



INSIGHT

A LESSON IN GEOTECHNICAL DUE DILIGENCE

GEOTECHNICAL · TECHNICAL INSIGHT

Topic

Geotechnical due diligence
Ground risk management

Sector

All sectors

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Reading Time

5 minutes

Related Services

Geotechnical desk study
Geohazard register
Ground investigation specification
Geotechnical interpretation
Risk-based foundation design

Related Case Studies

Karachaganak Unit 2 MRP, Kazakhstan
SIBA Gas Field Development, Iraq
O2 Sky Walkway, London
Natural History Museum, London
Luxury Resort, Sumba

Standards Referenced

BS EN 1997-1
BS 5930
SNI 8460:2017

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Summary

Ground is the one part of a project that nobody designs. It is already there, it varies from point to point, and most of it is out of sight. Geotechnical due diligence is the process of finding out enough about it, early enough, to make sound decisions about the site, the layout, the foundations and the budget.

It is not the same as a ground investigation. It is the thinking that decides what investigation is needed, what it must find, and what the results mean.

Start With What Is Already Known

Before a borehole is drilled, a great deal can be learned from a desk study: geological maps and memoirs, historic maps and aerial photographs, previous investigations, records of mining, flooding or landslides, and the experience of nearby works. On the SIBA gas field in Iraq, GTL assembled the regional geology, geomorphology and groundwater picture for the field before a single pile was designed, and identified buried channels, gypsum cementation, high groundwater and saline soils as the controlling risks.

Use Existing Data, With Judgement

Existing data is valuable, but only if it is representative. For the O2 Sky Walkway in Greenwich, GTL made full use of an extensive 1997 ground investigation for the Millennium site, which avoided a new investigation and the time it would have taken. Saturated conditions were assumed throughout, a conservative choice on a riverside site where groundwater is tidally influenced. The skill lies in judging whether historic data applies to the location and the design case, and in choosing cautious assumptions where it may not.

Fill the Gaps Proportionately

Where there is no data, the investigation should match the risk. For new display banner masts at the Natural History Museum in London, there was no ground information at all. GTL carried out dynamic probing with portable equipment and surveyed buried services on a busy public frontage, which was enough to design for the reversing wind moments with confidence.

Register the Hazards

At Karachaganak in Kazakhstan, the site combined collapsible soils with seasonal frost inside a live process plant, on a programme with no room for a further investigation. GTL commissioned an independent geohazard assessment and presented it as a register, with each hazard identified and categorised by risk. The design then dealt with each one:

- Bearing helices placed below both the collapse-prone layer and the depth of frost penetration.
- Shafts checked for downdrag from collapse settlement and for uplift from adfreeze.
- Residual uncertainty closed by preliminary and contract load testing, with 6% of contract piles tested.

This is the risk-based approach of Eurocode 7: decide which risks must be eliminated by investigation and which can be controlled by design and verification, and record the decision so the client knows what has been accepted.

What Happens When It Is Skipped

On a resort in Sumba, villas were built on a slope without any geotechnical investigation. A later investigation found a deep-seated landslide with a shear zone 8 to 15 m below ground, and the site was

classified as Very High Risk. Repairs over the following decade did not arrest the movement. Under SNI 8460:2017, investigation and slope stability analysis are required before design on sites of this kind.

The Due Diligence Sequence

1. Desk study and site walkover.
2. Preliminary ground model and hazard register.
3. Investigation scoped to the hazards and the structures.
4. Interpretation, with characteristic values and their basis stated.
5. Design that addresses each registered hazard, verified by testing.

Key point. Good geotechnical due diligence is proportionate, not exhaustive. Its purpose is to make sure that every significant ground risk has been found, decided on and recorded before money is committed.