CATHIE

Ground Models

We deliver geological, geospatial, geophysical and geotechnical engineering solutions for a wide range of offshore and nearshore industries, including: wind; oil and gas; marine energy; ports; and subsea cables. We work on projects at all stages,from feasibility studies through to decommissioning, offering innovative, cost-effective solutions to clients all over the world.

Offshore Wind Farms and their associated infrastructure represent spatially extensive developments whose siting, design, installation, maintenance and decommissioning activities require understanding of the seabed and sub-seabed conditions and properties. The development and curation of a knowledgebase integrating multiple observations, tests and interpretations is of benefit throughout the lifecycle of the infrastructure. This knowledgebase it often given the title 'Ground Model', though this terminology may encompass many different structures and usage patterns for the data within it.

A ground model may include seabed and subseabed data on materials and hazards, geological and geomorphological data, geophysical data and geotechnical data, with other elements included as necessary. These components may be stored simply in a file system, or integrated extensively within geospatial software such as GIS, geotechnical database systems or seismic workstation projects.

At Cathie we listen to our clients and strive to understand the way in which Ground Model data will be collected, processed and used within the infrastructure programme for specific purposes such as cable installation or foundation construction. We have flexibility and capability to implement specific model structures for clients that have a firm preference, and can provide advice and consultative support on all aspects for those that require it.

Desk Studies

Our teams have significant experience and robust capacity for the production of desk studies for feasibility, planning and survey design for offshore infrastructure projects in renewables, oil & gas and communications. These may include sections on geology, geohazards, seabed morhpology, anthropogenic influences, existing data inventory and review, and initial risk registers.

Strategic Planning

With strong understanding of foundation and cable design and installation, and design codes and standards regulating infrastructure, we support our clients in the planning of development of Ground Models optimising content, resolution and quality.

Geophysical Expertise

We have several staff geophysicists with experience from 1-30 years, many of whom are certified to work offshore. We provide services in survey design and scoping, procurement, survey management (including provision of client representatives) as well as interpretation and integration with other data types.

It is efficient to consider geophysical surveys as bespoke products whose design, parameters and quality requirements are specific to the challenge at hand. As such, their scoping and design is best made with clear view of the use to which the data will be put *throughout the project cycle*. We can support all survey approaches from 'stand alone' geophysical survey work to strategically planned, integrated ground model focussed survey campaigns to refine specific aspects of the ground model.

Geotechnical Expertise

We have significant breadth and depth of expertise in geotechnical engineering and Engineering Geology. We provide services in survey design and scoping, procurement, survey management (including provision of client representatives) as well as interpretative reporting and integration with other data types.

We have experience in delivery of geotechnical products under international and local design codes, standards and regulations and can efficiently tailor output to our clients requirement.

Geophysical and Geotechnical support capabilities

- **Survey design and scoping:** We assist our clients to balance scope, cost and quality, incorporating understanding of the purpose(s) to which data will be put, and the precision required, at different stages in a project cycle. Geotechnical test scoping, positioning and laboratory scheduling, and geophysical data acquisition design are performed with multi-disciplinary collaboration as appropriate.

- **Procurement:** We have extensive experience in procurement of geotechnical and geophysical survey work and can support in the production, management and evaluation of high quality tenders under most standard contract templates.
- **Survey management and supervision:** We can support survey work with onshore and offshore personnel with experience and deep expertise in logistical and technical practise, offshore operations, offshore and onshore QA and management. We support our clients from survey planning to review of reporting and data delivery.
- **Reporting:** Quality management of factual reporting, production and/or QA of interpretive reporting products, integration and reporting of existing or 3rd party supplied output products.
- **GIS:** Expert support in the design development, curation and assurance of geospatial data in a wide range of software environments including bespoke web-GIS solutions.

Working Environments

Cathie maintains skills and software licences to support an array of options for developing, curating and delivering Ground Models:

- **Geotechnical Engineering:** Holebase, gINT
- **Geophysics and Geology:** IHS Kingdom, OpendTect, Seisee, Sonarwiz, EIVA
- **GIS:** ArcGIS, QGIS, Web-served GIS applications

Ground Model outputs may be supplied in formats associated with these products, or others at the request of our clients.

Integration

A coherent ground model requires the integration of data streams to assure continuity between the various inter-related elements. We have experience of a number of successful projects in which timely collaboration between geotechnical engineers, geologists and geophysicists has provided important efficiencies and benefits to quality.

Key capabilities are:

- Co-located personnel with geophysical, geological and geotechnical skills, in small, integrated project teams;
- Established practice in geophysical and geotechnical survey planning using multi-disciplinary collaboration;
- Expert geophysical and geotechnical knowledge based on multiple windfarm developments;
- Established interfaces using geotechnical database, GIS and geophysical workstation software to enable robust exchange and alignment of factual interpretive data;
- Established practice in interpretive reporting of geotechnical and geophysical data using multi-disciplinary collaboration, integrating geological and geotechnical data for all the relevant geological units
- Experience in development of integrated ground model data products, with structural elements and engineering parameters presented in AGS format, GIS and/or seismic workstation filesystems.

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