



Geotechnical Investigations for Dams

Identifying needs

Understanding the ground you work on is the best way to reduce project risks and enable the design of reliable and cost effective infrastructure that performs as expected.

The geotechnical conditions encountered during excavation of a dam foundation can be the highest risk aspect of a project. Adverse ground conditions can have significant safety and cost implications both during construction and for ongoing operation and maintenance of the dam.

With a unique combination of science, experience, judgment and a passion for the diverse variability of ground conditions, GHD's geotechnical team provides clients with a complete understanding of the geotechnical needs for new or existing dam sites.

We offer a full range of geotechnical services to meet client needs including:

- Desk top studies, including literature reviews and aerial photograph interpretation
- Comprehensive site investigations, including:
 - Geological mapping and statistical fracture surveys
 - Diamond core drilling with oriented rock core and in-situ permeability testing
 - Geophysics, including optical and acoustic televiewer, gamma, seismic reflection and refraction, GPR, electromagnetics, resistivity, gravity and magnetics
 - Specialised in-situ testing, including CPTU, pressuremeter and borehole camera
- NATA accredited laboratory testing at our Artarmon and Morwell Offices

Solutions

Our geotechnical investigation results are assessed and assimilated to create a detailed geological model of the dam site. The geological model can be used to inform both dam design considerations and a range of key construction planning issues, including:

- Required depth of abutment stripping to expose a foundation with adequate stability, strength, stiffness and permeability characteristics
- Foundation excavation stability and slope stabilisation requirements
- Reuse of abutment excavation spoil
- Construction access and sequencing
- Construction resource evaluation, including concrete aggregates, earth and rock fill materials and filter sands

Benefits

With more than 180 geotechnical and geological professional and technical staff, we offer clients the knowledge and experience of one of Australasia's largest geotechnical teams, fully integrated with the diverse skill base of GHD as an international professional services company.

Experience

Supported by specialist software, in-house design aids and access to world-wide knowledge databases, the GHD Geotechnical team combines common sense and technological skills to develop creative solutions to problems big and small.

Some projects our geotechnical team has recently been involved in include:



Enlarged Cotter Dam – ACTEW Corporation Canberra, Australian Capital Territory (Winner of Engineering Excellence Award, 2009)

The Enlarged Cotter Dam comprises an 87m high, roller compacted concrete dam and is the third largest concrete gravity dam in Australia. Due to the steep abutment slopes, helicopters were required to lift drill rigs onto borehole locations and specialist rope access techniques were necessary to map outcrops. The investigation results created a detailed geological model of the dam site which in turn informed both dam design considerations and a range of key construction planning issues.



Sturt River Dam Safety Review – South Australian Water Corporation Flagstaff Hill, South Australia

Sturt River Dam was completed in 1966 and comprises a 41 metre high double curvature arch, with a total crest length of 107 metres. Geotechnical investigations included geological mapping, statistical fracture surveys, oriented cored boreholes, downhole geophysics, permeability testing and laboratory testing to define rockmass and rock defect parameters. The results obtained from geotechnical investigations enabled the compilation of a detailed geological model of the dam site.



Geotechnical Investigations for Western Australian Dams – Water Corporation of WA

Over several decades GHD has carried out numerous geotechnical investigations associated with new dams, dam upgrades and dam safety reviews for the Water Corporation. This includes planning through to detailed design and construction stages for Harvey Dam, a 54 metre high earthfill - earthcore rockfill embankment. Recent dam upgrades include embankment and spillway improvements at Wokalup, Logue Brook, Waroona, Serpentine and Samson Brook dams in central and south west of WA. In addition, GHD has carried out geotechnical investigations at Ord Dam, Moochalabra Dam and Kununurra Diversion Dam in the north west of WA.



Junction Dam Upgrade – AGL Bogong Alpine Village, Victoria

Junction Dam was completed in 1943 as part of the Kiewa Hydroelectric Scheme and is of a slab and buttress construction. Geotechnical investigations were undertaken to allow a better understanding of the dam foundations in preparation for mass concrete infilling of the dam. Geological mapping and compilation of historical records was undertaken to develop a geological model of the foundations. This model was then tested by geotechnical drilling which was undertaken within the dam utilising specialist compact equipment. Acoustic televiwer surveying was also undertaken in the boreholes. Seismic refraction surveys were then completed to provide further information on the depth of sediment requiring removal between the buttresses and the quality of the foundation rock.



Lake Manchester Dam Spillway Upgrade – Brisbane City Council Brisbane, Queensland

Lake Manchester Dam is a concrete gravity dam over 30m high and 188m long, which was originally completed in 1916. GHD were engaged to provide detailed design to upgrade the dam from 2006 to 2008 to bring the dam into alignment with current ANCOLD guidelines, as well as raising the dam to prevent overtopping. The upgrade included boreholes and geological mapping of the dam site to develop a 3D geological model in 12D of the dam to re-align the spillway away from a known fault in the left abutment at the existing spillway.

To touch base with the key person in your region, visit
www.ghd.com/dams

