



GROUND INVESTIGATION FOR MISSION CRITICAL NUCLEAR INFRASTRUCTURE

Overview

Planning and constructing nuclear infrastructure is founded on certainty. Every assumption, decision and design detail must be verified, managed and delivered with confidence.

For Tier 1 contractors, ground risk is commercially significant from the start. It's not just a technical consideration. Missed ground risks have the potential to impact delivery, commercial position and margin.

This case study looks at why ground investigation matters to nuclear energy projects. Instead of exploring through the lens of a singularly delivered project, we chat to clients and teams about why ground investigation is a critical part of successfully planning and delivering mission critical infrastructure.

The Challenge

Planning and constructing nuclear facilities in the UK is a heavily regulated environment. The Office for Nuclear Regulation (ONR) stipulates that it "regulates the design and construction of new nuclear facilities and associated activities, including elements of the supply chain".

ONR's Safety Assessment Principles outline how nuclear safety cases support its regulatory decisions. Projects are working with regulators who challenge assumptions and demand evidence that reduces risk and eliminates uncertainty as far upstream as possible. Getting the ground investigation right from the outset is essential for these and many more reasons.

Nuclear sites demand exceptional loading conditions with many facilities having strict limits on what those loads can be and what they can do to the ground. These include:

- Heavy structures, deep excavations or buried services
- Cooling infrastructures such as lakes or boreholes
- Access roads and hardstandings



- Cranes and tower scaffolds
- Temporary works platforms and assembly areas
- Security infrastructure, barriers and fencing
- Long-life structures with significant operational lifespan.





Fundamentally, nuclear energy projects are tough on the ground. This is where robust geotechnical and geoenvironmental site investigation is vital, verifying the ground is suitable and, importantly, interrogating every stage of design and delivery from:

- Site layout and foundation design
- Excavation support and sequencing
- Ground improvement and dewatering works
- Earthworks, contamination and material reuse
- Temporary works strategy and sequencing
- Long-term performance and asset integrity.

The International Atomic Energy Agency (IAEA) does not have direct legal authority to approve, block, or manage UK nuclear projects but it does play a vital advisory and oversight role, setting global safety standards that the UK and all member states use as the design baseline for new reactors. It understands that geotechnical site evaluation for nuclear power plants cuts across many areas of design and delivery.

So, ground investigation should look beyond only producing factual logs and laboratory results. Nuclear projects demand high confidence datasets that can be analysed, modelled and interpreted to support critical engineering decisions.

Tier 1 contractors understand that too. If ground conditions are known early enough, unknowns can be priced, planned for, mitigated or removed from the project completely.

Ground risk is programme risk

If nuclear facilities are affected by a ground risk, it can slow down a project significantly. One unknown could impact seemingly unrelated elements of the project including plant availability, working platform sizes, pile design lengths, excavation support pressures, construction access routes,

groundwater hazards or even enabling works outside of the nuclear site itself.

The crucial part is understanding if that risk has been identified, investigated and communicated early enough to do something about it.

Predictability in ground investigation helps navigate unknowns

Ground investigation should not be seen as a box-ticking exercise by delivery teams. Especially in mission critical infrastructure. Tier 1 contractors need ground investigation companies who appreciate the importance of managed scope, correct resourcing and collaborative engagement to minimise surprises during fieldwork.

A well-managed ground investigation should provide data to help answer critical questions around:

- Highest risk ground conditions
- Factors which may affect production rates or construction methodology
- Required site visits to verify design assumptions
- Sites where additional investigation may be required
- Safe exclusion zones to limit unnecessary investigation
- Where else we need information to make decisions to avoid costs and delays later in the project.



Geotechnics' Approach

Delivering engineering-led insight

There is a huge difference between ground data and ground intelligence. Investigation for nuclear facilities should be led by the engineering decisions that need to be made. Not by a standardised and repetitive fieldwork schedule or a toolset attached to one particular contractor.

Everything we do at Geotechnics starts with the ground investigation. We offer guidance and management through the process from desk study through to ground investigation, testing and design services. Our fieldwork is directed and supervised by qualified engineers with years of experience delivering robust geotechnical and geoenvironmental site investigation for over 40 years. Our wider services also include ground investigation, laboratory and reporting with reporting options including desk study reports, factual reports, ground investigation reports (GIR) and interpretive reporting.

Tier 1 contractors need engineering-led services because the gap between data and decision creates commercial pressure. That's where engineering insight can translate data into interpreted insight to help clients manage risk before it hits margin and providing valuable project intelligence around:

- Temporary work designs and constraints
- Piling loads and lengths
- Excavation support requirements and risks
- Groundwater hits and management
- Programme risks and procurement allowances.

Asset-light model allowing for flexibility and agility

Unlike many investigation companies Geotechnics isn't defined by the size of our plant. We're an engineering-led ground investigation company first. Our approach to client projects is directed by engineering knowledge, project requirements and desired outcomes.

Selecting the right technique and specialist resource to suit the project conditions, access constraints and programme requirements keeps projects moving, meaning we're not restricted to planned slots for big machines. This allows for flexible dialogue with our clients and enables projects to be planned appropriately to suit ground conditions and risk.

Robust internal systems

Predictable delivery is reinforced by quality systems and processes. Our bespoke project management software enables clients to see across project scope, progress, data and deliverables, offering an additional layer of co-ordination and maintaining complete visibility across all deliverables.



Personable and independent specialists

Successful delivery depends on people as much as processes. Technical capability underpins all Geotechnics' ground investigation services and, working collaboratively with clear communications, enables clients to understand the commercial ramifications and complexities behind ground data.

Commercial clarity

Commercial clarity is vital in nuclear infrastructure projects where procurement scrutiny, and Tier 1 contractors need the absolute confidence that scope, cost, assumptions and exclusions are understood from the outset. Procurement confidence with commercial clarity supports better project governance, avoids any programme ambiguity and protects margins.

Ground investigation shouldn't happen in isolation before construction starts on nuclear infrastructure projects. It is integral to the assurance framework that enables safe, buildable and commercially controlled delivery.

Tier 1 contractors need reliable data, practical site insight, responsive delivery and predictable commercial outcomes. Geotechnics independent and personable approach blends engineering leadership with flexible delivery, robust systems and bespoke project management tools that enable complete commercial clarity and which enables clients to make confident decisions on complex, mission critical projects, protecting programmes, controlling risk and delivering with confidence.

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

