

# CAPABILITY SHEET

## BOSKALIS SURVEY DEPARTMENT TECHNIQUES AND EQUIPMENT

### INTRODUCTION

Boskalis Survey Department provides services to all operating companies in the Boskalis group. These survey services provide geo-referenced information tailored to a project's precise requirements.

### ORGANIZATION

Based at Boskalis headquarters in Papendrecht in the Netherlands, the Survey department operates in close cooperation with Electronics & Instrumentation Services (EIS) and Dredging Software Development (DSD), both of which are part of the Central Fleet Support (CFS). The Survey department provides expertise, personnel and equipment, and EIS mobilizes, installs and maintains the equipment required. DSD supplies the software to integrate vessels and plant, crew, survey equipment and survey personnel in effective and efficient project execution.

### SURVEY PERSONNEL

The Survey department has an international pool of more than 100 qualified surveyors. More than 90% of the surveyors are university trained and in addition, 70% have CAT A (highest) level survey qualification from an institution accredited by the International Hydrographic Organization (IHO). The survey pool is international with personnel of 20 different countries, including 45 from the Netherlands, 30 from other EU countries, and 25 from other countries worldwide.

### SURVEY EQUIPMENT

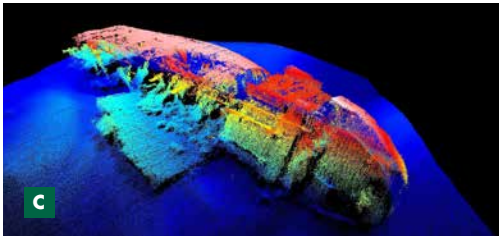
To ensure the latest equipment is available for all projects, a central pool of survey equipment is maintained in Papendrecht. Large investments are made to ensure the central pool is fully equipped with state-of-the-art technology and equipment, and this also applies to equipment installed permanently on our vessels.



**A** Dolwin 2 project offshore positioning services  
**B** Boskalis Hydrographic survey vessel

### SURVEY EQUIPMENT IN THE CENTRAL POOL

- 300+ RTK capable GNSS receivers (GPS+GLONASS)
- 250 other GPS receivers
- 50 Heading & motion reference units (IXBlue Octans)
- 55 Motion Reference Units (Kongsberg Seatex MRU5/H)
- 10 Inertial positioning systems (IXBlue PHINS/ROVINS)
- 35+ Multi beam echo sounder systems (Kongsberg EM2040c/EM3002, R2Sonic 2024)
- 90 Single beam echo sounders (NaviSound 420/210, Deso 17, Knudsen 320M)
- 2 Side scan sonar systems
- 5 Acoustic camera units (CodaOctopus Echoscope & ARIS)
- 2 Parametric echo sounders or Sub Bottom Profilers (SBP) (Innomar SES-2000);
- 4 Magnetometers (Geometrics G882)
- 7 Pipe trackers (TSS440)
- 6 Portable USBL acoustic positioning systems with transponders (IXBlue GAPS)
- 10+ Hull mounted USBL acoustic positioning systems (Kongsberg Hipap 50x/ Sonardyne Ranger)
- Sparse LBL acoustic positioning system (RAMSES Ixblue)
- ADCP current profilers & Bottom Trackers
- Tidal measurement and recording systems
- Radio & Wifi / WLAN data communication equipment
- Angle & pressure sensors
- Land survey equipment (total stations, level instruments, GNSS Manpacks)
- Laser scanner (Z+F 5010C)
- Unmanned Aerial Vehicle (UAV) or Drones for photogrammetry mapping surveys
- Environmental measurement sensors (YSI) and buoys (Mobilis)
- Weather & wave monitoring systems (Vaisala/Waverider).



projects carried out in joint ventures. As a result, our survey department operates year round and worldwide on a vast scope of projects.

### SOFTWARE

The Survey department works with the following software packages:

- Qinsy (QPS) for multibeam data acquisition, validation and cleaning
- Elics (Ixsea) for sidescan data acquisition and processing
- Mx (Bentley) for dry earthworks
- Visualsoft for video recording, overlay and playback,
- Bricscad for drawing storage and plotting

In addition, Boskalis has developed DredgeView 2 that is used for:

- single beam echo sounder data acquisition
- dredging vessel and plant navigation and production
- survey data storage and visualization and chart production
- vessel traffic monitoring, anchor handling
- dive support vessel (subsea) positioning
- offshore positioning and installation
- windfarm installation and special projects.

### MULTI DISCIPLINARY APPROACH

The key competencies of Boskalis Survey are measurement, calibration and calculation for positioning above and below water, bathymetry and object visualization, and data for working platforms of all operating companies in the Boskalis Group (Boskalis/SMIT Salvage/Dockwise). Where data interpretation is required, surveyors work in close cooperation with geotechnical engineers in the Boskalis Soil group and engineers in our Environmental group.

### TRACK RECORD

As well as providing services to all Boskalis operating companies, services are provided to

### OVERVIEW OF PROJECTS

- Azerbaijan Shah Deniz field, Boskalis Offshore: all surveys for trenching, pipe-pull and backfilling; all near shore survey and pipe laying support works for the pre-entry anchor corridor, pull head monitoring, touch down monitoring and as-laid survey for 3 pipelines;
- Salvage wreck Baltic Ace, SMIT Salvage: all positioning and survey work for the salvage of the Baltic Ace in the North Sea;
- Maasvlakte 2 Project, Boskalis Dredging: all positioning and survey work for the construction of the Maasvlakte 2 project;
- Dolwin 2 HVDC Platform Project, Boskalis Offshore: all positioning and survey work for scour protection installation, transport & installation and filling solid ballast for the DolWin 2 HVDC Platform;
- Goliat Project, Dockwise: all positioning and survey work for the float-on in South Korea and float-off in Norway of the Goliat FPSO on the heavy transport vessel Vanguard;
- Dredging of the New Suez Canal, Boskalis International: all positioning and survey work for the dredging of 35 km of the new Suez canal;
- Tapis-R Transport and Installation, Dockwise: all positioning, position and movement monitoring and weather monitoring for the Tapis-R platform transport and installation by float-over method.
- UXO projects, Wikingier OWF, Veja Mate, Baltic, Boskalis Hirdes: positioning, and survey work for UXO removal on cable routes and windfarm fields.



- C** Multibeam survey data Baltic Ace wreck for SMIT Salvage
- D** Side scan sonar data pipeline touchdown monitoring, Azerbaijan
- E** Topographic survey of Sandfill
- F** Boskalis surveyor processing data

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