GRM

CASE STUDY

# GRM investigation gets supermarket go-ahead

THE CHALLENGE

GRM was asked to investigate a 1.5 hectare site in the centre of the cathedral city of Ripon in North Yorkshire. The client, Maple Grove Developments Limited, proposed to develop the site with a large supermarket, several other retail units and apartment blocks, with associated car parks and infrastructure.

The principal challenge affecting the development of this site was the potential "development stopping" issue of ground collapse due to dissolution of gypsum deposits. Within the subsidence affected area of Ripon a major subsidence event occurs every 2 to 5 years, potentially causing significant damage to buildings or infrastructure.

It is likely that without a suitable ground investigation, either the site would remain undeveloped or a prohibitively expensive foundation solution such as 40 to 50m deep piles would be required.

A desk study carried out by GRM revealed lesser geotechnical and contamination related issues associated with former land uses, including backfilled cellars, fuel tanks and workshops.
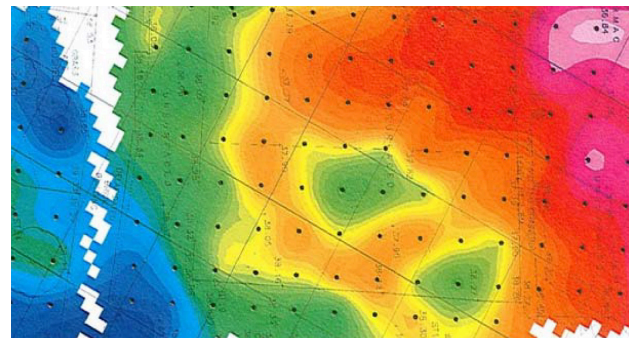
Gravity Survey

KEY FACTS

➤ Challenging site in area of known gypsum dissolution related problems,

➤ Appropriate ground investigation allowed use of cost-effective foundation solutions.

➤ Risk assessments revealed the site not to be at significant risk from dissolution related problems.

We Understand Land | LAND APPRAISAL

THE INVESTIGATION

The early phases of the ground investigation included geophysical surveys (micro-gravity and conductivity), window sampling, deeper cable-percussion boreholes and even deeper rotary openhole and cored boreholes.

Subsequent phases of the investigation then continued up until the start of construction works. Geophysical modelling in conjunction with a detailed borehole investigation indicated that although gypsum dissolution features are present within the site area these are generally present within the deep gypsum horizons. These ancient features took the form of either naturally filled or already collapsed "caves" within the gypsum horizons.

Present day collapses at ground level tend to occur where voids have formed beneath layers of intact rock which suddenly give way, or where pre-existing near-surface dissolution features with associated voids are reactivated.

The evidence from the ground investigation suggested that the strata overlying the gypsum bearing rocks were already highly brecciated and weathered. On this basis it was concluded that the risk of sudden catastrophic collapse is very low as the overlying strata has infilled any voids as they formed.

The extensive and detailed investigation carried out by GRM revealed only 1 existing dissolution hollow ("breccia pipe") that reached the near surface. This feature was filled with ancient glacial deposits.

The solutions.

The detailed investigations and risk assessments carried out by GRM allowed a recommendation to be made that the supermarket could be constructed using pad foundations in the relatively near-surface sand and gravel deposits. Without such an investigation it is likely that a much more expensive foundation solution would

have been required, as a precautionary measure.

A "no-build" zone was established around the single nearsurface dissolution feature present within the site area. This allowed the Client to make minor changes to the layout and design of the building, removing the need for more onerous foundation requirements.

Recommendations were made that the ground overlying this feature, now located within a road/car park area, was reinforced using a suitable geo-grid to mitigate against the effects of future ground movement.

CONCLUSIONS

A phased multi-disciplinary appraisal of the ground conditions beneath this site, that was previously perceived to be at a high risk from ground instability, allowed the Client to utilise a cost-effective foundation solution.

Land Appraisal | **Environmental** | **Geotechnical** | **Design** | **Mining** | **Inspections**

Please contact us for an informal discussion on how we can save both time and money on your development project:

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