



Dr. Burt Look

BSc, MSc, DIC, PhD, DGE, FIEAust, NPER, CPENG, MAGS, MASCE, PE, RPEQ

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Areas of Expertise

Earthworks and compaction; Subgrade assessment; Characterisation of soil and rock properties; Expansive Clays; Ground Improvements; Working platforms; Bridge foundations; Slopes and landslides; Retention Systems; Buried Pipes; Geotechnical assessment; Risk assessment; Queensland site characterisation; Geotechnical concept designs; Research and Training.

Qualifications and Accreditations

- ◆ BSc (Honours) Civil Engineering, 1982, University of the West Indies.
- ◆ MSc Soil Mechanics and Engineering Seismology, 1985, University of London.
- ◆ DIC (Diploma of Imperial College), 1985, Imperial College of Science and Technology, London.
- ◆ PhD Civil Engineering, 1996, The University of Queensland.
- ◆ Graduate Certificate in Philosophy (Critical Thinking), 2001, The University of Queensland.

Professional Memberships and Affiliations

- ◆ Fellow of the Institution of Engineers of Australia (FIEAust); Chartered Professional Engineer (CPENG).
- ◆ Member of the Australian Geomechanics Society (MAGS); Member of the International Society for Soil Mechanics and Foundation Engineering.
- ◆ Member of the American Society of Civil Engineers (MASCE).
- ◆ Registered Professional Engineer of Queensland, RPEQ.
- ◆ Past Chairman of the Queensland Chapter, Australian Geomechanics Society (1999-2000); Chairman (2004–07) of Organising Committee for 10th Australia – New Zealand Conference in Geomechanics, Brisbane 2007.

Career Overview

Dr Burt Look has 36 years professional Engineering experience with his early years in structural and civil works. He has over 33 years specialization in geotechnics, and Queensland based for the past 30 years. He is widely recognised in the areas of earthworks, expansive clays, landslides, risk assessment and site characterisation. He has been technical advisor and expert witness in these areas. He has introduced many innovations in testing and design which have been adopted in various specifications and procedures within Queensland and Australia wide.



He was previously the Practice Leader in SKM (now Jacobs), and the Knowledge and Service Line Geotechnical Group leader at Aurecon. Burt is the 2014 Queensland Professional Engineer of the year. He is the past Chairman of the Queensland Chapter of the Australian Geomechanics Society and a Fellow of The Institution of Engineers. He is a Diplomate of Geotechnical Engineering (DGE) as awarded by the ASCE Academy of Geo Professionals. Burt is a strong advocate in learning and development and sharing of experiences. He has developed and presents “Earthworks” a 2-day course (2006 to 2017) for Engineering Education Australia (EEA), and over 1,000 professionals have attended to date. He has also developed an associated 1-day course on “Earth Structures”. Burt has published 3 geotechnical engineering books and over 75 technical publications focused on industry practice developments within Australia and internationally, and is a regular invited speaker for industry lectures.

Awards

- ◆ Queensland Professional Engineer of the year 2014; Finalist Australia Professional Engineer of the year 2014.
- ◆ Diplomate of Geotechnical Engineering (DGE) – ASCE Academy of Geo Professionals.
- ◆ Technical Excellence and innovation – 2013 Regional Winner SKM (now Jacobs).

Employment History

2014-current

Senior Principal Geotechnical Engineer and Director, FSG Geotechnics & Foundations (formerly Foundations Specialist Group)

2010-2014

Executive and Principal Geotechnical Engineer, Sinclair Knight Merz, Brisbane, Australia (Acquired by Jacobs, December 2013)

Practice Leader for technical leadership for the global business and executive involved in growing the business locally. Integration of geotechnical issues into design. Technical review and RPEQ sign off for final reports and designs.

1997-2010

Project Engineer → Executive → Principal and Geotechnical Group Leader, Aurecon (formerly Connell Wagner), Brisbane, Australia

Responsible for technical leadership and developing the geotechnical business across Australia and Asia – Pacific region. Staff management and Section Leader. Technical and project management of site investigation projects, establishing procedures and minimum acceptable standards in the extent and quality of any geotechnical work, coordinating the investigations, and the review of reports, and implementation of the geotechnical findings into the design.

1996-1997 & 1988-1989

Senior Geotechnical Engineer, Soil Surveys Engineering Pty Ltd, Brisbane, Australia

Involved in investigation, reporting, and review of outgoing reports, mainly on site investigations and assessment.

1989-1996

Geotechnical Engineer (Materials and Development), Queensland Department of Transport and Main Roads, Brisbane, Australia

Involved in research and development for testing and specifications for roadwork projects as well as day-to-day design, analysis and reporting functions for major road developments on slope stability, subgrade assessments and foundations. Part time studies for the PhD degree at the University of Queensland.



Selected Projects

Best Practice in Compaction QA control for pavement and subgrades

Client: ARRB & Queensland Main Roads

Technical Advisor engaged to research processes / techniques for QA of earthworks and pavement materials relevant to road construction. Current QA practices are anchored in historical earthwork practices rather than appropriate (current) technology. The potential for new QA methods to be utilised in construction sites was shown. These methods would provide a direct measure of the in-situ modulus value, and lead to reducing time delay caused by traditional density measurement methods. Year 1 was a literature survey report, while year 2 report analysed and reported on multiple equipment used in parallel with traditional testing on various projects.

MRS04 Earthworks Specifications

Client: Queensland Transport and Main Roads

Technical Advisor for updating of MRS04 Earthworks specifications (2016). Harmonisation with other Australian State equivalent specifications. Previous technical input into the 1990s version which introduced concepts on Weighted Plasticity Index as a material screening parameter, characteristic values and zonation strategies. Co-Chair workshop for QTMR industry partners for dissemination and feedback.

Toowoomba Second Range Crossing (TSRC)

Client: NEXUS

Technical Advisor for deep lift compaction. Trial embankment with full scale instrumentation was used to develop a construction methodology for improved productivity based on compaction equipment and material types. Introduce testing strategies to conform to QTMR Earthworks specifications requirements for quality assurance.

Rocklea to Darra

Client: Bielby Hull Albem (BHA) Joint Venture

Design joint venture team integral for project award to BHA. Provided cost effective technical insights into piling and ground improvements for this major (\$400m) road upgrade on soft clays and weak rock. Subsequently involved in site investigation and detailed design where total and differential settlements are key challenges, while constructing in a highly-trafficked corridor. Geotechnical considerations were integrated into the construction scheduling for the ground improvements works, earthworks, 11 bridge deep foundations, multiple walls and culverts. Construction support for temporary works, working platforms, ground improvements and piling activities. Assessment of out of tolerance piles.

North Coast Region Landslides

Client: Queensland Transport and Main Roads

Technical Advisor role (initially). Lead team of engineers in the emergency works landslip repairs for the Queensland Main Roads. Many of these repairs occurred during a 3-month emergency phase following extensive 2011/2012 summer rainfalls. A risk management (emergency) approach with immediate mobilisation of Government resources for critical slopes.

Lead Geotechnical Engineer. Project Manager responsible for the assessment, investigation and design of remedial measures for over 60 landslides. Subsequent detailed investigation, design and documentation for other high-risk landslides not required in the emergency phase.

Gateway Upgrade Project

Client: Queensland Transport and Main Roads

Technical Advisor. Geotechnical assessment for the EIS and planning phases. Evaluation of the ground improvement options in the area north of the Brisbane River. Evaluation of foundation options for the Gateway Bridge. Reliability based analysis for rock sockets and slope stability assessment. Assessment of Tender options. Technical Advisor to Queensland Motorway Limited for the detailed design and construction phase for the bridge and ground improvement design.



Bruce Highway Upgrade (Cooroy to Curra)

Client: Queensland Transport and Main Roads

Lead Geotechnical Engineer for Section B Traveston detailed design. Implementation of geotechnical findings into the design for the earthworks, slopes and foundations. Sidelong embankments and cuttings over 20m high with one cutting over 85 m high. Planning and development of testing and construction methodologies to increase fill placements with thicker lifts. Rock socket design for various bridges.

Lead Geotechnical Engineer for Section C planning and preliminary design. Impact of geotechnical considerations to design. Erosion, bulking, cut and fill slopes, excavatability, material quality, subgrade and foundation influences. Also involve in section D (under separate contract) for planning and preliminary design.

Trackstar rail upgrade – Caboolture to Beerburrum Upgrade (6km)

Client: Queensland Rail

Lead Geotechnical Engineer. Evaluation of subgrade conditions and earthworks design and specifications. Procedures to standardise proof roll testing. Beerwah Rail Overpass - Zoned embankment design and specification development to optimise usage of on-site materials.

Bauhinia Regional Rail Upgrade

Client: Abigroup

Lead Geotechnical Engineer. Coordination of geotechnical investigation for 110 km rail line study in Central Queensland, with over 24 bridges and underpasses. Design assessment of foundation conditions, cut slopes, embankments, and subgrade conditions.

Coal fouling on rail ballast

Client: Queensland Rail

Technical Advisor. Assess the effect of coal fouling on rail ballast and its subsequent increased maintenance cost for various rail lines in central Queensland.

Airlie Beach Loop Road

Client: Whitsunday Shire Council

Geotechnical Design Engineer. Design of soil nail system and evaluation of various retention systems including geogrid walls and anchored contiguous pile walls.

Bruce Highway (Black Mountain)

Client: Queensland Transport and Main Roads

Lead Geotechnical Engineer. Planning and preliminary design for the pavements and geotechnical considerations. Assessment of Rockfall areas. Detailed design of the repair of an existing landslide that threatened the through carriageway. Due to uncertainty on the cause of distress of the pavement areas, inclinometer monitoring to determine the creep movements (if any) were undertaken. The Flat Plate Dilatometer (DMT), were undertaken to test for the presence of an active slip surface – first such application in Queensland. Deformation analyses were undertaken to identify regions of high shear strain within the embankment and a risk based observational approach was used to provide the client with a decision tool to allow planning of road maintenance funding.

Pacific Highway Upgrade – Package 4

Client: Queensland Transport and Main Roads

Geotechnical Design Engineer. Implementation of the geotechnical investigations into the design, including assessment of cuttings, stability and foundation assessments at the Smith Street, Gold Coast highway interchanges and Highway sections connecting.



Brisbane- Beenleigh Road, Waterford

Client: Queensland Transport and Main Roads

Site Engineer for earthworks and drainage. Involved construction of retaining walls, 6 m high embankments with side berms and extensive ground improvements including installation of stone columns. Paved side roads were built for traffic diversion. Drainage works included culverts, 6* 70 m lengths of 2.5 m diameter Helcor Pipes. Rock socket inspections for bored piers at the Logan River crossing, Waterford.

Pacific Motorway Upgrade

Client: Queensland Transport and Main Roads

Analysis and reporting of bridge foundation investigations. Geotechnical Investigation and Assessment. Pacific Motorway Upgrade: Analysis and reporting of bridge foundation investigations for Albert River, Oxenford Interchange, Foxwell Road, Hotham Creek, Coomera overflow Bridges, Nerang Broadbeach Interchange and Logan River. Geotechnical advice for bridge foundations, approach embankments and retaining walls.

South-east Transit Project

Client: Queensland Transport and Main Roads

Geotechnical Design Engineer. Investigation of the ground parameters. Includes tunnels, bridges and retention systems for a major busway system through Brisbane urban areas. Detailed design of early works at South Brisbane, including anchored contiguous pile walls, train crash barrier foundations and ground improvements. Stability and finite element stress and deformation analyses to assess the effect of the SETP embankments on its surroundings. Piled raft systems and stone column designs.

Buried Pipes; Toowoomba Second Range Crossing (TSRC)

Client: NEXUS

Evaluation of defective rigid pipes below significant height embankments. Effect of multiple barrels, and bedding effects on the pipe performance compared with finite element methods and the corresponding Australian Standards. Evaluation of rectification measures.

Buried Pipes Specifications

Client: Gippsland Water

Development of a buried specification for public issue. Technical note was also developed as a commentary to the specification for internal use.

Terrain evaluation of the S1 sewer alignment

Client: Brisbane City Council

Geotechnical Advisor. Geology assessment led to shifting the alignment to optimise the tunnelling works, to avoid an alternating sequence of rock and alluvium and resulted in rock tunnel boring machines at one end and soft ground machines at the other end. Assessment of the ground movements due to tunnelling and groundwater lowering for the S1 sewer tunnel, Brisbane.

Vulture Street Pedestrian Underpass

Client: Queensland Rail

Geotechnical Design Engineer. Review of geotechnical investigation for a jacked box tunnel. Design input and construction inspections.

GS1B Mine Water Dam Remediation

Client: BHP Billiton – Mitsubishi Alliance (BMA)

Lead Geotechnical Engineer. Remedial design of 7.5GL mine 18.5 m water storage dam. Assessment of material parameters and design sections to optimise capacity and reduce costs for remediation, including use of HDPE liner and various operational drawdown conditions.



Swanbank Ash Dam

Client: CS Energy

Geotechnical Engineer. Planning upgrade options and dam safety inspections. Design and contract documents for raising of the internal ash bund built on deposited ash. This included assessment of effects of piping and previous failures of the existing dam wall.

Callide Ash Dams

Client: CS Energy

Geotechnical Engineer. Dam Safety Inspections for the Callide ash Dam 1 (non operational) and the operational dams 4 and the main ash dam "B". Site inspections also included the diversion drains, seepage collection trench and the evaporation ponds. The inspection was for the licensing requirements under the dam safety provisions of the Queensland Act.

Red Mud Dam No. 2

Client: Queensland Alumina Ltd (QAL)

Geotechnical Engineer. Safety Inspection for QAL Red Mud Dam No. 2 dam safety review prior to dam raising (1997 and 2000 for stages 4 and 5, respectively) for licensing requirements. Assessment of wall stability for dam wall raising: Involved selection of seismic design parameters, and included evaluation of the operational basis earthquake (OBE) and the maximum credible earthquake (MCE); attenuation from the seismic source zones to the site and analysis of the response of the dam to the OBE and MCE. Probability based analysis was also carried out for the slope stability modelling.

Planning of geotechnical instrumentation, preparation of tender documents and evaluation of instrumentation tenders. Instrumentation was required to provide an early warning monitoring system to be in place and to monitor the effects of construction. Stress and deformation analysis were subsequently carried out to evaluate the likely response of the dam during the dam raising. Assessment of instrumentation monitoring of Dam response during loading (raising of dam wall and water levels). Seepage and slope stability assessment for a problem area identified from the inspections.

Rectification measures based on the results of the analysis. For this operational dam, the design included a geosynthetic clay liner on the upstream slope face extending into a bentonite cut-off wall. The downstream face included a stabilising toe berm with a horizontal drainage blanket. Preparation of specifications for the cut-off slurry trench walls. Construction inspections. Stability assessment of the dam wall during earthquake events. Liquefaction assessment of tailings.

Confidential site

Client: RPC Singapore Lawyers

Expert Witness. International Insurance claim related to ground improvement and fills up to 13 metres high on soft ground with stage loading and wick drains.

Confidential site

Client: HWL Ebsworth Lawyers, Victoria

Expert Witness. Buried Pipes backfill and construction methodology.

Confidential site

Client: Wotton Kearney Lawyers, Sydney

Expert Witness. Earthworks claim on major road construction.

Confidential site

Client: Sparke Helmore Lawyers

Expert Witness. Assessment for a failed building on expansive clays. Compaction and permeability issues.



Confidential site

Client: Carter Newell Lawyers

Expert Witness. Assessment for a partially failed retaining wall.

Landslide Zonation studies

Client: Whitsunday Shire Council and Pine Rivers Shire Council

Geotechnical Advisor. Landslide Hazard Assessment for both Shires using GIS based methods.

Design of retention systems at South Bank for deep basement excavations adjacent to the operational Queensland Rail embankment

Client: Southbank Corporation

Geotechnical Design Engineer. Top-down construction required the use of soil nails and contiguous piles with anchors. Instrumentation monitoring during construction. This included both the Thiess Building and the IMAX theatre.

Landslip investigation

Client: The University of Queensland

Geotechnical Engineer. Landslip investigation, analysis and design of remedial measures for the landslip on the Brisbane River at the University of Queensland. This included preparation of contract documents, and construction supervision.

Selected Invited Presentations

IEAust South East Queensland Geology, Brisbane (1999) on “Strength and Deformation Properties of Brisbane Rocks” and “Expansive Clays in South East Queensland”.

IEAust, Brisbane (2000) and IEAust, Cairns (2001), “Geotechnical input during the Planning Phase”.

IQPC Urban Geotechnical Practice, Sydney (2010) on “Achieving adequate compaction on construction sites”.

AGS Symposium on Reducing CAPEX by managing geotechnical risks on projects, Brisbane (2012) on “Integration of the geotechnical known and unknowns into reducing project CAPEX”.

Queensland Transport and Main Roads workshop (2016). MRTS 04 Earthworks - The Whys of change.

Workshop in Statistics and Probabilistic Methods in Geotechnical Engineering – Applications and Case Histories (2016). Characteristic Values for Rock Socket Design with a Case History on Gateway Bridge Upgrade Recent Trends in in Geotechnical Engineering. University of Southern Queensland.

ARRB Webinar (2018). Advanced Methods for Compaction Quality Control: Part 1 – Concepts.

Industry Lectures at the University of Southern Queensland and the University of the West Indies.

Engineering Education Australia (EEA) - Developed and presents “Earthworks” 2-day course (2006 to 2017) – over 1,000 professionals have attended to date.

Engineering Education Australia (EEA) - Developed “Earth Structures” 1-day course (2015 to 2017).

Publications

Look B G (1994), Introduction to Spreadsheet Geomechanics, Balkema Publishers.

Look B G (2007), Handbook of Geotechnical Investigation and Design Tables, Taylor and Francis Publishers.

Look B G (2014), Handbook of Geotechnical Investigation and Design Tables, 2nd ed. Taylor & Francis Pub.



Selected Technical Publications

- Look B G, Wijeyakulasuriya V C and Reeves I N (1992). A method of risk assessment for roadway embankments utilising expansive materials. 6th Australia – New Zealand Conference on Geomechanics, New Zealand, February, pp 96-105.
- Look B G, Reeves I N and Williams D J (1994). Field experiences using time domain Reflectometry for monitoring moisture changes in road embankments and pavements. TDR Symposium, Northwestern University, pp 374-385.
- Look B G (1995). Developments in the Construction of Expansive Clay Roadways. Transport Technology Transfer Forum, Queensland Transport.
- Look B G (1996). Performance of a Non-Standard Winton Sandstone Paving Material and its Engineering Properties. 7th Australia New Zealand Conference in Geomechanics, Adelaide, pp 667-672.
- Look B G (2005). Equilibrium Moisture Content of volumetrically active clay earthworks in Queensland. Australian Geomechanics Journal, Vol 40, No. 3, pp 55 – 66.
- Look B (2015). Appropriate distribution functions in determining characteristic values. 12th Australia New Zealand Conference in Geomechanics, Wellington, New Zealand, P014.
- Look B. (2016). MRTS 04 Earthworks - Background Research incorporated into the specification. Engineering Technology Forum, Queensland Transport and Main Roads.
- Look B (2016). The Weighted Plasticity Index in Road Design and Construction. Australian Geomechanics Journal, Vol 51, No.3, pp 55 – 66.
- Look, B.G. and Lacey D. (2017). Dynamic Monitoring and Modulus based specifications with deep lift compaction, 19th International Conference on Soil Mechanics and Foundation Engineering, Seoul.
- Look, Burt G. and Cameron D. (2018). Buried flexible pipes: Design considerations in applying AS2566 standard. Australian Geomechanics Journal. Vol 53, No.2, pp 101 – 115.