CURRICULUM VITAE

Owen Woodland

BEng(Civil, Hons), CPEng, MIEAust, RPEQ

GEOTECHNICAL ENGINEER

Perth, Western Australia

Education	BEng Civil (Hons), Monash University, Victoria, Australia, 2000
Professional Registration	CPEng: 2503533 NPER: 2503533 RPEQ: 11192
Professional Membership	Member of Engineers Australia
Languages	English, German

1. SUMMARY

Owen Woodland is a consulting geotechnical engineer with 17 years' experience. His experience lies in project management, geotechnical investigation and reporting for infrastructure, bridges, low-rise and high-rise buildings, land development, harbours, mining, slopes and transport. He is experienced in slope stability field assessment, analysis (including numerical modelling), drainage and stabilisation recommendations.

He is also experienced in geotechnical modelling (including finite element modelling), foundation analysis and construction issues. He has experience in installation, reading and interpretation of geotechnical monitoring equipment. He is also experienced in geotechnical data capture and management, including the use of gINT software.

2. EMPLOYMENT HISTORY

2.1. GALT GEOTECHNICS PTY LTD (PERTH): 2009-PRESENT

GEOTECHNICAL ENGINEER AND DIRECTOR

Geotechnical Engineer and Director in this firm of consulting Geotechnical Engineers. Work involves a mix of technical work, marketing and company administration. Technical component involves an array of projects which may be summarised as follows:

- Construction Support: frequent visits to projects for construction support purposes, varying between small infrastructure and land development projects to harbours and a multi-billion dollar

magnetite mine and processing plant (ongoing for more than 12 months). Advice, problem solving and contractor liaison are principal aspects of the support provided. Geotechnical verification of foundations and earthworks.

- Proposals and Reporting: Writing of proposals for site investigation and other geotechnical projects, including desk studies of expected site conditions, understanding client requirements, responding to briefs and potential client liaison.

- Site Investigations and Reporting: start-to-finish execution of investigations, including specification of site investigations, appointment and supervision of drilling and probing subcontractors, writing health and safety management plans to meet internal and external client criteria, site supervision of site investigations, field testing with numerous geotechnical instruments, soil and rock logging, sampling, specification of laboratory testing, analysis and report writing and subsequent client liaison.

- Slope Stability Assessment: design-level and field-level assessment of known or suspected slopes in a variety of backgrounds (infrastructure, municipal, residential, mining, submarine), data gathering and model development for slope stability assessment, development of remedial recommendations, specification of drainage, specification of slope stabilisation measures, field assessment of remedial measures and verification reporting.

- Analysis and Design: review of geotechnical data, geotechnical parameter derivation, design and analysis both with conventional theory, elastic modeling and finite element modeling. Design and modelling of supported and unsupported excavations, submerged infrastructure, piles and shallow footings. Geotechnical specification of earthworks and footings.

With regard to business administration and marketing, the main duties are:

- Marketing, meeting potential clients and providing information to potential clients and others regarding Galt's capabilities.

- Fostering subcontractor and subconsultant relationships to develop a cohesive team for delivery of services both in and outside of Galt's scope of services.

- Recruitment and management of employees.

- Oversight of financial matters, tracking costs and income, budgeting, payment of bills and salaries, tax planning, liaison with book-keeper and accountant.

- Day-to-day administrative matters regarding overhead suppliers, premises, vehicles, etc.

2.2. GOLDER ASSOCIATES PTY LTD (PERTH): 2005-2009

GEOTECHNICAL ENGINEER

Geotechnical Engineer in this firm of consulting Geotechnical, Environmental, Mining and Tailings Engineers. Full time employment in the Geotechnical division. Generally involved with a 50-50 mixture of large geotechnical projects and smaller site investigations, which may be summarised as follows:

- Proposals and Reporting.
- Site Investigations and Reporting.
- Computer Analysis: use of a number of computer packages on large projects, including a large a large amount of finite element modelling using PLAXIS 2D for a harbour deepening project, use of pile modelling packages such as REPUTE, PYGMY, PISSAP, for extensive analysis of existing piles in a wharf structure, writing of numerous spreadsheets for specialist tasks and for automation of routine tasks. Slope stability analysis for various jobs, including numerous lots in a major canal development.
- Project Management: Management of engineering projects from proposal stage, arranging and appointing subcontractors, overseeing and/or undertaking site supervision, supervising field engineers, processing incoming data, writing reports and making recommendations to clients, client liaison, invoicing and undertaking follow-up work.
- Major Projects: involved as a team member on several major projects, including mining infrastructure projects, ongoing advice relating to a harbour deepening project, and primarily responsible for geotechnical analysis and reporting on the project. Also involved in geotechnical site investigation, analysis and reporting for a major mine upgrade in South Australia. Principal team member in both instances (1 of 2 or 3 main engineers).
- Project Manager for a number of projects up to around $2 million in fees.
- Projects almost always undertaken from the proposal phase right through to reporting, including frequent client liaison. Responsibility taken for most logistical aspects of projects, including arranging site access, ordering and liaising with subcontractors, obtaining supplies, arranging laboratory testing, etc. Significant responsibilities for ensuring that deliverables were developed within allotted timeframes, appropriately reviewed and issued.
- The Australia-wide 'champion' for gINT geotechnical software 2006-2009. Responsible for training, specification of new templates and development, troubleshooting, liaison and maintenance of the software. Championed the use of tablet PCs and other digital devices to aid data capture in the field and simplify work flows.

2.3. GOLDER ASSOCIATES (UK) (LTD) (MAIDENHEAD, UK): 2003-2005

GEOTECHNICAL/WASTE ENGINEER

Geotechnical Engineer in this firm of consulting Geotechnical, Environmental and Waste Engineers. Full time employment, mostly in the Waste and Resource Management (WARM) team, and mostly involving Construction Quality Assurance and Site Supervision, in the construction of Landfills, which may be summarised as follows:

- Construction Quality Assurance: Writing of CQA plans for approval by the Environment Agency, guidelines on the construction of Landfill cells that must be adhered to, to ensure compliance with EA regulations.
- Construction Supervisions: Day-to-day site supervision of the construction of Landfills in East Anglia, Surrey and Cornwall (including work over a 9 month period on the Beddington Landfill in Croydon, Surrey and a 3 month period on the Connonbridge landfill in Cornwall), liaison between contractors and clients, including day-to-day dealings with both parties during construction, overseeing all details of construction to ensure compliance with specifications.
- Construction Supervision – Earthworks: daily earthworks supervision and testing (including Nuclear Density Gauge and various other testing)
- Construction Supervision – Other: supervised the construction of various other facilities at the Beddington Landfill in Surrey and Connonbridge Landfill in Cornwall, including the construction of a skip waste facility, a leachate management facility, pipelines, surface water control systems and various peripheral works.
- Report Writing: Writing of reports involved with Construction Quality Assurance associated with construction activities, to provide evidence to authorities of compliance with the appropriate regulations.

2.4. GOLDER ASSOCIATES PTY LTD (MELBOURNE, AUSTRALIA): 2001-2003

GRADUATE GEOTECHNICAL ENGINEER

Graduate Geotechnical engineer in this firm of consulting Geotechnical and Environmental Engineers. Full time employment involving large quantities of fieldwork which may be summarised as follows:

- Drilling supervision: Supervision of rotary drilling operations in numerous sites in and around Melbourne, Australia, which is a geologically complex area. Duties included driller and client liaison, logging, *in situ* testing (including Cone Penetration Testing (CPT), Dissipation testing, High Pressure pressuremeter testing (in soil and rock)), as well as the taking, testing and preservation of disturbed and undisturbed samples.

- Test Pit supervision: supervision of the excavation of test pits, including logging, sampling and restoration.
- Construction Inspection and Supervision: Mostly foundation inspections, including a variety of bored piles as well as spread footings. Also a number of continuous supervision projects in order to assess (on-site) the adequacy or otherwise of a series of foundations.
- Computer Analysis: Analysis of slope stability problems using the programs 'Slope/w' and 'GWEDGEM'. Seep analysis problems using 'Seep/w'. Sheet pile analysis. Design of numerous spreadsheets to automate repetitive or tedious tasks.
- Proposals and Reporting: Wrote and co-wrote proposals for projects in and around the Melbourne area, and frequently undertook the acquired projects, and wrote the reports for them. Projects were often undertaken from the proposal phase right through to reporting, including frequent client liaison. Responsibility taken for most logistical aspects of projects, including arranging site access, ordering and liaising with subcontractors, obtaining supplies, arranging laboratory testing, etc.

3. MAJOR PROJECTS

3.1. SLOPE STABILITY

RESIDENTIAL DEVELOPMENT, THE PATCH, VICTORIA

Slope stability assessment and recommendation of rezoning for a zoned 'high risk' area that the owner wanted to develop. Involved review of shire guidelines, site-specific testing with latest methods for subsurface profiling (largely geophysical methods with intrusive sampling), development of a geotechnical model and detailed report recommending rezoning. Included site measures (primarily drainage) to help ensure long-term stability.

AUGUSTA BOAT HARBOUR, AUGUSTA, WESTERN AUSTRALIA

A quarry site with slopes up to about 15 m high. The government owner of the site was concerned about slope stability after some minor failures. Developed a topographic model of the site and risk zones based on soil and rock profiles, plus detailed site inspection. Provided recommendations for monitoring and stabilisation options. Recommended and specified a surface drainage system to help reduce water ingress and slope instability. Provided guidance on remedial options should further distress be noted.

Ongoing annual inspections for signs of any ongoing instability, including recommendations for further remedial work as needed.

CITIC PACIFIC MINING – CAPE PRESTON, WESTERN AUSTRALIA

Slope stability assessment for cut slopes up to about 15 m high through rock and soil road cuttings. Specification of cost-effective stabilisation measures (rock netting, catch fences, etc) based on site specific conditions, inspection of implemented works.

VARIOUS, PERTH, WESTERN AUSTRALIA

Slope stability assessments for temporary and permanent works in various land developments, typically for slopes up to about 5 m high. Site assessment, numerical analysis, recommendations of stabilisation measures and site verification of the same.

PRIVATE RESIDENCE, MOSMAN PARK, WESTERN AUSTRALIA

Existing slopes up to 10 m high had been constructed partly on limestone rock and partly with stabilised soil backfill with a limestone facing on a large, exclusive private estate. After localised slope failures circa 30 years after construction, carried out investigation to determine that the stabilised soil was seriously compromised. Designed a soil nail remedial method, including numerical analysis, specification and analysis of trial nails and specification of the production nails.

Extensive involvement in the construction of the same, including numerous site visits and verification/close-out report. Included specification of drainage measures to help relieve water pressures on the wall.

FREMANTLE PORT, WESTERN AUSTRALIA

Engineer responsible for the bulk of the site investigation and extensive geotechnical analysis for the harbour deepening project. This involved detailed site investigation and numerical analysis of the stability of submarine slopes below the wharves, in the context of proposed deepening of the harbour by around 3 m depth. Particularly relevant given the history of dredging events and inconsistent previous engineering efforts involved in the same. Provided slope stabilisation measures for localised problem zones.

NEWMONT BODDINGTON GOLD, WESTERN AUSTRALIA

Geotechnical engineer for a study into piezometric levels throughout up to ~70 m high oxide (clayey silt) zones in the context of a proposed future cutback in close proximity to existing plant and infrastructure. The assessment of suitable cut-back angles in this area has a very large financial impact on the viability and configuration of the proposed cutback. Work ongoing.

Geotechnical engineer for assessment of oxide slope stability in a cutback area adjacent to the north pit, including commentary on suitability of a water retaining dam to be near the pit crest.

Geotechnical engineer for assessment of temporary oxide slope stability during dumping of the oxide waste dump, including recommendation for steeper batter angles than had previously been adopted on site.

3.2. MINING

NEWMONT BODDINGTON GOLD, WESTERN AUSTRALIA

Lead geotechnical engineer responsible for the investigation, design and specification of numerous surface water control measures (including open drains, buried drains, culverts, water retaining dams and sediment ponds) for a large waste rock dump expansion.

This included numerical analysis of slope stability, dam design and specification, drainage design, etc. Close liaison with hydrology and hydrogeology experts. Extensive civil design and earthworks specification. Lead engineer during construction phase with frequent site visits, to facilitate ultimate signoff of the works as compliant with design.

Worked with hydrologist on water balance and flow design as related to drain design, dam volumes, etc.

Designed and specified two 12 m high zoned earth embankment dams (including rock lined spillways) in accordance with ANCOLD guidelines. Included full materials specification, materials search, direction and review of laboratory testing prior to and during construction and preparation of close-out report.

Contract value of the drainage and dam works was around $15 million.

Also undertook numerous minor works associated with surface water control and slope stability at the mine.

CITIC PACIFIC MINING – CAPE PRESTON, WESTERN AUSTRALIA

Project Manager and lead geotechnical engineer/client's representative geotechnical engineer for construction support on this multi-billion dollar magnetite ore mine and processing plant. Specification and review of geotechnical designs for earthworks and footings in the process plant and associated infrastructure. Verification and sign-off of earthworks and footings. Supplementary geotechnical investigations for various infrastructure. Liaison with contractors on the various work packages. Dealing with the Chinese clients who sometimes had issues with poor English. Provision of services over a period of more than a year with frequent (weekly to fortnightly) site visits and dealing with a large variety of work packages.

BHP BILLITON RGP6 SITE – NEWMAN, WESTERN AUSTRALIA

Project Manager for site investigation for geotechnical investigation for a new iron ore hub and associated facilities (crushers, ROM pads, rail, conveyors, stockpiles, train load-out, accommodation village, etc). Also planning, scheduling and directing borrow search for construction materials. Managing the site activities

of up to two drill rigs and two backhoes simultaneously plus data collation, planning, assistance with approvals process. Based both on site and in our Perth office. Also responsible for accounting, liaison with other disciplines working on the project (geological, hydrology and hydrogeological studies), facilitation of other works at the site, continual client liaison, cost tracking and reporting.

Also involved in scheduling and specifying laboratory testing, analyses of outcomes of laboratory testing. Lead engineer in analysis and reporting of all phases of the geotechnical work.

Project value was around $2 billion, with consulting fees in excess of $2 million over the course of a 10-month project.

3.3. LAND DEVELOPMENT

NEERABUP QUARRY – NEERABUP, WESTERN AUSTRALIA

Earthwork verification for a large industrial subdivision in suburban Perth. Project involved over 50 ha of earthwork including remediation of a large zone of uncontrolled fill. Responsible for project management, client liaison, attendance at meetings, direction of field testing, analysis and reporting. Involvement in this project led to several other large land development projects in the nearby area.

VARIOUS LAND DEVELOPMENT PROJECTS, WESTERN AUSTRALIA

Project manager and geotechnical engineer on numerous land developments across Western Australia, including the Perth metropolitan area and most regional centres in the Pilbara and Kimberley. Site investigation, design recommendations and earthworks verification for a large variety of residential, commercial and industrial subdivisions and building developments. Sourcing, review and recommendations for borrow materials and recommendations for ground improvement. Founding and earthworks conditions representing the full spectrum from very weak soils through to hard rock.

3.4. GEOTECHNICAL ENGINEERING (BUILDINGS, FOUNDATIONS, INFRASTRUCTURE, ETC)

PEDESTRIAN BRIDGE – MANDURAH, WESTERN AUSTRALIA

Lead geotechnical engineer responsible for specification and execution of an investigation for a pedestrian bridge overpass to Mandurah Road. Project owner was a consortium of Public Transport Authority, Main Roads WA and City of Mandurah. Assessment of foundation conditions and recommendations for economical foundation options in variable limestone stratigraphy.

NEW PINJARRA ROAD TRAFFIC BRIDGE – MANDURAH, WESTERN AUSTRALIA

Lead geotechnical engineer responsible for specification and execution of an investigation for a replacement for the Pinjarra Road traffic bridge at Mandjar Bay. Investigation was barge-based on subject to significant constraints on operating times, hours and positions. Ground conditions were challenging

with heavily loaded piles in a marine environment. Project owner was a consortium of Main Roads WA and City of Mandurah. Assessment of foundation conditions and recommendations for economical foundation options in deep soft soils.

CAPITAL SQUARE – PERTH, WESTERN AUSTRALIA

Geotechnical engineer involved as part of a team investigating founding conditions for barrettes founded on siltstone. Involved post-drilling barrettes, coring of concrete and siltstone, sonic logging and down-hole camera survey. Assessment of barrette adequacy and recommendations to client. Involved in client liaison, meetings, etc.

BIOMASS POWER STATION – MANJIMUP, WESTERN AUSTRALIA

Project Manager and geotechnical engineer for this biomass power station in rural Western Australia. Involved from proposal stage through to construction. The project included heavily loaded foundations and deep excavations in silty soils.

GORO NICKEL PROJECT – GORO, NEW CALEDONIA

Site Geotechnical engineer in the Golder team on this US $2 billion nickel mine in the South Pacific. This project involved many similar day-to-day tasks as in Australia, but frequently in very remote locations away from contact with supervisors, requiring a high level of independence and frequent decision making without the traditional support network of peers and managers. Also some observation of earthworks supervision.

This was also a very sensitive project, environmentally and socially, and was closely observed by the government. This job involved daily liaison with French speaking drillers and machine operators, and was run to a tight deadline, with long hours and 6-7 working days in the week.

3.5. PORTS

INNER HARBOUR – FREMANTLE PORT, WESTERN AUSTRALIA

Engineer responsible for the bulk of the site investigation and extensive geotechnical analysis for the harbour deepening project. Involved modelling of a number of different aspects of the project (including berth stability, pile strengths and design of geotechnical reinforcement). Also primarily responsible for reporting of site investigations and analyses. Responsible for administration of other aspects of the project undertaken by other engineers. Responsible for liaison between Golder and consultant structural engineers also working on the same project, including ensuring a flow of information between parties. Total fees worth over $300,000.

Primary contact for Fremantle Ports and ECI contractors (dredging and civil works) during the multi-million dollar berth upgrade project commencing in 2008. Client liaison, further analysis and provision of ongoing advice during piling and associated construction.

BERTH 11/12 WAREHOUSE, FREMANTLE INNER HARBOUR

Lead and site geotechnical engineer for a site investigation for a proposed new warehouse on Berth 11 and 12 for a common-user facility. Including proposal, investigation, client liaison, reporting and follow-up recommendations. Responsible for administering subcontractors in the context of working in restricted areas on Berth 11 and 12 at the Fremantle Inner Harbour.

JAMES POINT PORT, KWINANA

Lead geotechnical engineer for the development of a proposed new bulk handling facility at James Point, near Kwinana, Western Australia. Included close integration with a larger design team looking at dredging, piling, wharf structures, revetments, breakwaters, etc.

Responsible for scheduling and prioritisation of the investigation results including continual supply and interpretation of the latest geotechnical information during the course of the investigation. This was a critical feature of the delivery on this project, which was running in a tight timeline.

Worked closely with other consultant teams, particularly the coastal engineers and structural engineers for development of solutions taking into account the complicated and unexpected ground conditions at the site.

KWINANA BULK TERMINAL UPGRADES

Lead geotechnical engineer for an investigation, design and construction support/verification program for a series of new conveyors, a rail-mounted stacker and other minor infrastructure as part of a series of upgrades to Kwinana Bulk Terminal.

Dealt with restricted physical access and a high degree of health and safety responsibility for a contractor working for Fremantle Ports to deliver the required outcomes in a timely fashion.

MELVILLE ISLAND, NORTHERN TERRITORY – NEW LOADOUT FACILITY

Lead geotechnical engineer for an investigation, design and construction support/verification program for a new floating pontoon wharf with piled supports and dolphins. The most significant projects constraints were a highly compressed schedule and limited availability to carry out a detailed geotechnical campaign. Nonetheless, the project was successfully implemented with close oversight of the near-shore piling campaign.

DAMPIER CARGO WHARF

Lead geotechnical engineer for an investigation, design and construction support/verification program for a new land-backed wharf supported by a combi-pile wall adjacent to the existing Dampier Port cargo wharf. The piling was challenging given a large retained height and inconsistent ground conditions which made toe restraint of the piled wall difficult. The most significant constraint was a highly compressed schedule with geotechnical design ongoing in parallel with structural design and detailing.

3.6. POWER

WESTERN POWER AND HORIZON POWER – VARIOUS PROJECTS, WESTERN AUSTRALIA

Field Engineer for transmission line investigation projects, responsible for engaging, managing and liaison with site investigation subcontractors, field logging and testing. Review of data and footing recommendations. Involved with various discussions on piling methodology with Western Power (transmission line branch) for transmission line footings including options for less conservative and costly foundation design.

3.7. WATER

NO. 1 WASTE WATER TREATMENT PLANT, KARRATHA

Project manager and geotechnical engineer for this project assessing rock excavatability across a series of ponds required for construction of the treatment plant expansion. Arranged logistics of executing this field program, assessed the drill core, interpreted the excavatability and provided advice to the client. Responsible for securing the contract, client liaison and reporting.

PS2/PS6 SEWER UPGRADES, KARRATHA

Project manager and geotechnical engineer for this project assessing excavation conditions and fill suitability along the alignment of about 14 km of new and upgraded sewer proposed across the Karratha area. Included acid sulfate soils assessment, which was undertaken by a subcontractor. Arranged logistics of executing this field program, assisted with field supervision, managed the environmental subconsultant, specified and interpreted laboratory test results, interpreted results and provided advice to the client. Responsible for securing the contract, client liaison and reporting as well as subconsultant management.

PS1 PUMP STATION UPGRADES, KARRATHA

Project manager and geotechnical engineer for this project assessing excavation and founding conditions for the proposed replacement to the existing PS1 pump station. Included acid sulfate soils assessment, which was undertaken by a subcontractor. Arranged logistics of executing this field program, assisted with field supervision, managed the environmental subconsultant, specified and interpreted laboratory test

results, interpreted results and provided advice to the client. Responsible for securing the contract, client liaison and reporting as well as subconsultant management.

3.8. WASTE

BEDDINGTON LANDFILL – CROYDON, LONDON, UNITED KINGDOM

Site Supervisor on four separate projects (respectively worth £150,000, £200,000, £600,000 and £750,000). Daily client liaison, organising and attending progress meetings, record keeping, construction supervision and quality assurance (earthworks, concrete and tank building). Also responsible for coordination and overseeing of all testing works. Subsequently wrote CQA reports for each project.

BROCKWAY ROAD LANDFILL – MOUNT CLAREMONT, WESTERN AUSTRALIA

Project manager and lead geotechnical engineer for the proposed construction of a rugby stadium on a closed domestic waste landfill in suburban Perth. Tasks included specification and execution of a site investigation program, interpretation of results, review of historic survey data, specification of future monitoring, settlement analyses and development of numerous models for foundation solutions to meet client requirements.

This project involved close client liaison for a government client and close co-operation with a full consultant team.

3.9. INSTRUMENTATION AND MONITORING

140 WILLIAM STREET – PERTH, WESTERN AUSTRALIA

Geotechnical engineer overseeing installation and reading of geotechnical instruments including tilt meters, inclinometers and strain gauged props for support of a station box next to a large basement excavation in the Perth CBD. Was responsible for ongoing interpretation and reporting of instrumentation results and provision of advice to the client.

TRINITY CHURCH – PERTH, WESTERN AUSTRALIA

Geotechnical engineer installing and reading of geotechnical instruments including crack meters, tilt meters, tilt plates, EL beams and vibration meters in this heritage-listed church in the Perth CBD. Significant monitoring was required during excavation of a deep basement and construction at an adjacent property. Was responsible for ongoing interpretation and reporting of instrumentation

FORMER WATER CORPORATION SEWER PUMP STATION, MOUNT PLEASANT

Geotechnical engineer installing and reading vibration monitors around sensitive receptors near a demolition site of a former Water Corporation sewer pump station in Mount Pleasant. Responsible for

review and advice relating to monitoring results and notifying contractor of exceedances of vibration limits.

4. PUBLICATIONS

CONFERENCE PROCEEDINGS

- Woodland, Owen. 2008. Monitoring of William Street Station Box. 8YGPC Conference Proceedings, November. Wellington, New Zealand.

JOURNAL ARTICLES

- Woodland, Owen. Harbour Deepening at Fremantle Port. Australian Geomechanics, Vol 42 No 4 (2007), 93-98.

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