

Geotechnical investigations for offshore renewables

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What is a geotechnical investigation?

Geotechnical investigations are undertaken to evaluate the physical properties of soil and rock layers along and beneath the seabed by using specialised geotechnical equipment and activities.

Geotechnical investigations are carried out by specialised vessels and drilling units. The vessels must be able to position themselves at specific locations, remain stationary at site (see illustration below) and be able to withstand any extreme sea states and weather conditions.

A geotechnical investigation is typically performed after a geophysical investigation has been completed.

What activities are typically conducted during geotechnical investigations?

Grab sampling is used to take samples from the seabed surface and can be collected by a diver or remotely operated vehicle using a specialised vessel. A typical grab sampler will close around the sample and transport it to the surface for analysis and testing.

Cone penetration tests and borehole drilling are used to take detailed samples from various depths beneath the seabed and will require a suitable drilling unit. Typical drilling units include drill ships, seafloor drill rigs and jackup barges. The samples are collected in a core barrel and taken away for analysis and testing.



Why are geotechnical investigations necessary for offshore renewables developments?



Typical fixed foundations (not to scale)



Typical floating foundations (not to scale)

The data collected during a geotechnical investigation is used to determine site suitability and is critical to the design, installation, and operation of the proposed development, within the marine environment.

For offshore wind, geotechnical data will inform the deployment of key offshore wind farm components including offshore substations and wind turbine foundations, inter-array and export cables.

The scope of a geotechnical investigation will depend on the types of foundation being considered and variability in seabed characteristics.

In water depths up to 60 meters, data from geotechnical investigations is used to inform the method for securing fixed foundation turbines to the seabed.

Floating offshore wind turbines have the ability to be installed in deeper water and require multiple moorings. The design of the mooring system for floating offshore wind turbines will rely on the results of the geotechnical investigation.

Geotechnical investigations for offshore renewables developments will require authorisations and approvals under the Offshore Electricity Infrastructure Act framework.

Timeframe for a typical offshore wind farm development



