

Linear route planning

Geo-environmental ground risk studies

by Bruce Napier & Holger Kessler, *Keyworth*

Transco plc is responsible for the planning and construction of the UK high pressure gas pipeline network that comprises over 6400 kilometres of buried pipeline. The demand for gas in the UK is forecast to rise significantly year on year. Consequently, Transco is upgrading its network capacity, including the building of new pipelines where needed. This initiative has resulted in a significant increase in environmental assessments commissioned

from a range of environmental consultancies prior to pipeline routing and construction.

Transco places the highest priority on safety and the environmental impact of its pipelines. The BGS was therefore commissioned in 1998 to prepare geo-environmental ground risk studies to be included in the Transco environmental reports. A multidisciplinary team of BGS staff was assembled. The team has since completed over thirty reports covering approximately 850 kilometres, from Devon to the Grampian region.

Geographic Information Systems (GIS) have been used to compile and summarise an array of BGS data-sets, including digital geological surface data, location of roddons and sinkholes, and other hazards or issues.

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Trafficability is a major issue for pipeline planners.

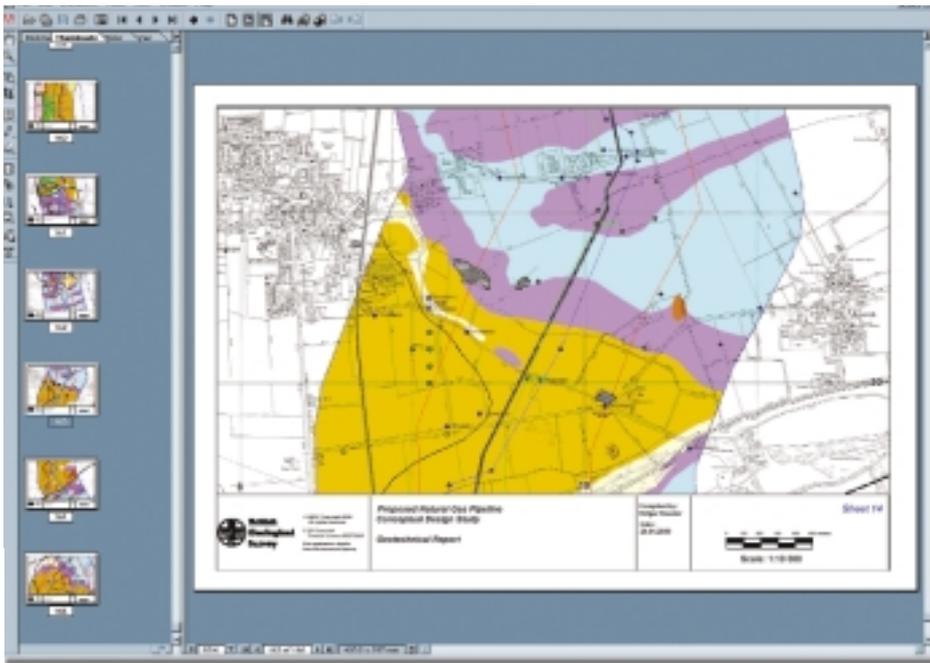
The reports are designed in three sections:

- Tabular summary for Transco executives.
- Full report on ground instability, geo-environmental and geotechnical considerations for the Transco pipeline planning team.
- Technical annexe for site engineers.

The tabular summaries give a succinct description of the geohazards present along the various proposed route corridor options, enabling routing decisions to be made at an executive level. The pipeline planners' interests lay mainly with geo-environmental issues that were described in detailed reports containing maps of the assembled BGS data. Site engineers were particularly concerned with factors



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An example page from a geotechnical report in PDF format.

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affecting trafficability, ease of excavation, and trench stability, generally presented in a tabular and graphical format.

The information held in the reports must be presented in a format that can be easily understood by the customer. GIS technology allows information to be

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presented in a user-friendly way. For example, one of the key elements of a linear ground risk study along a proposed pipeline route are the ‘chainage’ points placed at one kilometre intervals along the centre line of the proposed corridor. These kilometre points reference the ground information in text and tables to the accompanying maps created with the MapInfo® GIS. A cross-section parallel to the centre line delivers information about the composition and character of the subsurface.

The final product including all topographical data and digital orthorectified aerial photographs is



Transco's National Transmission System (blue) and commissioned study areas (red).

delivered electronically in MapInfo® and Portable Document Format (PDF) along with a printed document.

The success of the project lies in our capability to use data and expertise from many disciplines across the BGS and fuse them into a customer-focused product. The efficient delivery of this project would not have been possible without teamwork, and the whole project team should be acknowledged for their hard work.

For further information contact:

Steve Booth, Project Manager linear route ground risk assessments.
Tel: 01159 363193
e-mail: sjbo@bgs.ac.uk

Ground risk assessments cover themes such as:

- Ground instability considerations.
 - Mining.
 - Mineral extraction.
 - Solution voids.
 - Subsidence.
 - Landslip.
 - Landfill.
 - Disturbed ground.
 - Peat (compressible ground).
 - Buried valleys.
 - Seismicity.
- Geo-environmental considerations.
 - Contaminated land.
 - Major/minor aquifers.
 - Groundwater vulnerability.
 - Source Protection Zones.
 - Water supply abstractions.
 - Springs.
 - SSSI/AONBs.
 - Soils and land use.
- Geo-engineering considerations.
 - Trafficability.
 - Ease of excavation.
 - Trench stability.

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