



CURRICULUM VITAE

Dr Adrian Bowden

Director

FuturesPlanner Pty Ltd

Areas of Experience

- Business Risk
- Environmental Risk
- Hydrogeology
- Waste Management
- Geomorphology

Career Summary

Dr Adrian Bowden has 44 years of professional experience. He has led development of innovative strategic risk business risk assessment methodology which he has applied in the Asia-Pacific region, Africa, South America, Canada, the United States and Europe. Since 1992 Adrian has used his multi-disciplinary experience as a hydrogeologist, together with a high degree of innovation to develop this client-focused service. He has developed the RISQUE Method, which expanded the conceptual basis of strategic risk assessment. The RISQUE Method uses existing technology specifically adapted to suit the needs of a wide range of clients and strategic risk situations.

Adrian has published a number of papers, conference presentations and articles on risk management and is principal author of the book *Triple Bottom Line Risk Management – Enhancing Profit, Environmental Performance and Community Benefit*, by Adrian Bowden, Malcolm Lane and Julia Martin (Wiley, New York, 2001).

Dr Bowden has managed or directed key projects such as:

- Development of a mine closure probabilistic costing tool for the Century Mine, Queensland.
- Development of financial assurances using probabilistic techniques for a gold mine at Waihi (New Zealand) and major landfills at Swanbank, Queensland and Cardup, Western Australia.
- Probabilistic cost estimation (including risk costs) for remediation of contaminated soil at former defence site in Maribryong, Victoria.
- Probabilistic estimation of contaminated land clean-up costs for Caltex, Shell, Mobil, Australia.
- Calculation of financial risks to assist in the development of a realistic insurance strategy for a major international mining company.
- Application of the RISQUE method and probabilistic techniques for a total community risk assessment of major dams in Victoria.
- Assessment of global water resources and climate change risk for The Coca-Cola Company, Atlanta.

- Indonesia - Study of the future GHG emissions from a natural gas project and evaluation of the impact on these emissions and development of a climate change abatement strategy and offset options.
- Development of a risk management framework and assessment of the risk and impacts on the wider environment (climate change, social, economic) due to a proposed major channel deepening (dredging) project, Victoria, Australia.
- Geological storage of CO₂ containment, effectiveness and community impacts risk assessments, Australia (Otway Basin, Denison Basin, Gorgon Project, Gippsland, Dongara, Petrel, Carnarvon Basin).
- For a major international mining company, calculation of financial risks from environmental (including climate change) causes, on a company-wide and individual sites basis, to assist in the development of a realistic insurance strategy.
- Worked with executive management and Board to develop and implement a prioritised corporate risk management strategy for a water authority. Conducted four triennial reviews since 2013.
- Development of a corporate risk management framework, design and implementation of project risk assessment, corporate risk assessment, engineering design options assessment and environmental impact assessment for a port development authority in Victoria.
- Total community benefit-cost assessment of relocation of regional wastewater treatment facility at Alkimos in Western Australia.
- Assessment of environment and project risk for harbour deepening (dredging) projects in Geraldton, Western Australia.
- Development and application of CO₂ geological storage risk assessment methodology, CO2CRC, Australia and UK.
- For major mining companies in Papua New Guinea and Philippines, comparison of financial risk posed by waste management options prior to selection of appropriate alternative.
- Evaluation of the potential financial consequences of risk issues derived from environmental and regulatory causes for acquisitions of fossil and hydro power stations in the United States, Australia and New Zealand.
- Quantitative assessment of risk posed by development to Declared Rare Flora in southwestern Western Australia and Victoria.
- Containment, effectiveness and community impacts risk assessment of operating EOR CO₂ injection program, Weyburn, Canada.
- CO₂ injection and storage risk assessment for currently operating gas field, In Salah, Algeria.
- LNG gas field, pipeline and processing plant project risk assessment, Queensland, Australia
- Coal seam gas associated water risk assessment and development of management options selection tool, Queensland, Australia
- Oil pipeline decommissioning risk assessment and cost estimation, Queensland, Australia.

Career Details

Business Risk Assessment

- United States, global – development and application of an appropriate risk methodology and tools to assess the global water resources and climate change risk posed to The Coca-Cola Company at all organisational levels, due to operations at all plants around the world.
- Western Australia, Victoria, Australia – Development of appropriate methodology to assess the risk associated with geological storage of CO₂. For CO2CRC assessment of containment risk, effectiveness risk and wider community risk and impacts.
- Indonesia - Conducted a study of the likely GHG emissions from the Betara Gas Complex over the life of the project and evaluated the impact on these emissions of a number of potential risk events and development of a defensible climate change abatement strategy and development of offset options.
- Philippines - comparison of risk posed by various options to clean up a large mine tailings release into riverine and marine environments to assist selection of the most appropriate option.

- Romania – Conducted a risk assessment to help an international bank understand the potential financial risk associated with financing a major gold mining venture in Transylvania. The risks that were evaluated included environmental, social, political, economic and engineering risk events.
- Victoria, Australia - This project used a new approach to combine dams engineering understanding with a wide range of other disciplines (community consultation, ecology, agricultural economics, infrastructure engineering, and hydrology) to determine the societal and financial risk posed by the water utility's portfolio of major dams.
- Western Australia – Assessment of the risk posed by development of a mine pit close to a natural vegetation stand that is a gazetted Threatened Plant Community and that contains plants from 9 Declared Rare Flora.
- New South Wales, Australia – Assessment of risk to human life and financial liability posed by potential landslides and rock falls along an 80 km length of alpine highway. The results were used to develop a strategy (largely geotechnical engineering works) to reduce the risk.
- Australia, New Zealand, US and Europe – Estimation of potential financial liability at all sites owned by a large public mineral processing company prior to rationalization of assets. The results were expressed in probabilistic terms and were provided to potential investors.
- New South Wales, Australia – Assessment of risk to park visitors due to tree-fall at Myall Lakes and development of a risk treatment strategy.
- Western Australia - Total community benefit-cost assessment of relocation of regional wastewater treatment facility at Alkimos. The project used the RISQUE method to put dollar values on “intangible” issues such as community diversity, public amenity, and transport permeability, to identify the financial benefits and costs of relocating a proposed wastewater treatment plant further inland of a designated regional beach.
- New Zealand - Assessment of risk and potential costs associate with mine closure, post-closure management and potential environmental impairment. The assessment formed the basis for development of an appropriate financial assurance strategy.
- Australia - Assessment of third party exposure to financial risk due to environmental impairment for 40 mining and mineral processing sites in Australia, South East Asia and the United States. Calculation of aggregate and individual plant financial risks from environmental causes to assist in the development of a realistic insurance strategy. The project included a desk study using environmental audit data provided by the client for mines, smelters, metal extrusion and finishing plants and a range of other allied manufacturing operations. The study was completed in five weeks.
- Papua New Guinea - Comparison of financial risk posed by each of five mine tailings management options prior to selection of appropriate alternative. The assessment later included estimation of costs associated with risk from engineering, construction, operation and environmental impairment for each option.
- Tasmania - Estimation of potential total costs associated with the closure of a west coast mine. The project involved estimation of costs on a probabilistic basis associated with risk from environmental impairment, mine rehabilitation, and plant demolition and disposal.
- Western Australia - Assessment of options for a financial assurance strategy for a major proposed major landfill in Western Australia. The project involved estimation of costs on a probabilistic basis associated with risk from landfill operation, premature closure, environmental monitoring and environmental impairment.
- Victoria - Assessment of risk in dollar terms due to environmental causes to assess the adequacy of an existing financial bond for an active landfill.
- Western Australia – Estimation of the financial risks, benefits and costs of a decision whether to relocate and build a new mineral processing plant, to perform a minimal (compliance-based) upgrade and remain on-site, or to perform a major (performance-based) upgrade and remain on-site.
- New South Wales, Australia – Develop an appropriate methodology to assess the public risk of train derailment within the suburban Sydney train network. The method enabled identification of key risk sites and comparison of acceptability of the risk with conventions elsewhere.
- Australia and New Zealand - Evaluation of the environmental liability of all sites within one division, prior to sale of some assets. The project included a brief preliminary assessment of 48 sites,

located throughout Australia and New Zealand, within two weeks. The environmental issues for each site were listed with regard to non-compliance and environmental impairment. In addition, an indication of the associated potential risk (in dollar terms) for non-compliance penalties, remediation and possible third party claims was provided.

- Queensland - Development of financial assurances for a proposed sub-regional landfill in Queensland. The project involved estimation of costs on a probabilistic basis associated with risk from landfill operation, premature closure, environmental monitoring and environmental impairment over a 30 year post-closure period. Final report reviewed by Treasury Department and accepted by the Queensland Department of Environment & Heritage.
- Victoria - Financial risk assessment to evaluate a range of environmental issues relating to Water Board operations particularly for prioritization of environmental issues.
- New South Wales, Australia – Comparison of the financial risk, benefits and costs posed by several alternative major sewage pipeline alignments and designs in a highly community and environmentally sensitive setting in the Blue Mountains. The chosen engineering solution was selected on the basis of the assessment.
- Victoria - Development of a financial management strategy for a public groundwater supply system. The study included an estimation of risk for equipment failure and maintenance over a ten year period as a basis for rationally calculating user subscription costs.
- Assessment of pre-tender project financial risk using a probabilistic approach to identify the highest risk components of the project brief.
- United States - assessment of benefit/cost, financial risk and liability due to environmental, climate change, statutory and engineering factors associated with the potential acquisition of 17 power generating facilities.
- United States - Determination of future costs (base costs and risk costs), benefit/cost analysis, and provision of recommendations for the amounts and structure of a trust fund reserve with respect to closed landfills in San Diego County.

Site Contamination Assessment and Remediation

- Bombay, India - Site audit and environmental and waste management assessment (including compliance) of refrigerator manufacture facility on large, diversified industrial site.
- Gwalior, India - Assessment of suitability of proposed "greenfield" site for appliance manufacture and statutory compliance.
- Kuala Lumpur, Malaysia - Site audit and assessment of asbestos waste management and disposal practices, including compliance evaluation. Assessment of future asbestos waste disposal options.
- Kuala Lumpur, Malaysia - Site assessment of soil contamination from asbestos product factory.
- Tongling, China – Specialist hydrogeologist for AUSAID project. Wu Gong Li tailings dam located in densely populated urban centre on Yangtse River in Anhui Province. Tailings dam seepage assessment, field investigation, computer modelling of seepage and contaminant transport, technology transfer.
- Zhong Tiao Shan, China – Specialist hydrogeologist for AUSAID project. Mao Jia Wan tailings dam located in remote mountain area in Shanxi Province. Tailings dam seepage assessment, field investigation, computer modelling of seepage and contaminant transport, technology transfer.
- Ballarat, Victoria - Environmental audit of asbestos waste disposal facility and evaluation of suitability of proposed new site.
- Gippsland, Victoria - Identification and assessment of the quantity and environmental effects of leakage from a liquid waste storage pond.
- Geelong, Victoria – Hydrocarbon contamination study. Assessment of the most effective methods to determine the origin and extent of cooling oil leakage from aluminium oil manufacturing plant.
- Mulwala, New South Wales - Groundwater environmental effects study for government explosives factory.
- Myrtleford, Victoria - Assessment of the nature and degree of pollution from sewage treatment ponds.

- Alice Springs, N.T. - Planning and supervision of a geophysics and drilling programme and hydrogeological appraisal of results to assess the potential for contamination of the existing Alice Springs water supply aquifer by pollutants which may emanate from a proposed noxious industries development site.
- Werribee, Victoria - Groundwater contamination of viability of several potential sewage treatment/disposal options Kuala Lumpur, Malaysia - Site assessment of soil contamination from asbestos product factory.
- Ballarat, Victoria - Environmental audit of asbestos waste disposal facility and evaluation of suitability of proposed new site.
- Gippsland, Victoria - Identification and assessment of the quantity and environmental effects of leakage from a liquid waste storage pond.
- Geelong, Victoria - Hydrocarbon contamination study. Assessment of the most effective methods to determine the origin and extent of cooling oil leakage from aluminium oil manufacturing plant.
- Mulwala, New South Wales - Groundwater environmental effects study for government explosives factory.
- Myrtleford, Victoria - Assessment of the nature and degree of pollution from sewage treatment ponds.
- Alice Springs, N.T. - Planning and supervision of a geophysics and drilling programme and hydrogeological appraisal of results to assess the potential for contamination of the existing Alice Springs water supply aquifer by pollutants which may emanate from a proposed noxious industries development site.
- Werribee, Victoria - Groundwater contamination of viability of several potential sewage treatment/disposal options.
- Nagambie, Victoria - Evaluation of groundwater and surface water contamination potential from proposed gold heap leach operation.

Aquaculture

- General Manager of innovative land-based abalone farm in Tasmania. Part of core team. Tasks included site management (operations, maintenance, monitoring), site layout design, assessment of potential new sites, development of spawning and grow-out methodology, artificial feeding trials, grow-out tank design development, filter design development, growth trials, live product export, business development.

Professional History

FuturesPlanner Pty Ltd, Director, Current

URS Australia Pty Ltd (formerly AGC Woodward-Clyde, which was formerly Australian Groundwater Consultants) Senior Principal (1993-2015), Principal Hydrogeologist (1990-1993)

Tasmanian Univalve Pty Ltd, General Manager, Director, Company Secretary, 1989-1990

Australian Groundwater Consultants, Principal Hydrogeologist (1988-1989), Associate Director (1986-1987), Associate (1983-1986), Senior Consultant (1980-1983)

University of Tasmania, Tutor, Department of Geography, 1977-1980

Australian Water Resources Council, (through University of Tasmania) Research Project Officer, 1975-1977

International Oil Exploration NL, Geologist, 1968-1970

Shell Development Ltd, Geological Assistant, 1966-1968

Education and Training

University of Tasmania, Doctor of Philosophy, 1981

University of Tasmania, Bachelor of Science with Honours (First Class), 1974

University of Tasmania, Bachelor of Science, 1973

Professional Organizations

Member, Australasian Institute of Risk Management