

Engineering Capabilities

Aqualis Offshore (Aqualis) is a global engineering and marine consulting firm. The company was set up in December 2012 to service the growing demand for quality offshore engineering and marine consultancy.

The geotechnical department within Aqualis is primarily based in the UK and is led through its' subsidiary company Offshore Wind Consultants Ltd (OWC). It consists of engineers who have many years of experience within the offshore industry with both excellent design and analysis skills combined with direct experience of working offshore managing site campaigns. Our staff are specialists in jack up leg penetration analyses, offshore site investigations, and the geotechnical design and installation analysis for offshore oil and gas and wind turbine foundations.

Jack-Up Leg Penetration Analyses

Aqualis are experienced in jack-up drilling rig leg penetration analyses and have developed bespoke software to predict spudcan penetrations to the SNAME 2008 design code. The Aqualis leg penetration analysis methodology determines the actual capacity at each depth using the load-spread method, considering the capacity of materials below, so that the capacity at any depth is limited by the punch through potential of underlying soils. We have undertaken analyses for soils in the following areas:

- North Sea (including Norwegian Sector)
- Middle East
- Gulf of Mexico
- Offshore Australia
- Offshore China / Malaysia
- Offshore India
- Offshore West Africa



We have access to and use a large and increasing database of previous loading and penetrations to constantly optimise our analyses.

The penetrations, fixities and V-H envelopes the geotechnical team determine are then used by our structural engineering team in their Site Specific Assessments.

Site Investigations

Aqualis, through their subsidiary OWC are very experienced at offshore wind farm Site Investigation (SI) management, with staff who have managed many SIs over the last 10 years. Recently OWC developed a Live SI methodology tool that had a significant influence in saving a UK offshore wind farm project development costs. This project resulted in OWC being shortlisted for the 2015 Ground Engineering Awards.

Our capabilities span the whole life cycle of the SI process, and include:

- Running SI tender competitions
- SI scoping and contractor management
- Review of geotechnical contractor's method statements, Project Execution Plan, and HSE plan in advance of the offshore works
- Onshore project management during the SI
- Scheduling of onshore/offshore laboratory and in-situ testing
- Provision of experienced offshore Client Representatives
- Use of live SI methodology tool (i.e. calculating the length of borehole required as the ground information is gathered, ensuring boreholes are economically sized)
- Data interpretation and development of final soil models for foundation and cable design using SI data and preparation of Geotechnical Interpretative Report
- Assurance that regulatory and certification authority requirements are met



Ground Modelling & Geotechnical Interpretation

Our team have developed ground models for the world's largest and most complicated offshore wind farm sites. We utilise advanced software to manage and interpret large data sets of ground investigation results to:

- Identify engineering units across a site
- Understand expected ground behaviour
- Develop geotechnical design parameters
- Identify and manage ground based risks
- Assess lateral and vertical ground variability

We also work closely with geophysicists to produce a ground model benefiting from the advantages of both geotechnical and seismic assessments.

Foundation Design

Our geotechnical engineers have designed over 500 offshore wind farm foundations, and are experienced at:

- Development of design soil models
- Finite Element Modelling
- Selection of geotechnical parameters

We have designed monopiles, jacket piles, gravity bases, mat foundations, ground anchors and suction caissons. We use the latest standards, industry research and best practice to ensure that our designs are safe, efficient, reliable and satisfy latest

code and certification requirements.

Our team utilises a whole life approach to identify possible design issues early in the ground model process and mitigate the risks through improved site investigation methods and design studies.

Foundation Installation Analysis

Following foundation design our geotechnical engineers undertake the installation analysis and management, this includes:

- Pile driveability assessments
- Site supervision during foundation installation
- Pile driving induced fatigue analysis
- Seabed preparation advice
- Mudmat design

Cable Route Analysis and Planning

We have wide ranging experience in the design of cable routes and undertaking assessments to ensure the effective protection for the design life of the cable system. We have our own in-house cable experts and consultants who work closely with our in-house geotechnical team. The team can then effectively assess the risks along the entire length of a cable system and undertake detail risk assessment taking into account navigational risk assessments, fishing activity, seabed geotechnical conditions, bathymetry and all other relevant survey data. The end result is a sectional analysis along the cable route which informs the cable design and cable protection processes. We also recommend the optimum cable protection solutions to effectively protect the cable systems from all forms of hostile seabed intervention whilst still ensuring the cables can be successfully maintained in the future.

