



### Education

*PhD Geomechanics,  
Monash University,  
Melbourne, 1988*

*MEng Geotechnical  
Engineering, Asian Institute  
of Technology, Bangkok,  
1979*

*BSc(Eng) Hons Civil,  
University of Ceylon, Sri  
Lanka, 1976*

### Affiliations

*Member, Australian  
Tunnelling Society*

*Standards Australia,  
Committee member,  
Geosynthetics*

*Registered Professional  
Engineer (RPEQ)*

*Member and Past Chair,  
Australian Geomechanics  
Society*

*Fellow, Institution of  
Engineers, Australia*

### Brisbane

#### **Principal Geotechnical Engineer**

Jay has been a practising civil engineer for over 35 years specialising in geotechnical engineering. Early part of his career was spent overseas before joining the Coffey Group in 1989. He is currently a Principal at Golder Associates. He has worked on numerous projects across Australia as well as in New Zealand, Indonesia and Singapore.

Jay has wide experience in major projects and has been involved in major ports, roads and highways, buildings and tunnels. He has been involved with the investigation, design and construction of several of the major highways in Brisbane including Pacific Motorway, Pacific Highway/SE Freeway, Logan Motorway, Port of Brisbane Motorway, Logan Duplication and the Northern Access Road Project in Brisbane as well as the Port Access Road and the Caldwell Road Project in Townsville. He led the Geotechnical Team for the A\$1.88 billion Gateway Upgrade Project, the largest infrastructure project by Queensland Transport at the time. He is currently providing technical direction and/or review services to the Woolgoolga to Ballina Portion B, Gateway Upgrade North, Kingsford Smith Drive Upgrade, Westconnex project and for the State Highway 16 project in New Zealand where a major highway on deep soft soils is being widened.

He was the Geotechnical Team Leader for the FPE Seawall project at the Port of Brisbane which consisted of the design and construction of a 4.6km seawall in the Moreton Bay and won several industry awards. He was the Project Director and Technical Leader for the Ground Improvement Trials conducted at the Port of Brisbane which won the Innovation Award at the 2010 Engineering Excellence Awards of the Institution of Engineers, Queensland. He has been assisting the Port of Brisbane as a reclamation and ground improvement specialist for the port expansion works over the last decade. In addition Jay has worked on numerous projects associated with the Port of Townsville, Port of Gladstone and Port of Botany. Jay also was the Geotechnical/ Reclamation specialist and lead designer for the proposed reclamation at the Port of Lyttelton in Christchurch, NZ. Jay also provided technical direction and was a Principal Reviewer for the New Priok Port Project in Jakarta.

He was a key member of the geotechnical team who was involved in the design of the Circle Line 3 metro project in Singapore which included five station boxes and cut & cover tunnel stretches and won an industry award for the underpinning of Bishan Depot. He also worked as the geotechnical consultant to several multi-million dollar tenders involving railway tunnels and stations, and DTSS tunnels in Singapore.

He has co-authored close to 50 technical papers on soft clay, reclamation and ground improvement and has presented in conferences in Australia, New Zealand and other international forums. Recently Springer Publishing Company published his first book on geotechnical engineering titled "Correlations of Soil and Rock properties in Geotechnical Engineering.

Jay is a Past Chair, Australian Geomechanics Society, Queensland Division and a member of the Australian Standards Committee for geosynthetics. He was the chair of the Working Group on the Australian Standard 8700 on Prefabricated Vertical Drains issued in 2011. He is also a visiting lecturer in Geotechnical Engineering at Queensland University of Technology, Brisbane.



## **Employment History**

### **Golder Associates – Brisbane and Sydney**

*Principal (2015 to Present)*

### **Coffey Geotechnics – Brisbane and Sydney**

*Senior Engineer to Senior Principal (1989 to 2015)*

Responsible for providing technical leadership to the geotechnical group in all geotechnical projects. Mostly involved with road projects, soft clay and ground improvement, ports and land reclamation. Geotechnical team leader for major civil engineering road and port projects.

### **National Building Research Organisation - Sri Lanka – Colombo, Sri Lanka**

*Senior Geotechnical Engineer (1986 to 1989)*

Ground investigations and a variety of projects including residential and commercial developments. Led a UNDP sponsored applied research project on appropriate foundations for low cost housing in low lying marshy areas, and behaviour of peat.

### **Monash University and Footscray Institute of Technology – Melbourne**

*Research student and part-time tutor (1981 to 1985)*

Carried out research for the PhD degree and worked as a part time/casual tutor in soil mechanics, mathematics, structures and applied mechanics

### **Central Engineering Consultancy Bureau – Sri Lanka**

*Project Engineer (1979 to 1980)*

Project engineer attached to the Bowatenna Power Project office. Structural design of foundations for the Switchyard and the Mahaweli Cultural centre.

### **Ceylon Development Engineering Pty Ltd (CDE) – Bowatenna, Sri Lanka**

*Site Engineer (1977)*

Site Engineer at the Bowatenna power plant and tunnel site.

### **Asian Institute of Technology (AIT) – Bangkok**

*Postgraduate research student (1977 to 1979)*

Postgraduate student in geotechnical engineering. Casual research assistant in the AIT Library Geotechnical database project and Bangkok traffic management research project

### **University of Ceylon – Peradeniya, Sri Lanka**

*Assistant Lecturer (1976)*

Assistant lecturer affiliated to the Soil Mechanics group. Tutor/lecturer for structures, applied mechanics, surveying, rock mechanics.



## **PROJECT EXPERIENCE – ROADS AND HIGHWAYS**

### **Gateway Duplication Project**

Brisbane, Queensland,  
Australia

Geotechnical Team Leader for the successful tender and Geotechnical Project Manager for the preliminary phase of the detailed design under the Contractor, Leighton-Abi Group JV. The \$1.88 billion project was the largest infrastructure project handled by Queensland Transport at the time. The project was 20km in length with significant issues dealing with soft soils as deep as 30m, 34 bridges and the duplication of the main Gateway Bridge across the Brisbane River. Ground improvement techniques employed for the Project included soil displacement, replacement, lightweight fill, preloading, wick drains, geotextiles, piled embankments, piled rafts, dynamic replacement and controlled modulus columns.

### **Woolgoolga to Ballina Portion B**

NSW, Australia

Principal reviewer for the Portion B of the Woolgoolga to Ballina Project. Portion B is 28km long, with 11km of soft soils in the floodplain of the Clarence River. The site conditions dictate major design and construction issues including staging of construction and keeping the main highway open all the time. The latter requires extensive temporary roads which later gets attached to the local road network.

### **Gateway Upgrade North (GUN)**

Brisbane, Queensland,  
Australia

Geotechnical Team Leader for the tender prepared by Leighton Contractors. Currently acts as a geotechnical reviewer during the detailed design and construction. The project involves the widening the highway from 4 to 6 lanes; to be built on areas underlain with soft soils. The construction is to be carried out adjacent to the existing operating motorway (M1), where traffic is expected to be heavy. The works include embankment widening and median upgrading, with many culverts and bridge crossings. Surcharging and wick drains adopted as the main ground improvement method.

### **Gold Coast Light Rail**

Gold Coast, Queensland  
Australia

The 7.3km route runs from Helensvale heavy rail station adjacent to the Gold Coast Line, then adjacent to the Smith Street Motorway to connect with Stage 1 at the Gold Coast University Hospital light rail station. The project includes 3 new stations, a new 1000 car space park 'n' ride facility at Parkwood station and a 400 space expansion of the existing park 'n' ride facility at Helensvale station. The alignment runs alongside a major highway over a long length and requires major retaining walls and temporary works as the construction needs to progress without affecting traffic. Acts as the Principal Geotechnical Reviewer for the project.

### **Port of Brisbane Motorway**

Lytton to Fisherman  
Islands, Queensland

Geotechnical Team Leader from initial stage to detailed design stage for the \$120m Port of Brisbane Motorway Alliance Project with the Contractor Leighton. The project was completed in 2002. Led the geotechnical team and was responsible for geotechnical investigations, design and analysis, geotechnical instrumentation and construction advice on earthworks. The Motorway passes through variable ground conditions including up to 30m deep soft to firm alluvial clays. Embankments rise up to 28m and use of borrow materials and earthworks were important considerations. One of the major challenges was the design of embankments to control settlements and construction within one year without resorting to costly ground improvement work. The project was successfully completed saving the Alliance significant time and money and was awarded several industry awards for geotechnical design, construction and environmental performance.



**Kingsford Smith Drive  
Upgrade (KSD)**  
Brisbane, Queensland,  
Australia

Reviewer of soft soil design and ground improvement for the tender design work for the Contractor, BMD/Leighton JV. KS) and currently acting as the reviewer for the project to be constructed by Lend Lease. KSD is a major road linking Brisbane CBD to the Brisbane Airport, Port of Brisbane, Northshore Hamilton and the Australia TradeCoast area. KSD Project (Stages 2 & 3) involves the upgrade of KSD between Theodore Street and Breakfast Creek Road, approximately 3.5km in length, including widening from 4 to 6 lanes carriageway with improved public facilities. The project (~\$650m) and is funded by the Brisbane City Council (BCC).

**Highway Duplication**  
Mingela, Northern  
Queensland, Australia

The duplication underwent distress within two weeks of opening to traffic over a length of 5km. Investigations involved Benkelman beam testing, shallow auger holes and laboratory testing. The causes for distress were ascertained and remedial works carried out.

**Cardwell Range  
Realignment**  
North Queensland,  
Australia

Geotechnical reviewer for the upgrade of 4km of Bruce Highway between Townsville and Cairns. This \$120 million Alliance (sub-contracted to the lead contractor Abigroup) project involved geotechnical delivery of design packages for 4 bridges, 5 retaining walls, pavements, earthworks, a deep cutting and temporary works.

**North South Bypass  
Tunnel Project (NSBT)**  
Brisbane, Queensland,  
Australia

Key member of the Geotechnical Team who provided advice on soft clay and ground improvement to Thiess- John Holland Joint Venture during the tender design. The tunnel passes under the Brisbane River, through weathered to fresh rock and residual soils but the road extension is on embankments located on soft soils. Ground improved proposed included surcharging with wick drains and piled embankments.

**Port of Brisbane  
Motorway Upgrade**  
Brisbane, Queensland,  
Australia

Principal Geotechnical Reviewer during the tender phase for the \$150m Project for Leighton Contractors, one of the two joint ventures selected for the double Early Contractor Involvement (dECI) Process. Project included soft soils deeper than 25m and associated ground improvement, bridge structures and culverts, noise wall foundations etc.

**Northern Access Road  
Project (NARP)**  
Brisbane, Queensland,  
Australia

NARP refers to the road linking the new Gateway Upgrade Project to the Brisbane Domestic Airport. The project consisted of the design and construction of about a 4km long road over soft soils as deep as 25m, 4 bridges including a bridge with 11 spans, several retaining structures, pavements and tight limits on post construction settlements and grade changes. The whole length of the alignment needed ground improvement with preloading, wick drains, piled embankments and controlled modulus columns considered. Acted as the Principal reviewer for the project including soft soil and ground improvement designs, retaining structures, bridges and construction techniques.

**State Highway 16 -  
SH16 Causeway  
Upgrade Project**  
Auckland, NZ

The project which is currently under construction involves the widening and upgrading of a 4.2km long motorway which runs across the Bay. It is built on soft marine sediments without ground improvement and therefore continuously settle. Widening against an existing settling embankment with the widening lanes merging in and out of the existing lanes was a significant challenge. Clever use of wick drains for the widening and lightweight fill materials for the raising of the existing were adopted but required detailed analysis and instrumentation to ensure grade changes across the cross sections are maintained. Geotechnical input was critical for this complex project which was undertaken by an Alliance with the Contractor being Fulton Hogan and Leighton, a joint venture. Provided technical direction and acted as a Principal Reviewer for the geotechnical work. Acted as the team leader during a critical design phase of the project.



**Bruce Highway**  
Gympie to Maryborough,  
Queensland, Australia

Assessment of pavement conditions using site investigations and deflection testing and recommendations on remedial measures and upgrading including options such as deep lift asphalt and foam bitumen stabilisation.

**Logan Motorway Duplication**  
Brisbane, Queensland,  
Australia

Provision of advice to design and construction tender, geotechnical investigations for earthworks and structures, advice on embankments and cuttings, recommendations on bridge foundations and effects of groundwater on construction.

**Pavement Distress, Various Sites**  
Queensland and  
northern NSW, Australia

Site investigation, Benkelman Beam Deflection testing and interpretation, and assessment of causes of distress to road pavements and recommendations on remedial measures. Some of the projects include Barkly Highway, Logan Motorway, SE Freeway and Council areas of Logan City, Brisbane City and Pine Rivers Shire.

**Inner City Bypass**  
Brisbane, Australia

Provided geotechnical advice on pavement materials and was the internal peer reviewer for selected pavement designs.

**Kwinana Freeway**  
Western Australia

Collation of geotechnical investigation results and production of a geotechnical report, geotechnical advice on remedial measures for unsuitable subgrades and advice on drainage requirements for pavements.

**Pacific Motorway – Mudgeeraba**  
SE Queensland,  
Australia

Principal Reviewer for bridge and embankment widening for a 1km section of the Pacific Motorway over soft ground including bridge approaches, where lightweight fill was innovatively used to omit the need for preloading thus allowing the rapid completion of construction.

**Ipswich Logan Motorway Interchange Upgrade**  
Brisbane, Queensland,  
Australia

Geotechnical Reviewer for the A\$255m interchange upgrade project in the west of Brisbane.

**Pacific Highway Upgrade**  
Brisbane, Queensland,  
Australia

Provision of geotechnical advice for the A\$ 50 million project including evaluation of existing pavements using non-destructive testing methods and field investigations and advice on rehabilitation, pavement designs for new pavements, advice on cut batters, borrow materials and drainage measures for the widening. Liaison with Queensland Main Roads officers and provision of alternative cost effective designs for construction.

**Pacific Motorway, Yatala and Nerang**  
Queensland, Australia

Provided advice to two packages of the Pacific Motorway, constructed by John Holland Group and Leighton Contractors. The cost of the project was greater than A\$200m. Provided advice on pavements, construction difficulties, effects of piling on nearby structures, stability of cuts and embankments, fill materials, and groundwater seepage.

**UNDP Training Project**  
Sri Lanka

UNDP sponsored training program to train engineers and technicians in Sri Lanka. At the invitation of UNDP, conducted a 5 week training program in 1996 for engineers and technicians involved in the 50km long Colombo-Katunayake expressway proposed over marshy areas overlying up to 10m thick peat deposits. Training included project management, field investigations, laboratory testing and analysis, and design.





**Osprey Drive  
Extension/part of Port  
Drive Upgrade**  
Lytton, Australia

Port of Brisbane is planning to upgrade Port Drive between the end of the Port of Brisbane Motorway at Pritchard Street to the Captain Bishop Bridge at Port of Brisbane. The proposed upgrade works are to be carried out in several stages and new connection road between Osprey Drive and Tanker Street was earmarked to be part of the Early Works of the project. Geotechnical investigations including borehole, piezocone tests, test pits, and geotechnical and ASS laboratory tests were carried out. Targeted investigations and detailed assessment of test results allowed the confirmation that ground improvement was not required. Provided technical direction and acted as the Principal Reviewer.

**Port Drive Additional  
Investigation**  
Lytton to Fisherman  
Islands, Australia

Port of Brisbane is planning to upgrade Port Drive from the end of the Port of Brisbane Motorway (PoBM) at Pritchard Street to the Captain Bishop Bridge, and subsequently to Lucinda Drive near Whimbrel Street at Port of Brisbane. A geotechnical investigation was undertaken to fill in the gaps in the geotechnical information available along the alignment. The geotechnical investigation included boreholes, test pits, pavement auger holes, piezocone tests, dissipation and vane shear tests, and supplemented with geotechnical and ASS laboratory testing on the samples. The investigation was successfully carried out in adjacent to live traffic and completed on schedule. Provided technical direction and acted as the Principal Reviewer.

**Kite Street Overpass**  
Lytton, Queensland,  
Australia

Geotechnical investigations were carried out at Kite Street intersection on Port Drive to facilitate a concept design for a proposed seven-span bridge structure at the intersection. Geotechnical investigation including boreholes, piezocone tests, test pits, dynamic cone penetrometer tests and geotechnical and ASS laboratory tests were carried out. A geotechnical interpretive report was submitted as part of the works, which includes recommended geotechnical design parameters for retaining walls and piles, ground improvement concept designs, pile capacities, pile testing and acceptance criteria, recommendations on embankment stability, pavement design and construction control. Provided technical direction and acted as the Principal Reviewer.

**Cairns Bruce Highway  
Upgrade**  
North Queensland,  
Australia

Was involved with BMD AbiGroup JV (successful consortium) in the double early contractor involvement (ECI) tender, the first phase of the proposed Cairns Southern Access Road upgrade. The project consisted of the design and construction of a 1.5km long road with up to about 20% of the alignment over soft soils, 3 road overpasses, 1 pedestrian bridge and several retaining structures. The soft soil section needed innovative designs to overcome stability and tight limits on post construction settlement and grade changes. High water table and artesian conditions were expected and had to be designed against. The geotechnical team was also involved in the design of bridge piles and a 30m high cutting. Acted as the Principal Reviewer for the geotechnical component.



### PROJECT EXPERIENCE – GEOTECHNICAL ENGINEERING

**Mainline Upgrade,  
Meadvale Deviation**  
Queensland, Australia

Site investigation and design advice on embankments, excavation conditions, cut stability, suitability of materials for earthworks and foundation design parameters for various bridges.

**Newlands Coal Mine**  
North Queensland,  
Australia

In collaboration with University of Sydney, an analytical and numerical study was carried out to assess the significance of stress distributions around roadway openings in the Newlands Coal Mine. Finite Element analysis in conjunction with analysis developed on structural theory was used for the study.

**The Outlook Estate**  
Worongary, SE  
Queensland, Australia

Site investigation and design and construction advice for a large residential subdivision in steep terrain including recommendations on earthworks, excavation conditions, cut/fill batter stability, groundwater control, earthworks specifications and construction supervision of the estate including the design and construction control of up to 12m high boulder walls.

**Townsville Hospital**  
Townsville, North  
Queensland, Australia

Geotechnical Team Leader for the new Townsville Hospital. A difficult site where the ground conditions were complex and therefore significant risks to construction and therefore possible variation claims from the contractor. Responsible for liaising with the client and contractor to minimize costs and penalties, design of deep cuts in dyke territory including design of supports using soil nails and anchors, design of foundations sensitive to settlements, design of permanent retaining walls and other construction advice.

**Foundation Advice**  
various Sites,  
Queensland, Australia

Design of shallow and deep foundations, earthworks specifications, advice on cuts and stability, excavations and retention

**Lihir Gold Mine**  
Lihir, PNG

Provision of advice on the Geotechnical model and Reviewer. The project involved the design of a coffer dam in the sea with water depths up to 50m and complications due to geothermal activities, liquefaction and landslide issues.

**Wivenhoe Dam  
Upgrade**  
Wivenhoe, Queensland,  
Australia

Geotechnical Design Manager and member of Alliance Leadership Team. Responsible for all geotechnical outcomes, value management and liaison with the Management Team and members of other disciplines.

**Sun Metals Refinery**  
Townsville, North  
Queensland, Australia

Provided advice on geotechnical parameters for the design of foundations, design of piles totalling more than 1500, numerical analysis of sensitive footings and their effects on nearby structures, supervision and training of site personnel on pile installation, provision of earthworks specifications and construction supervision using Coffey personnel, advice on groundwater control in deep cuttings.

**ESCAP Groundwater  
Modelling Workshop**  
Bangkok, Thailand

ESCAP sponsored Workshop on Numerical Methods In Groundwater Modelling held in Bangkok, Thailand. Conducted a two week long workshop for representatives of 10 Asian countries on numerical methods including application to selected problems.

**Fern Bay residential  
Development**  
Fern Bay, NSW,  
Australia

A groundwater study was carried out to assess the likely effects on the regional groundwater table due to proposed residential development at the site.



<b>Oaklands Mine</b> Oaklands, Victoria, Australia	Numerical groundwater modelling study for an 8km <sup>2</sup> mine to assess mine dewatering requirements and reinjection of excess water to a borefield 10km north. The numerical study was carried out to assess the effect on the regional groundwater system due to likely high dewatering rates (in excess of 100 ML/d) and the preliminary design of reinjection wells. The Finite Element model extended 100km in length.
<b>Mineral Sands Development</b> Horsham, Victoria, Australia	Groundwater modelling study carried out for the proposed mineral sands mining development at Horsham. The proposed mine will involve the use of a floating dredge and operation of a large scale water supply borefield. Developing a hydrogeological model for the region, effects of mining operations on the existing groundwater regime and salinisation within the study area were assessed.
<b>Queensland Magnesite Project</b> Kuwarara, Queensland, Australia	Numerical groundwater modelling to assess the effects of mine dewatering and injection on the groundwater system. Cases studied included steady state and transient analyses of mining with partial and full dewatering for the life of the mine.
<b>Sand Quarry</b> Calga, NSW, Australia	A numerical groundwater study was conducted for the Calga Sand Quarry to assess the effect of quarrying on the groundwater regime. The finite element plan model consisted of a single unconfined aquifer unit within part of the study area. Quarrying was simulated in stages after calibration against observed groundwater levels.
<b>Groundwater Analysis</b> Chowilla, Australia	Finite element groundwater analysis of the Chowilla flood plain. To investigate groundwater interception and enhanced flooding options a numerical groundwater model was constructed and calibrated against observed behaviour. The effects of infiltration and evapotranspiration were included in the analysis.
<b>Destination Bay Resort</b> Kurnell, Australia	A numerical groundwater model was developed to assess the effects of Destination Bay Resort Development on the hydrogeological system using the demands assessed from water balance studies. The study assessed the effects of the development on regional groundwater levels, system response to low and high rainfall events, the available long- term groundwater yield to provide irrigation water to the project and the movement of the coastal salt water/fresh water interface as a result of the development.
<b>UNDP</b> Sri Lanka	UNDP sponsored project to set up Quality Assurance procedures and train local engineers in Sri Lanka. In 1998 visited National Building Research Organisation in Sri Lanka to initiate a quality certification process and documentation of quality procedures. Included the training of personnel on quality control and quality assurance procedures.
<b>Groundwater Study</b> Ewington, Western Australia, Australia	independent review was carried out on the groundwater study of the proposed open cut mine in Western Australia
<b>Ballera Gas Project</b> Ballera, Australia	Geotechnical Team Leader for plant site investigations and construction materials search for the Ballera Gas Project including design advice for shallow and pier footings, ground anchors and construction.
<b>Remediation of RSS wall</b> Weipa, North Queensland, Australia	Assessment of causes of distress to a 13m high RE wall including numerical analysis using FLAC software program, advice on remedial measures and monitoring of remedial measures. “





<b>Remediation of rail embankment</b> Iveragh, North Queensland, Australia	Assessment of causes of distress in a railway embankment along a 5km stretch including several culverts and advice on remedial measures to be carried out with minimum disruption to train services.
<b>Dock Side</b> South Bank, Brisbane, Australia	Site investigation and geotechnical recommendations on shallow and deep footings and other construction constraints for a high-rise apartment building in the Southbank.
<b>RAAF Base, Scherger</b> North Queensland, Australia	Assessment of causes of distress to several RE walls in Scherger and advice on remedial measures.
<b>Industrial Plants</b> SW of Brisbane, Australia	Site investigations and recommendations on industrial plant foundations, construction methods and pavement designs for the hardstand areas.
<b>South East Freeway</b> SE Queensland, Australia	Pavement distress investigation of a newly constructed pavement over a length of about 2km. Assessment of causes of distress based on test pitting, deflection testing and laboratory testing, and advice on remedial measures.
<b>Mine Infrastructure</b> Queensland, Australia	Site investigations, design advice on shallow and deep foundations for mine infrastructure, advice on borrow materials and other construction issues
<b>Excavation adjoining Heritage listed bridge</b> Brisbane, Australia	Numerical analysis of an excavation adjacent to a heritage listed bridge to assess the effects of excavation in residual soils and weathered, jointed rock for Leighton Contractors.
<b>Excavation induced distress</b> Stafford, SE Queensland, Australia	Field and laboratory investigations, FLAC analysis and groundwater modelling carried out to assess the influence of excavation for a shop building on the adjacent property which had undergone distress.
<b>Airport public and staff Car Park Improvement</b> Brisbane Airport, Australia	BAC has opted to develop the proposed CPA Staff car park in stages. Earthworks for Stages 1 and 2 have already been completed and civil works have just commenced. Coffey was initially contracted by BAC to carry out ground improvement designs review carried out by others for the proposed Stage 3 and 4 of the car park development which was located in a vacant low lying area in the Banksia Place precinct of Brisbane Airport. Later, BAC engaged Coffey to carry out detailed ground improvement designs including IFC drawings and project earthwork specifications. Is the Principal reviewer.
<b>Airport Industrial park</b> Brisbane Airport Vicinity, Australia	BAC proposed to develop a part of Airport Industrial Park at the NE corner of the intersection of Boronia Road and Lomandra Drive. The proposed development work was referred as "Stage 1A" and consists of 4 lots; namely Lot 1 (5ha), Lot 2 (3.4ha), Lot 3 (1.6ha) and Lot 4 (13.3ha). Brisbane Airport Corporation (BAC) awarded the civil design contract to OPUS International Consultant Pty Ltd (OPUS) and Coffey Geotechnics Pty Ltd (Coffey) as the preferred geotechnical designer. Coffey carried out ground improvement design and provided project earthwork drawings and specifications. We are currently providing Level 1 earthwork supervision for surcharge construction. Is the Principal reviewer.
<b>Brisbane International Airport</b> SE Queensland, Australia	Risk assessment of settlements of the airport and taxiway areas underlain by up to 30m deep soft compressible clays. This assessment was critical for the proposed development because excessive settlements would have made the maintenance of aprons very difficult and rehabilitation expensive.



**Tingira Street  
Development**  
Pinkenba, SE  
Queensland, Australia

Two adjoining sites to be developed are underlain by deep soft, compressible clay. Preliminary investigations were conducted using boreholes and Cone Penetrometer tests as well as laboratory tests on undisturbed samples collected from the field investigation. As the settlements expected under the development loads exceed 1.5m, surcharging with wick drains were proposed.

**UNDP Project on  
Foundations**  
Sri Lanka

UNDP sponsored project on Appropriate Foundations For Low Lying Areas Of Colombo. Team leader accountable to both UNDP and the Sri Lankan Government. The team comprised two senior engineers, five junior engineers and technical support staff. The objective of the research project was to evolve appropriate foundation types and guidelines for construction for low cost housing in low lying marshy areas. Responsibilities included budget preparation, planning and management, analysis and dissemination of findings to UNDP, Sri Lankan Government and the civil engineering fraternity.

**BP Refinery**  
Bulwer Island, SE  
Queensland, Australia

Site investigation and design of shallow and deep footings and advice on ground improvement for several large storage tanks, buildings and other infrastructure in an area underlain by up to 40m of interlayered soft clays and loose sands. Development of earthworks specifications and construction supervision.

**Burleigh Waters estate**  
Gold Coast, SE  
Queensland, Australia

Burleigh Waters Estate Development is located in the Gold Coast where deep, meandering alluvial channels with marine clays occur to 20m depth. Work included site investigation, settlement assessment and preload designs including advice on ground improvement to remove in-service settlements, construction advice to overcome marshy conditions and materials handling.

**Brisbane Airport  
vicinity**  
SE Queensland,  
Australia

On behalf of Port of Brisbane Corporation, carried out a study for the Brisbane Airport Corporation (BAC) to provide advice on land development in an area where dredged mud from the Brisbane River has been placed. As the area is earmarked for hangars and aircraft pavements, one of the issues for the BAC was the effects on the heavy duty pavements.

**Land Disposal at Hay  
Point**  
SE Queensland

Preliminary advice on placement methods of dredge spoil, compaction and future suitability of the placed dredge spoil for development and surcharge management.

**Burleigh Cove  
Development**  
Gold Coast, SE  
Queensland, Australia

Burleigh Cove Development consists of about 500 residential allotments and townhouses spread over a 70 hectare area surrounding an artificial lake. It is underlain by deep deposits of soft clays and therefore the ground was improved using preloading techniques. Design and construction advice was provided from feasibility stage until completion. Advice on ground improvement, stability of canal batters especially during construction, advice on the effects of preloading on surrounding services and structures using numerical analysis and provision of construction supervision.

**Industrial Park**  
Brisbane Airport area,  
SE Queensland,  
Australia

Acted as the Principal Reviewer for the project involving the development of 25ha of land underlain by soft clay to be improved for future industrial development. The project also required optimisation of construction period and surcharge design such that most of amount of land can be developed under a limited budget over a limited period of time.

**University Hospital  
Development**  
Sunshine Coast,  
Queensland, Australia

Technical Director and Principal Reviewer. The site was located in a marine environment filled with dredged material overlying soft soil interbedded with indurated sand. Advice was provided on ground improvement to limit post construction settlement.



<b>Newport Waterways</b> Newport, Queensland, Australia	Stability analysis and provision of construction advice on lake edge allotments including preloading for a large canal development.
<b>land Fill</b> Footscray, Victoria, Australia	A secure landfill, to hold about 200,000m <sup>3</sup> of contaminated soil, within a clay and geomembrane lined earth cell, was proposed at a site underlain by soft alluvial soils adjacent to a river. An assessment of likely settlements and stability problems during and after construction and their consequences was carried out.
<b>Coal Mine Water Management Study</b> Lemington, Australia	Water management study carried out to ensure adequate water is stored for open cut operations, design of tailings dams, storage and silting ponds in the Lemington Coal Mine.
<b>Stuart South Oil Shale Mine</b> Queensland, Australia	Water management study conducted for the Stuart Oil Shale Mine. Water balance studies were carried out during and after mine operations for average conditions and various rainfall events so that adequate measures could be designed for satisfactory water management. Work also included locating and sizing of pipes, surface drains and sedimentation ponds.
<b>Coal Mine Water Mangement</b> Griffin Coal Mine, Australia	Parametric Investigation Of Stability And Stabilising Techniques For The Griffin Coal Mine Using Computer Slope Stability Methods.
<b>Pile Driving</b> SE Queensland, Australia	Assessment of effects of pile driving on several construction sites in and around Brisbane.
<b>Sandy Creek</b> SE Queensland, Australia	Investigation and assessment of distress to the canal slopes, assessment of groundwater control measures and an independent review of the proposed design.
<b>Tailings Dams at Leyshon Gold Mine</b> Australia	Detailed stability assessments were carried out for the proposed tailings dams at Mt Leyshon Gold Mine. The sensitivity of parameters and the effect of earthquake loading were also checked as part of the brief.
<b>Residential estates</b> Queensland, Australia	Investigation, foundation advice, construction overview and advice on construction issues in several large residential estates in and around Brisbane.
<b>Escarpment Instability</b> Australia	Numerical studies were carried out to assess escarpment instability associated with mining subsidence adjacent to cliff lines. A non-linear jointed model was analysed incorporating horizontally bedded joints and a vertical joint set.
<b>Paper Mill</b> Tumut, NSW, Australia	Analysis and design of shallow and deep footings for settlement sensitive structures, assessment of interaction, design advice on retaining walls and pavements for a paper mill at Tumut.
<b>Freight Terminal</b> Accacia Ridge, SE Queensland, Australia	Site investigation, plate load testing and analyses, and provision of design recommendations on heavy duty and flexible pavements.
<b>Assessment of Quarry Products</b> Logan City, SE Queensland, Australia	Assessment of Bega Road quarry gravels for highway construction. An assessment was carried out on the conditions of pavements constructed using Bega Road gravels including deflection testing and analysis of field and laboratory testing.



**Highway Interchanges**  
NSW and Queensland,  
Australia

Geotechnical studies including the assessment of subgrade conditions, design advice on embankment materials, batters and settlements, geotechnical advice on cut slopes, and pavement design recommendations for several major interchanges.

**Container Terminal**  
Port of Brisbane,  
Australia

Review of pavement distress studies undertaken at a container terminal and design studies for a new heavy duty pavement.

**Toyota Complex**  
Accacia Ridge, Australia

Pavement evaluation study to assess the causes of distress of industrial premises and advise remedial measures.

**Industrial Plant**  
Rocklea, SE  
Queensland, Australia

Site investigations and recommendations on industrial plant foundations, construction methods and pavement designs for the hardstand areas, specifications for construction and construction overview.

**Pavement design**  
Various sites in NSW,  
Australia

Pavement designs for residential estates, major roads and highways in Northern New South Wales.

**Freight Terminal**  
Accacia Ridge, Australia

Site investigation, plate load testing and analyses, and provision of design recommendations on heavy duty and flexible pavements.

**Ampol Refineries**  
Lytton, SE Queensland,  
Australia

Provided advice on the design and construction of foundations for storage tanks and other infrastructure in an area of alluvial compressible clay. Compiled tender drawings and specifications, carried out tender evaluation and construction monitoring, and provided on site advice



## PROJECT EXPERIENCE – DEEP EXCAVATIONS AND TUNNELLING

**Cirle Line 3**  
Bartley to Marymount,  
Singapore

The project involves the construction of 5 underground stations and a 6km long tunnel and estimated to cost more than 300million dollars. The twin tunnels pass through difficult ground conditions including marine clays, fluvial sands and encounter mixed face conditions. The alignment passes through residential areas and the geotechnical team had to deal with the effects of tunnelling on buildings, pile foundation interception, underpinning where foundation capacity is reduced, and protective works where tunnelling effects are severe. Responsible for liaising with our counterparts in the client organization, attendance at meetings with government officials, route alignment changes to minimize tunnel effects and therefore costs and social impacts, the assessment of buildings due to tunnel/station excavations and the analysis and reporting on underpinning, protective works and instrumentation for the whole project.

**Airport Link**  
Brisbane, Australia

The \$4.2billion project between Kedron and Toombul involves a tunnel and cut & cover excavations in variable ground including soft soils. Geotechnical consultant for temporary works associated with cut and cover tunnels including the design of temporary retaining walls, piling platforms and foundations. Acted as the Reviewer.

**Expressway from  
Dhoby Ghout to  
Millennia**  
Singapore

Geotechnical Team Leader in the initial stages of a tender for the above project in Singapore for Penta Ocean (Japanese Contractor). The project (estimated cost \$300m) included cut and cover tunnels and bored tunnels, and 4 stations. Ground conditions were variable from alluvial deposits to weathered rock of the Jurong Formation.

Work involved an assessment of ground conditions, settlement assessments, preliminary advice on suitable construction methods and equipment and preliminary advice on effects on adjacent buildings.

**Paya Lebar Tunnel**  
Singapore

Geotechnical Team Leader for Shimuzu (Japanese Tenderer) for the 6km long Paya Lebar Tunnel (DTSS) and associated Works (Estimated cost \$100m) tender. The tunnel passes through variable ground conditions including soft clays, loose sands and peat. Work involved the compilation of a geotechnical interpretative report, assessment of ground settlement, construction effects on existing structures and remedial measures, instrumentation and monitoring programme, and the design of groundwater recharge systems.

**Marina Line 824**  
singapore

Geotechnical Team Leader for Impregilo (Italian Contractor) tender for the Marina Line 824 passing through mainly Kallang alluvial soils and marine deposits. The project (estimated cost \$300m) includes a cut and cover tunnel and a bored tunnel across the river, and two cut and cover stations. Working with design team members from structural/architectural/electro-mechanical fields provided geotechnical advice for ground improvement including jet grouting, support methods, construction difficulties in difficult ground conditions.

**Excavation adjacent to  
Heritage Building**  
Adelaide, Australia

Numerical analysis using FLAC was carried out to study the displacements and strains associated with a sheet-piled excavation adjacent to a heritage building and assess anchor support requirements to control the effects of excavation.





<b>Park Street Car Park and Rail Tunnel</b> Sydney	Finite element analysis was carried out to study the effects of stress redistribution and assess the feasibility of an excavation of a proposed carpark and tunnel in Park Street, Sydney. The proposed excavation was about 40m deep and approximately 29m wide by 172m long. The effects of excavation on nearby high-rise buildings, especially the basements and the effectiveness of ground support systems were analysed.
<b>York Lane Tunnel</b> Sydney, Australia	To enable construction of the 3rd runway at the Sydney Airport, the existing Mill Stream was scheduled to be diverted. The complex soil profiles, dredging operations and the complicated construction sequence of sheet pile walls required numerical analysis using WALLAP and FLAC modelling
<b>Mill Stream Diversion</b> Sydney, Australia	To enable construction of the 3rd runway at the Sydney Airport, the existing Mill Stream was scheduled to be diverted. The complex soil profiles, dredging operations and the complicated construction sequence of sheet pile walls required numerical analysis using WALLAP and FLAC modelling
<b>Opera House Underground Carpark</b> Bennelong Point, Sydney, Australia	Studies carried out in collaboration with Sydney University to establish the primary support system for the 18m span, 12 storey deep underground carpark. Finite Element Method was used to simulate excavation sequence and support placement. Was also involved with instrumentation to monitor movements and effects of vibration.
<b>Barangaroo South</b> <b>Sydney, Australia</b>	An independent geotechnical review of alternative options for retention systems for the project was carried out as requested by the Developer.



## **PROJECT EXPERIENCE – PORTS AND MARINE**

<b>Plasterboard Plant</b> Port of Bundaberg, Australia	A plasterboard plant and a conveyor structure are proposed to be constructed at Port of Bundaberg. The site is underlain by soft compressible clay. Ground improvement proposed included surcharging and wick drains. Cost estimates for several ground improvement methods were provided. Acted as the geotechnical reviewer and provided technical direction for ground improvement and pile design.
<b>Port Headland - Reclamation Ponds</b> Western Australia, Australia	Project Director and Principal Reviewer for rehabilitation concept designs using several types of ground improvement methods ranging from preloading to controlled modulus columns and cost estimates for the development of reclamation ponds containing dredge muds as requested by Fortescue Metals Group Limited .
<b>New Parallel Runway (NPR) - Dredge pipeline construction</b> Brisbane, Australia	NPR Project required 4.5km long dredge pipeline to pump sand from Luggage point, Pinkenba to the reclamation area of the proposed new parallel runway at Brisbane Airport. The dredge pipeline was spanning across waterways and low-lying areas and the construction involved civil works that required modifications to the existing drainage and construction of access roads, over pass and underpass for pipeline. Coffey provided geotechnical advice to Hall Contracting for the construction, developed construction specifications, and support/certified construction works pertaining to our designs. Was the Principal Reviewer.
<b>New Parallel Runway (NPR) - Dredging and Reclamation</b> Brisbane, SAustralia	The approximate area of the construction footprint of the proposed NPR Project is about 475ha and is located approximately 2km west of the existing main runway of the Brisbane Airport. The majority of the proposed development is in the Canal Area of the Brisbane Airport and is low lying. Ground improvement design carried out by others requires approximately 13 million cubic metres of sand for preloading. Dredged sand from the Moreton Bay area will be used for raising the ground levels. Design of reclamation primary bund design was carried out and construction support provided. JDN's dredge fill stability design was reviewed and certified. As part of the design and construction process, geotechnical instrumentation was installed. Was the Principal Reviewer for the project.
<b>Tanjing Prork Port Development</b> Jakarta, Indonesia	Technical Director and Principal Reviewer for the design review carried out for the client (Indonesia Port Corporation). The project involved the review of design work conducted by others associated with the seawall, reclamation, ground improvement and wharves.
<b>Port of Brisbane - Terminals 11 and 12</b> Australia	Assisted Thiess Contractors with the tender design for the development of container terminals T11 and T12 at the Port of Brisbane including geotechnical design and analysis of control modulus columns (CMC) as a ground improvement measure for the Automatic Stacking Crane foundations. The reference design provided as information documents was optimises making significant savings to the tender.



**Port of Brisbane -  
Reclamation using  
dredged materials**  
Australia

Jan De Nul (JDN) was engaged by Port of Brisbane to discharge 800,000 to 1,000,000m<sup>3</sup> of sandy fill into the reclamation paddocks within a 3 week dredging period and therefore geotechnical input was required on the reclamation strategy, design the construction sequence, and provide construction monitoring. The paddocks are underlain with very soft dredged spoil, with shear strength of 3kPa, and stability of the bund walls was assessed to be critical considering the volume of material to be placed within a short period of time. Detailed stability and deformation analyses were carried out to assess the viable placement strategy and an optimal construction sequence agreed on, Observational Method. Inclinerometers were installed at the boundaries of the paddock and monitored regularly during the fill placement. With full time geotechnical presence on site, fill was successfully placed in the paddocks under a 24/7 operation. Provided technical direction and acted as the Principal Reviewer

**Dampier Port**  
Dampier, Western  
Australia, Australia

Review of dredged materials and reclamation issues at the Dampier Port where Dampier Port Authority (DPA) is undertaking dredging and reclamation works as part of Dampier Marine Services Facility (DMSF) Project.

**Ichthys Onshore LNG  
facilities Project**  
Darwin, Northern  
Territory, Australia

Principal reviewer for the tender work carried out for Leighton Contractors. The site is located on a low lying peninsula and therefore located on intertidal mangrove mud flats. Coffey carried out geotechnical interpretation and set up geotechnical models for different areas of the development. Different ground improvement methods were provided based on the models. The concepts included excavation & replacement, surcharging with and without wick drains and soil-cement mix columns. Advice on acid sulphate management as well as instrumentation and monitoring were provided.

**Forest City Project -  
Land Reclamation**  
Malaysia

Principal Reviewer for ground improvement and reclamation. The proposed project for Country Garden is located in the Strait of Singapore which separates Malaysia from the mainland of Singapore. The project site comprises fill placement from sea bed level to a finish design level of 4.0mRL for constructing the commercial and residential building. As weak subsoils occur under the footprint of the proposed development area the ground it is necessary to improve the ground before construction, to limit settlements and to improve stability.

**Port of Bundaberg -  
Land Development**  
North Queensland,  
Australia

Technical direction was provided for this project which involved preliminary investigations and ground improvement concepts for a 55ha site at the Port of Bundaberg underlain by deep soft soils. Investigations included Cone Penetration testing, borehole drilling, test pitting and Dynamic Cone Penetration testing. An assessment of subsurface conditions was carried out which allowed zoning of the area and providing different ground improvement concepts deepening on the site conditions.

**Port of Brisbane -  
Reclamation and  
Ground Improvement**  
Queensland, Australia

Since 2005 to 2015. Provided design and construction advice on reclamation and ground improvement work associated with the Future Port Expansion (FPE) area at the Port. Provided technical direction to the junior engineers and mentored them over the years. Ground improvement work included preloading with and without surcharging as well as vacuum consolidation. Directed the geotechnical instrumentation monitoring and assessment of preload behavior.



**Port of Brisbane -  
Ground Improvement  
Trials**  
Queensland, Australia

Project Director for the ground improvement trials in reclaimed areas which involved in conducting the trials in association with three international contractors to assess several techniques including conventional preloading with wick drains and vacuum consolidation modified to suit site conditions. Port of Brisbane reclamation area is underlain by up to 35m of soft clay and dredged mud up to 10m in thickness

**Port of Gladstone**  
North Queensland,  
Australia

Approximately 7km long newly build reclamation seawall is located to the north of existing Fisherman's Landing reclamation area in the western basin of Port of Gladstone. The reclamation operation would fill the basin to RL7m over 4 years and the fill behind seawall bunds may need further lifting, probably to RL15m or higher. Coffey carried out due diligence study of as-built conditions of the seawall as well as proposed a scheme to raise the bund levels internally to accommodate the expected reclamation fill including construction monitoring strategy using instrumentation. Acted as a Geotechnical Reviewer.

**Port of Lyttelton - Desk  
study on data  
assessment**  
Christchurch, NZ

Principal Geotechnical Reviewer for a risk based assessment of over 70 years of the Port's geotechnical data and development of a method to assess the data adequacy for specific future engineering works if the associated designs were undertaken without additional investigations. The solution provided the Port's project management team with a dynamic tool to follow in which they could determine 'most likely' options for future developments without further expensive and time consuming investigations.

**Port of Lyttelton -  
Consent Application**  
Christchurch, NZ

Geotechnical/Reclamation specialist and lead designer for the proposed reclamation at the Port of Lyttelton, where a consent application was sought to extend the Port activities by reclaiming part of the Te Awaparahi Bay. Design and construction of a seawall up to 15m on soft soils, seismic effects and liquefaction potential of sand/silt layers in the subsurface profile are some of the issues involved with the project.

**Port of Lyttelton -  
Reclamation Strategy**  
Christchurch, NZ

Provided technical direction and the principal reviewer for for reclamation works and assiting OPUS International who were developing reclamation construction strategies by using building rubble originated from the collapse and/or demolition of buildings following the February 2011 Earthquake in support of the city clearing and recovery process. Due to the urgency of the recovery works, there was no seawall being constructed for the containment of reclamation materials and which would be deposited on soft clays. Provided advice on reclamation to reduce the risk of failure including the preparation of a Geotechnical Work Method Statement (GWMS) to assist OPUS and the construction staff.

**Port of Lyttelton - Land  
Reclamation**  
Christchurch, NZ

Provided technical direction and acted as the Principal Reviewer for a high level review of land reclamation strategies adjacent to the Port. The scope of works covered five main priorities including; the provision of advice relating to temporary stockpiling of rubble fill, investigation into the optimal methodology and sequencing for land reclamation for up to 30 ha, identification of remote fill sources and assessment of marine fill suitability.

**Port of Lyttelton**  
Christchurch, NZ

Principal Geotechnical Reviewer for a risk based assessment of over 70 years of the Port's geotechnical data and development of a method to assess the data adequacy for specific future engineering works if the associated designs were undertaken without additional investigations. The solution provided the Port's project management team with a dynamic tool to follow in which they could determine 'most likely' options for future developments without further expensive and time consuming investigations.



**Port of Lyttelton**  
Christchurch, NZ

Geotechnical/Reclamation specialist and lead designer for the proposed reclamation at the Port of Lyttelton, where a consent application was sought to extend the Port activities by reclaiming part of the Te Awaparahi Bay. Design and construction of a seawall up to 15m on soft soils, seismic effects and liquefaction potential of sand/silt layers in the subsurface profile are some of the issues involved with the project.

**Embankment  
Causeway**  
Bako, Malaysia

Independent review of the design of a causeway to be built over Sg Santubong by excavating the soft soils below the riverbed by about 9m and rockfilling to the final design level. The design parameters used their relevance and the construction method and consequences were reviewed. FLAC analysis was also carried out to predict settlements and assess impact of lateral deformations due to the construction on existing infrastructure.

**Future Port Expansion  
(FPE) Seawall Project**  
Port of Brisbane,  
Queensland, Australia

Geotechnical Team Leader for the \$90m seawall constructed at Port of Brisbane Future Port Expansion (FPE) area in association with the Contractor, Leighton Contractors. The seawall is up to 8m high, 4.6km long along the alignment, and extends about 2km into Moreton Bay from the existing shoreline. The seabed is 1.0m to 3.5m below the lowest astronomical tide. The site is underlain by soft clay deposits with the thickness varying from 8m to 30m with the surface clays very soft. The most challenging aspects of the design were the control of mudwaving and stability of the seawall, continuing settlement of the wall during and after construction, design and construction of geotextile bases to improve stability, and monitoring and analysis of results to modify the construction programme appropriately.





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