processing & Reporting
8. Planning;
9. Commercial proposal;
10. Terms & Conditions.

We hope that attached proposal meets your requirements and expectations. Of course you can contact me or my colleagues anytime when you need additional information or clarification.

Kind Regards,

Joram Bootsma - Deep BV

### 1. INTRODUCTION

At the invitation of Siemens Wind Power A/S (SIEMENS), Deep BV (DEEP), Amsterdam, the Netherlands, has been invited to submit a quotation for a combined Bathymetric / side scan object detection Survey near Thyboron Harbor, Denmark.

DEEP, founded in 1999 with a head office in Amsterdam, the Netherlands, is a hydrographic and geophysical survey company, specialized in near- and inshore surveys of various natures, utilizing state-of-the art equipment and specialized personnel.

Our aim is to render the offshore oil-and gas industry, the coastal engineering industry and various water-related authorities with a comprehensive range of high technology services in the field of bathymetry, geophysical and geotechnical engineering, land survey and hydrological services. We employ qualified and experienced staff of hydrographic surveyors, electronic engineers, geologists and geophysicists.

DEEP wish to thank SIEMENS for the invitation to submit a suitable quotation for the above mentioned project and herewith guarantees to carry out the works according to the best possible survey practices and instrumentation, available at present, in case of award of contract to DEEP.

### 2. GENERAL

The site is located South West of Thyboron Harbor (Denmark) (Figure 1).

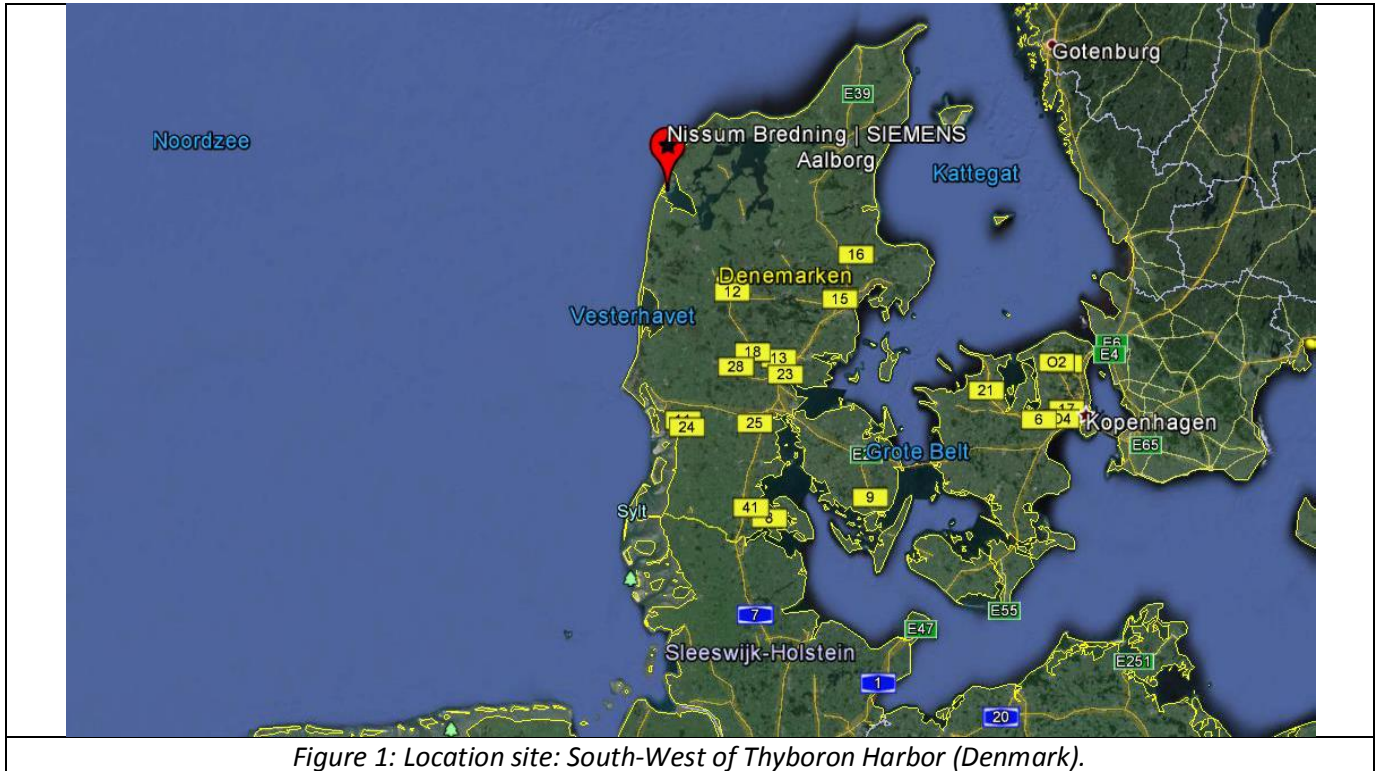


Figure 1: Location site: South-West of Thyboron Harbor (Denmark).

**3. OBJECTIVE OF WORK**

The objective of the survey shall be to detect objects with a minimal size of approximately 70 x 25 cm. The area to be surveyed is defined as:

- 255 meter Radius (500 meter diameter) around the 4 WTGS
- 50 meter wide (25 each side of the center) of the 4 dredging-channels leading up to the 4 WTG's
- 50 meter wide (25 each side of the center) of the cabel trace / export cable

Water depths vary between 0.5m – 8.0m (local tide is approx. 0.5m)

The object detection survey comprises the following techniques:

- SeaSwath Plus combined Bathymetric and side scan sonar
- Areal footage by drone
  - In the shallow parts areal pictures will provide a possible other view on objects that may be found. The effectiveness and usability if these areal footage will greatly depend on the (water)visibility at the time the survey is executed.

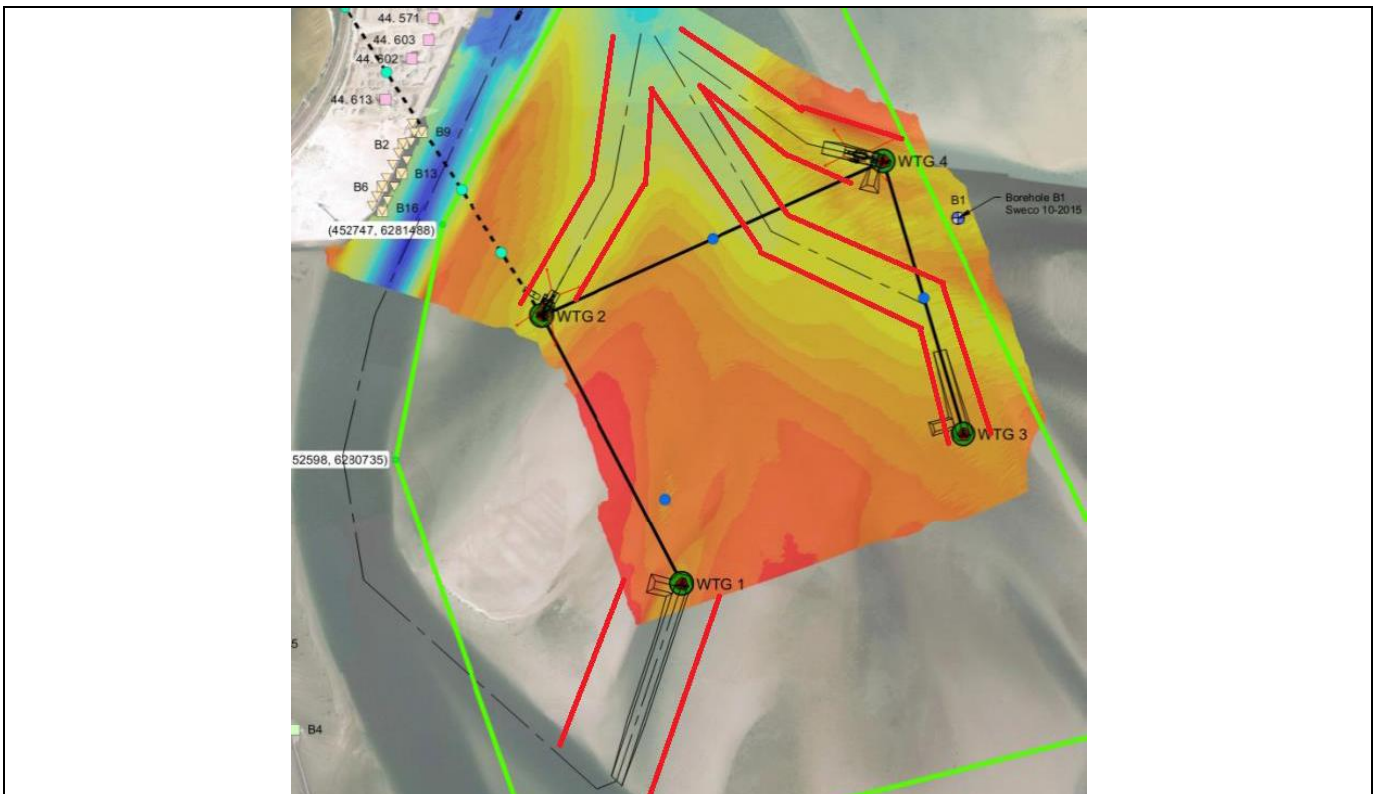


Figure 2 – Outline of Survey area.

#### 4. SCOPE OF WORK

The scope of work for the object detection survey can be summarized as follows:

- Installation, calibration and mobilization to project location;
- 12hr/ day Survey operations
- Demobilization from project location;
- Data processing and reporting.

#### 5. PERSONNEL, VESSEL AND EQUIPMENT

##### 5.1. Personnel

To carry out the survey operations, the following personnel will be on site during the project phases:

Offshore operations, working 12hrs/day

- One Hydrographic Surveyor;
- One Skipper/Drone pilot.

##### 5.2. Survey Vessel

Nearshore survey vessel "PURPLE" or similar;

- All nearshore survey activities; Mobilisation from the Netherlands to Thyboron (Denmark by road);
- Workability of the vessel up to 0.50 Hs. Workability of survey equipment depends on wind direction, currents and current orientation in respect to the survey line orientation.
- The minimum water depth equipment and vessel is able to operate is 0,7 meter.



Figure 4 – Nearshore Survey Vessel "PURPLE" or similar (subject to availability at contract award).

## Surface Positioning equipment

- Novatel or Trimble GNSS RTK Receiver, using LEICA Smartnet corrections received by 3G/4G internet connection;
- Hemisphere Crescent VS100 series dGPS and heading receiver for sec. navigation;
- Survey/Navigation computer with QPS QINSy v8 acquisition and QC software installed.

## Combined Side Scan / Bathymetric Equipment

- Sea Swath-plus 234kHz swathe echosounder
- Reson Navitronics SVP-14 or SVP-15 sound velocity probe.

## Drone

- Asctec Falcon (or similar) with camera
- Resolution at 80 meter flying height will be 1 – 1,5 cm
- Pictures taken by the drone are stamped with and GPS coordinate. Visible object this will be linked and presented together with the object as detected (and accurately positioned) by the Bathymetric data.

## Auxiliary equipment

- TSS 355B Motion sensor;

## Data Acquisition and Processing Equipment

- QPS QINSy v8.1 data acquisition and processing software;
- QPS processing software.

## 6. HSE

Health, Safety and Environment issues are considered to be the DEEP's primary concern and are covered by the Company HSE Policy document.

Our quality management system is ISO 9001:2008, ISO 14001 certified and our safety management system meets the demanding OHSAS standard 18001:2007.

## 7. DELIVERABLES

Deep will provide the following deliverables:

- Short description of the work carried out (meta data);
- Bathymetric data (ASCII XYZ in 0.5 x 0.5m grid)
- Bathymetric chart size A0
- Object listing based on the side scan data including:
  - Size and position of found objects
  - Side scan Picture of object
  - Bathymetric picture if object visible
  - Areal footage if object visible