GEOTECHNICS
BUILD ON CONFIDENCE

CASE STUDY

BUILDING ENERGY INFRASTRUCTURE ON CERTAINTY:

How Early Ground Investigation Protects Design, Programme and Margin

Overview

Energy infrastructure projects can be visibly complex, yet many of the risks that influence safety, efficiency and commercial outcome remain hidden from view.

Substations, hydrogen production facilities, battery storage compounds, process equipment, pipework, access roads, drainage layouts, foundations, containment structures and high-value mechanical and electrical assets all present major on-site delivery challenges. Yet variable ground conditions, made ground, groundwater, buried obstructions, contamination risk, foundation sensitivity, service routing constraints and many more such hidden elements can severely disrupt even the most well-managed construction programme.

By appointing ground investigation specialists early, preferred sites for energy infrastructure developments can be assessed for construction suitability prior to committing significant time and resources to detailed design, programme and enabling works. Delivered correctly, geotechnical and geoenvironmental data helps clients make informed decisions about site suitability and design strategy without unnecessary cost or programme impact.

The challenge

Sites for energy infrastructure are often not selected on ground conditions. They may be chosen for grid connection, proximity to industrial demand, available land, access to utilities, planning potential or logistical requirements. But while ground risks can seem less obvious during initial site selection, they can become the deciding factor on cost, constructability and long-term asset performance.

Poor ground understanding can lead to a number of problems:

- Highly variable and soft compressible strata will increase differential settlement risk under heavy equipment loads or steel framed structures
- Soft ground or compressible clay deposits will affect slab design, roads and crane mat designs
- Groundwater strikes during excavation could impact temporary works and long-term drainage strategy
- Aggressive soils could compromise buried concrete platforms and pipework

- Contamination could require costly disposal or introduce reuse, health and environmental liabilities both on and off site
- Made ground, buried obstructions and hidden evidence of previous land uses could cause piles to deflect, torsion or buckle during driving
- Service trenching, duct routing and extensive earthworks could be severely disrupted.

Geotechnics' approach

Geotechnics leads with engineering professionalism and pragmatism rather than plant; looking firstly at the information needed to make confident decisions about design, risk and procurement strategy.

Phased investigation programmes are established to define ground conditions and understand key risks. Desktop reviews follow to include site history, assessment and evaluation of the environmental setting. Preliminary ground risk profiles are developed to inform targeted intrusive investigation. Supplementary in situ testing is undertaken alongside laboratory testing to verify certain behaviours. An interpretative report is delivered that addresses both geotechnical and geoenvironmental factors.

With energy infrastructure projects, ground risks usually affect more than one area of design or delivery. Contamination can limit the reuse of good quality materials. Groundwater behaviour can turn technically acceptable foundations into commercially unviable options. Localised settlements may be accommodated by ground improvement in some areas of site yet dictate piled foundations or layout adjustment elsewhere.

Engineering led approach rather than plant ownership

Geotechnics' culture is defined by its asset-light, engineering-led delivery model. In practice this means ground investigations scoped around the information the designers, client and contractor need to know rather than around a set package of fieldwork. Focused on getting real design decisions right first time, this helps to optimise investigation positioning and specification of boreholes, trial pits, sampling, monitoring points and testing programmes.

It also helps to avoid both insufficient and excessive investigation by understanding geological variability at an early stage. This enables appropriate investigation density to be applied to key zones so as to better understand ground constraints or risks which may later affect construction.

Asset-light model allowing for flexible procurement routes

An asset-light model supports a more flexible approach to selecting technique and resource to suit ground conditions and decisions required. Applying engineering leadership throughout projects reassures clients that their investigation is tailored to project need, not forced to fit around equipment availability or pre-determined methods of working.

Strong Internal Systems and Processes

Engineering insight at the planning stage establishes a clear route from site activity to decision-ready outputs meaning, for the design engineer, reliable information on which to base design assumptions. For the main contractor and specialist tiers, earlier visibility of ground risks which could impact construction sequencing, productivity and margin.

Bespoke project management software provides an additional layer of coordination, tracking and control helping maintain programme visibility across fieldwork, testing requirements, deliverables and key milestones.

Personable and Independent Experts

Technical competence underpins Geotechnics' ground investigation work but projects are delivered by people, not processes. Collaborative working and clear communication mean project stakeholders understand the commercial implications and complexity of ground data.

Procurement Confidence with Commercial Clarity

Ground data that provides a factual baseline to support procurement confidence. By identifying risks before ground is broken on site, surprise costs and unplanned civil works are eliminated, protecting the long-term operation of key assets.

Geotechnics is an Engineering Driven Ground Investigation Partner. We help clients turn complex ground data into clear, confident project decisions with commercial clarity and cost framing. For energy infrastructure projects, that clarity enables safe design, controlled delivery and long-term asset performance.

To find out how Geotechnics can reduce ground risk in your hydrogen infrastructure project contact the team call **024 7669 4664,** email: **mail@geotechnics.co.uk** or visit **www.geotechnics.co.uk**

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Tel: 024 7669 4664 | mail@geotechnics.co.uk
www.geotechnics.co.uk
Coventry | Chester | Exeter | Leeds