

news

WINTER 2004

Douglas Partners Geotechnics • Environment • Groundwater

DP award for world's largest coal terminal

Douglas Partners involvement in the Stage 3 Expansion of Kooragang Coal Terminal for client Bechtel has been acknowledged at The Association of Consulting Engineers 2003 Awards for Excellence. The \$345 million project won a Gold Award of Merit.

Located on 160 hectares of land in the port of Newcastle NSW, the terminal first opened in 1984. The Stage 3 expansion has increased the terminal capacity to 89 mtpa, making it the world's largest coal handling facility.

on which it was undertaken at Kooragang which is unique. The mobilisation of 300,000 cubic metres of material created enormous logistical, materials sourcing and cost control challenges.

DP's contribution to the project included:

- Minimisation of costs through reuse of existing onsite materials
- Timely delivery of project, without interruption to existing continuous terminal operations
- Reduced amount of cement required to stabilise berm through use of crusher dust as an additive, and
- Improved risk management through extensive and comprehensive monitoring programme design and implementation.



Barry Neilsen (second from right) congratulates staff from DP Newcastle Office, from left; John Niland, Stephen Jones and Chris Bozinovski

The terminal site was originally formed by reclamation of a number of small islands, channels and shallows; and is characterised by soft alluvial soils and tributaries of the Hunter River. The prime geotechnical challenge was to develop a ground improvement programme which could meet design settlement tolerances for the new berm and reclaimer facilities within acceptable cost and time constraints.

The judges commented, "Douglas Partners demonstrated high standards of engineering excellence and innovation through the application of sophisticated testing techniques, analytical skills and outstanding judgement".

Contact: Stephen Jones
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Stage 2 of Preload at the Kooragang Coal Terminal Expansion

After evaluating various methods of ground improvement including vacuum consolidation, dynamic compaction and stone columns, preloading was selected as the most suitable technique. Although this is a widely used method of ground improvement it is the scale

STOP PRESS

Promotions announced at the 2004 DP Annual Technical Seminar were:

Principals:

Michael Broise, Melbourne;
John Lean, Sydney;
Alan Lee, Brisbane.

Senior Associate:

Glyn Eade, Melbourne

Associates:

Michael Gawn, Townsville; Nik Kontos, Wollongong; Scott McFarlane, Newcastle; Andrew Murphy, Melbourne; Julius Pucci, Sydney; Will Wright, Newcastle.

Industry Award for MD

Douglas Partners Managing Director, Dr Terry Wiesner has been honoured at the 2003 Annual Association of Consulting Engineers Australia (ACEA) Awards for Excellence presentation. Terry received the President's Award in recognition of his outstanding contribution to the ACEA over the past 13 years.

An active member of ACEA since 1991, Terry has served on various ACEA committees including acting as a liaison on geotechnical matters and encouraging the use of responsible environmental practices amongst ACEA members. Terry has recently been elected as Vice-Chairman of the NSW division of the ACEA.

Underground carpark risks managed

Redevelopment of a distinctive inner city Sydney site, impeded for many years by parking space limitations is now proceeding with the help of some innovative geotechnical risk management by DP engineers.

A multilevel retail/residential building is being built above the heritage listed Scots Church building, built in the 1920's, on the corner of Jamison and York Streets.

The solution to the parking problem involves a car-stacker excavation within an area measuring only 18m by 12m, to a depth of 27m. This will accommodate 116 cars directly beneath the existing church assembly area.

In 2002 developer Westpoint engaged DP to provide geotechnical advice on the feasibility and to manage potential geotechnical risks involved in implementing this parking solution.

Columns supporting the church floor slab had to be removed or underpinned to allow excavation for the proposed stacker. Two basic approaches were considered; 1) removal of the floor slab with



Early stage of car stacker excavation and service passageways

reinstatement of a new one at completion, or 2) removal of columns supporting the church floor, temporarily suspending the floor slab off beams supported by temporary columns founded on the edge of the excavation. The latter was chosen as the most viable option.

A critical issue for the car stacker excavation was the close proximity (3.5m to the inside face at the closest point) to the City Circle underground rail tunnel and former tram tunnels (now used as parking). Strict rules of allowable angular displacement are enforced by the Rail Infrastructure Corporation (RIC). Extensive 3-DEC (3 Dimensional Distinct Element)

modelling was undertaken to provide predictions of displacement and stresses at various stages of the excavation. When coupled with a sound knowledge of Hawkesbury Sandstone rock behaviour, this analysis enabled DP engineers to demonstrate an acceptable level of risk to all parties involved, including the RIC.

DP engineers also undertook investigations of existing footings to enable excavation and construction of new service ducts, water tanks, and fire escape passages through these footings. Innovative underpinning involved cutting through up to 50% of existing footings to allow for these excavations. This required a design and construct approach with close supervision by DP as the excavation progressed.

The development is progressing in accordance with DP's predictions with no major obstacles encountered to date.

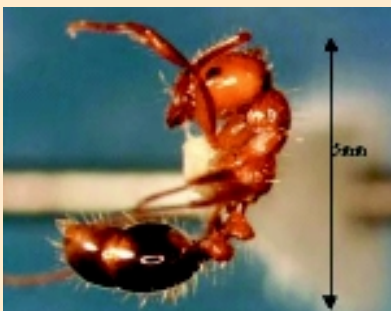
Client: Westpoint Ltd
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Enemy of the state

The Red Imported Fire Ant, discovered in the Brisbane area in February 2001, originates from the US and Northern South America and is thought to have entered Brisbane via shipping containers. Hard to distinguish from other common ants, Fire ants attack in large numbers and produce a painful sting.

The presence of these pests has changed procedures in carrying out geotechnical and environmental activities in the Brisbane area, particularly within major



infestation areas occurring on the eastern side of Brisbane (around the port area) and in Brisbane's western suburbs and parts of Ipswich.

The civil construction industry in particular requires vigilance when dealing with this problem due to the excavation and transportation of large volumes of soils from site to site. Transportation of infected soils will spread the occurrence of the pest making eradication even more difficult.

Field staff in DP Brisbane office have undergone training by the QLD Department of Primary Industries in awareness and recognition for fire ants. The Brisbane office has an approved Fire Ant Management Plan in place that allows sampling to be conducted within the Fire Ant Restriction Zones.

When undertaking investigations soil samples need to be double-bagged and

recognised ant-kill insecticide spread within the outer bag to kill any ants that exit the inner bag. Laboratory staff are notified whether a sample has been taken from within a fire ant area, and once testing has been completed the soil mass must be heated in an oven to 65°C to kill potential ants and/or eggs before disposal.

A planned eradication programme costing over \$130 million is currently underway in the Brisbane area, however, the outcome is still unknown.

DP Brisbane staff are familiar with all requirements for fire ants that affect construction operations, and can provide advice on this issue where required.

For more information contact:
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First Sychrotron in Australia



Artists Impression of the first Synchrotron Building in Australia

Smoother chocolate, better babies nappies, anti flu drugs and cleaner water. These are just some of the outcomes of research undertaken on the latest generation particle accelerators or Synchrotrons. Now instead of having to travel overseas, Australian researchers will soon have access to a local machine currently being built on a former drive in cinema site adjacent to Melbourne's Monash University – The first of its kind in Australia.

Working for structural engineers, Ove Arup and Partners, DP's Melbourne office have been involved since the early days of inception and site selection.

As Brian Ims, DP's project manager explained, "the major geotechnical issue associated with the Synchrotron is the tight movement tolerances of less than 10 mm over the storage ring's 216m circumference".

From previous work undertaken in the area and more than 40 years accumulation of site investigation data, DP were able to provide early insight into the suitability of the various sites being considered without the need to undertake invasive investigation work. Although as the choices narrowed, a preliminary investigation of the

ground conditions was undertaken to confirm the anticipated conditions.

Once the site had been selected, a more detailed investigation was undertaken using a variety of techniques including conventional boreholes and sampling, cone penetrometer testing and geophysical profiling to the underlying mudstone at some 20 m depth.

The results confirmed the suitability of the site with, in particular, the ability of the site to support the structure on a slab without the need for piles as has been the case for many Synchrotrons elsewhere in the world.

Careful attention is being paid during construction to minimisation of moisture changes in the subgrade, even to the extent of sealing exposed clays.

Client: Ove Arup & Partners
DP Project Manager: Brian Ims
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GEO-BITES

Cairns booming

DP Cairns has recently been involved in a significant number of new resort developments.

The developments located in the Cairns and Port Douglas areas, comprise multi-storey unit buildings over basement car parks. Generally being undertaken on low-lying coastal areas typically underlain by soft soils with a high water table, the developments have required geotechnical investigations to identify potential settlement problems due to soft ground conditions, or allow design of piles footings.

DP has also provided Acid Sulphate Soil Investigation and advice in areas where excavations for basement areas were required.

Gas pipeline completed

Woodside Energy's North West Shelf Trunkline System Expansion Project involved DP Perth engineers supervising the backfilling operations of the pipeline trench. The 30km section was completed in twelve 24-hour shifts, nine days prior to estimated completion time. Total project cost is estimated at \$800m.

Newcastle coalfields expand

The largest underground coal producer in NSW, Centennial Coal recently commissioned DP's Newcastle office to undertake site investigations at two underground colliery developments in the Newcastle Coalfield.

DP was engaged to determine the impact of subsurface conditions upon design, construction and long-term stability of the proposed declines for a new mine project at Mandalong Mine and also for a new access proposal being considered as part of the expansion of Newstan Colliery. Both declines will be over 1km in length and constructed to a grade of 1 to 8.

DP field investigations included geological mapping, core logging, point load testing, water pressure testing and down-hole geophysical logging.

Accelerated weathering tests were conducted to assess the potential for presence of expansive claystone in the strata, which can create excessive pressure on the roof support system and poor floor conditions.

Uniaxial Compressive Strength (UCS) tests were carried out in the laboratory and correlated with numerous point load tests. The UCS and point load tests carried out for the Newstan project were also correlated with downhole p-wave sonic logging. Acoustic televiewer logging was also carried out, the results of which will be used in rock-mass classification in addition to traditional rock-mass data. Results of the acoustic televiewer provide information in the orientation of discontinuities on the bore. This information cannot readily be obtained by other methods and is important for the ground support design, substantially adding to the value of drilling investigations.

Client: Centennial Coal
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