Geophysical Site Surveys

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Introduction – The Fugro Group

- Fugro is a Dutch multi-national company headquartered in Leidschendam, Netherlands.

- Fugro acquires and interprets Earth and engineering data to support the design, construction, installation, repair and maintenance of infrastructure.

- Fugro employs approximately 12,500 employees in over 60 countries.

- The Fugro Group is divided into 3 major business lines each containing numerous individual operating companies.
Introduction – Fugro Survey Limited

- Principle activities;
  - High resolution marine geophysical site surveys primarily for the oil and gas industry.
  - Pipeline / cable route surveys.
  - Offshore wind farm surveys.
  - Positioning services for pipeline / cable lay operations and offshore construction.
Introduction – Fugro Survey Limited

- Office locations;
  - Aberdeen (head office)
  - Great Yarmouth

- Geographical areas of operations;
  - North-west Europe (primarily North Sea and Norwegian Sea)
  - West Africa
  - South America
Section 1 - Geophysical Site Surveys

- The purpose of a geophysical site survey is to determine whether the emplacement of offshore infrastructure at a particular site is suitable and safe.

- What do we need to know:
  - Seabed bathymetry (water depths, gradients and relief)
  - Seabed sediment types (clay, sand, gravel, bedrock)
  - Seabed obstructions (existing infrastructure, wrecks, debris, boulders)
  - Shallow geology (foundation / anchoring conditions)
  - Geohazards (slope stability, faulting, shallow gas)
  - Environmental impact (protected areas such as MDAC, herring spawning grounds)
Seabed Bathymetry
Seabed Bathymetry
Seabed Sediment Types
Seabed Obstructions - Existing Infrastructure

50m
Seabed Obstructions - Wrecks
Seabed Obstructions - Wrecks
Seabed Obstructions - Debris
Seabed Obstructions - Debris
Shallow Geology

50m
Geohazards – Slope Stability
Geohazards – Faulting

500m
Geohazards – Shallow Gas
Geohazards – Shallow Gas
Environmental Impact
Section 2 - Principles, Methods and Tools

- Geophysical surveys use mainly acoustic methods to gather information (remote sensing)

- By using a range of equipment with different acoustic frequencies, more detailed information on the seabed and sub-seabed environment can be gathered.
Multibeam Echosounder
Side Scan Sonar
Side Scan Sonar

Ht = Target height
Ls = Acoustic shadow length
Hf = Towfish height above seabed
Rs = Slant range to target
Rs + Ls = Slant range to end of shadow
Sub-bottom Profilers
2D High Resolution Seismic
2D High Resolution Seismic

- **Water Column**
- **Source**
- **Streamer**
- **Strata**

**Diagram Details:**
- **CDP GATHER (CDP 1)**
- **CORRECTED GATHER (CDP 1)**
- **STACK (CDP 1)**
Magnetometer
Environmental Survey
Geotechnical Survey
Autonomous Underwater Vehicle
Autonomous Underwater Vehicle
Fugro Survey’s Fleet
Section 3 - Interpretation and Reporting

The interpretation of site survey data needs an integrated approach.

- Bathymetry
- Well logs
- Background information
- Side scan sonar
- Magnetometer
- Client supplied 3D
- 2DHR
- Sub-bottom profiler

Interpretation

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Final Product - Site Survey Report

- Comprehensive, structured and high-quality survey report.
- Often includes integrated geophysical, environmental and geotechnical results.
- Detailed figures and charts showing the final interpretation.
Seabed Features Chart
Shallow Soils Chart
Shallow Profiles
Geological Profiles
Seismic Anomalies Chart
Summary

- Geophysical site surveys are essential to ensure the suitability and safety of sites for offshore infrastructure construction.

- During a site survey a large amount of information on the seabed and sub-seabed environment is acquired.

- A detailed and integrated interpretation is required to turn this information into a high quality site survey report for the end user.
Thank You