Fugro provides a 'light footprint' approach to the investigation of challenging, sensitive sites at the interface of land and water, based on integrated geophysical, geotechnical and geo-consultancy capabilities.

**ADDRESSING THE CHALLENGE**

With a growing number of developments being built at the interface between land and water, there is a need for site investigation data to build robust ground models. Construction of infrastructure associated with nuclear plants, LNG facilities, ports and harbours, pipelines and offshore wind requires thorough characterisation of ground conditions.

For coastal sites, conventional marine and land-based surveys typically result in a data gap in the crucial intertidal zone where water depths are insufficient for vessels, and ground conditions are unsuitable for rigs and other site investigation plant.

Ground investigation at such sites may be further complicated by environmental sensitivity and variable ground conditions that necessitate a high sampling density.

Building on experience gained at coastal, lacustrine and fluvial sites around the world, Fugro has developed a package of highly mobile surveys well-suited to investigating shallow transition zones. Geophysical surveys can screen the site, providing data from depths of less than a metre to more than a kilometre. Results are used to target intrusive site investigation to characterise geotechnical and geological conditions.

The shallow transition zone can be defined as a zone of typically less than 200 m in depth (capturing most pile and foundation extents) and less than a few kilometres in width.

Mobilising a low ground pressure vehicle from a landing craft to support a geophysical survey team.
BRIDGING THE DATA GAP

Developers of projects in the shallow transition zone between land and water have often had to deal with a gap in the information provided by orthodox land-based and marine surveys. Most marine survey vessels struggle to operate in water depths of less than 2 metres. Jack-up platforms provide an alternative, but are not suited to rapid data acquisition.

Land-based surveys are heavily reliant on drilling, cone penetration testing (CPT) and other intrusive methods, which are constrained by access and ground conditions.

The resulting data gap can leave designers guessing about ground conditions in what is often a critical zone for projects such as cable or pipeline landfalls, or major infrastructure such as nuclear power plants and oil and gas facilities.

Fugro can help to bridge the knowledge gap using methods that ensure continuous coverage from land through to marine, deltaic estuary, lacustrine or fluvial conditions.

KEY SERVICES

Survey
- Integrated positioning systems
- Metocean measurement and monitoring
- Integrated bathymetry and laser-scanning (BOAT-MAP™)
- Environmental studies
- Hydrographic surveys

Geophysical
- Ultra high-resolution seismic reflection
- Surface wave seismic (MASW)
- Seismic refraction and reflection
- Magnetometry (UXO)
- Wireline logging and borehole geophysics
- Sub-bottom profiling

Intrusive
- Borehole and in situ testing
- Cone penetration testing
- Vibrocore and grab sampling
- Excavation and sampling
- Core logging and photography
- Laboratory based soil and rock testing

Construction support
- Trenched pipeline installation
- Large diameter shaft drilling
- Specialist construction services including pile installation

TYING IT TOGETHER

Fugro has an enviable track record of completing shallow transition zone investigations safely and efficiently in the most challenging international locations. We offer a complete service based on three key elements:

1. Highly experienced teams using innovative methods to access challenging sites safely, and complete surveys with minimal environmental impact.

2. Integration of geospatial, geophysical and geotechnical data collection, processing and reporting - using one datastream to better understand the others, and build a continuous picture of the subsurface.

3. Geoconsultancy - building a ground model based on big picture geophysics and intelligently targeted intrusive surveys, from route planning and design to construction support and decommissioning. Delivering results in a coordinated GIS-enabled package.
KEY DELIVERABLES
By addressing the specific challenges of shallow transition zones, Fugro provides laterally continuous information from land to water.

By integrating continuous geophysical imagery with intrusive sampling and laboratory testing, we deliver value-adding information relating to:

- Geological, geotechnical and hydrogeological shallow transition zone site characterisation
- Geohazards including capable faulting, liquefaction, karst, slope stability and shallow gas
- Engineering properties of soil and rock
- Seismic risk and ground motion studies
- Foundation conditions
- Trenching conditions
- UXO and obstructions
- Depth of burial
- Mineral resources
- Archaeological assessment

Jack-up platform.

Advanced geotechnical laboratories specialising in marine samples.

Integrated reporting of geophysical and geotechnical data.
THE BENEFITS OF WORKING WITH FUGRO

Fugro is a global organisation with the resources, experience and expertise to deliver fully-integrated solutions. Our regional crews understand local conditions and constraints, ensuring safe and efficient project delivery.

Delivering a comprehensive range of surveys and geoconsultancy to characterise the surface and subsurface of your site, we can benefit your project in three key areas:

Programme - modular equipment can be mobilised rapidly to remote sites; surveys can cover hectares per day and results can be delivered in days or weeks rather than months.

Safety - two-stage survey approach, with ‘light footprint’, highly mobile, geophysical teams, enabling targeting of intrusive investigation to minimise reliance on heavy plant.

Budget - a better understanding of ground risk can provide the justification for leaner design solutions, fewer tender qualifications and reduced risk of hidden surprises and claims during construction.