

18 March 2024

The Secretary
NSW Department of Planning, Housing and Infrastructure
4 Parramatta Square, 12 Darcy Street
PARRAMATTA NSW 2150
Via NSW DPHI Project Portal

ATTENTION: Steve O'Donoghue

Dear Steve,

RE: MOOLARBEN COAL COMPLEX UG4 – SUITABLY QUALIFIED EXPERTS FOR EXTRACTION PLAN

Moolarben Coal Operations (MCO) is currently preparing an Extraction Plan for underground mining area Underground 4 (UG4) Longwalls (LW) 409-414, in accordance with the requirements of Project Approval 05_0117 for Stage 1 of the Moolarben Coal Complex.

In regard to suitably qualified and experience persons involved in the preparation of the Extraction Plan, Condition 77, Schedule 3 of Project Approval (05_0117) states:

The Proponent shall prepare and implement an Extraction Plan for all second workings on site to the satisfaction of the Secretary. Each extraction plan must:

(a) be prepared by suitably qualified and experienced persons whose appointment has been endorsed by the Secretary;

MCO seeks the approval of the Secretary for the appointment of the nominated specialists (**Table 1**) and MCO employees (**Table 2**) as suitably qualified and experienced persons for the review and preparation of the relevant components of the Moolarben Coal Complex Extraction Plan for UG4 LW409-414.

The nominated specialists are the same as those approved by the Department for the Extraction Plan for LW401-408, with the exception of Dr Emma McIntyre (who replaces Mr Rhidian Harrington at Niche).

Table 1 Nominated Specialists

List of Proposed Suitably Qualified and Experienced Persons external to MCO

Name	Role in Extraction Plan
Mr Peter DeBono <i>Mine Subsidence Engineering Consultants</i>	Preparation of relevant subsidence components, including prediction and monitoring of potential subsidence effects and Built Features Management Plan.
Dr David Newton <i>WRM Water and Environment</i>	Preparation of relevant surface water components of Water Management Plan.
Mr Andrew Durick <i>Australian Groundwater and Environment</i>	Preparation of relevant groundwater components of Water Management Plan.
Mr Jamie Reeves <i>Niche Environment and Heritage</i>	Preparation of relevant Aboriginal cultural heritage and historic heritage components.
Dr Emma McIntyre <i>Niche Environment and Heritage</i>	Preparation of relevant biodiversity components of the Biodiversity Management Plan.

Table 2 MCO Employees

MCO Employees involved in the preparation of the UG4 LW409-414 Extraction Plan

Name	Role in Extraction Plan
Mr Elliot Baume <i>Underground Mine Manager – MCO</i>	Responsible for review, sign-off and implementation of the UG4 Extraction Plan as well as mining engineering standards and procedures.
Mr Liam Mildon <i>Underground Technical Services Manager – MCO</i>	Responsible for preparation of the Built Features Management Plans, Public Safety Management Plan, Land Management Plan and Subsidence Monitoring Program. Responsible for review, sign-off and implementation of the UG4 Extraction Plan as well as mining engineering standards and procedures.
Mr Trent Cini <i>Environment and Community Manager – MCO</i>	Responsible for review, sign-off and implementation of the UG4 Extraction Plan as well as mining engineering standards and procedures.
Mr James Hord <i>Registered Mine Surveyor – MCO</i>	Preparation of graphical plans.
Mr Michael Moore <i>Manager – Environmental Standards – Yancoal</i>	Review of management plans and overall UG4 Extraction Plan documentation.
Mr Matthew Cooper <i>Safety and Training Manager – MCO</i>	Responsible for review of Public Safety Management Plan.

MCO considers that the proposed team is suitable for preparation of the UG4 LW409-414 Extraction Plan. The Curriculum Vitae of the primary contributing suitably qualified and experienced persons are attached with a summary provided below.

Mr DeBono

Mr DeBono's qualifications include a Bachelor of Engineering (Civil) from the University of Technology Sydney as well as a Graduate Diploma in Information Technology from Charles Sturt University. Mr DeBono is an Associate Director at MSEC and has significant experience in the prediction of mine subsidence parameters and the assessment of mine subsidence impacts on natural features and surface infrastructure.

Mr DeBono is currently the suitably qualified and experienced person approved by the Secretary for the MCO's Stage 2 Project Approval PA 08_0135 and for UG4 LW401-408 Extraction Plan.

Dr Newton

Dr Newton's qualifications include a Bachelor of Engineering (Civil) and Masters of Engineering Studies from the University of Queensland as well as a Doctorate of Philosophy from Griffith University. Dr Newton is an experienced engineer with 30 years experience in water resource management. Dr Newton has extensive experience in hydrologic and hydraulic modelling and water strategy and policy from both the engineering consultancy and local government standpoints.

Dr Newton is currently the suitably qualified and experienced person approved by the Secretary for the MCO's Stage 2 Project Approval PA 08_0135 and for UG4 LW401-408 Extraction Plan.

Mr Durick

Mr Durick's qualifications include a Bachelor of Environmental Engineering (Hons) from Griffith University as well as a Masters of Applied Science (Mathematics) from Queensland University of Technology. Mr Durick is the Principal Modeller and Director of Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) and has over 20 years' experience in groundwater modelling, with 11 years working for the Queensland Government in the capacity of a groundwater modeller, and the last 14 years groundwater modelling for the mining sector.

Mr Durick is currently the suitably qualified and experienced person approved by the Secretary for UG4 LW401-408 Extraction Plan.

Mr Reeves

Mr Reeves has a Bachelor in Archaeology (Hons) from La Trope University. Mr Reeves the founding director of Niche Environment and Heritage and has 22 years' experience as a heritage professional with extensive experience with aboriginal cultural heritage assessments and heritage management for mining projects, including extraction plans.

Mr Reeves is currently the suitably qualified and experienced person approved by the Secretary for the MCO's Stage 2 Project Approval PA 08_0135 and for UG4 LW401-408 Extraction Plan.

Dr McIntyre

Dr McIntyre's qualifications include a Bachelor of Environmental Science as well as a Doctorate of Philosophy from the University of Wollongong. Dr McIntyre is a project manager with over 20 years' experience in ecology, environmental approvals and spatial analysis. Dr McIntyre has experience in environmental assessment and planning for a range of clients such as state government agencies, local councils, urban developers and the mining industry, including the application of the biodiversity certification assessment methodology and ecological sensitivity analysis to inform master planning and rezoning proposals.

Yours sincerely

MOOLARBEN COAL OPERATIONS PTY LTD

A handwritten signature in black ink that reads "Trent Cini". The signature is written in a cursive, flowing style.

Trent Cini
Environment and Community Manager

Enclosure 1. Mr Peter DeBono's Curriculum Vitae.
Enclosure 2. Dr David Newton's Curriculum Vitae.
Enclosure 3. Mr Andrew Durick Curriculum Vitae.
Enclosure 4. Mr Jamie Reeves' Curriculum Vitae.
Enclosure 5. Dr Emma McIntyre's Curriculum Vitae.

ENCLOSURE 1. MR PETER DEBONO'S CURRICULUM VITAE.

Peter DeBono, Associate Director

Education:

1988 - 92	University of Technology Sydney <i>Degree in Civil Engineering</i>
2002	Charles Sturt University <i>Graduate Diploma in Information Technology</i>

Academic and Professional Qualifications/Affiliations

	B Eng, Civil Engineering, 1992 GDipIT, 2002 Secretary of the Mine Subsidence Technological Society 2014-2017 and 2022 to present
1987	Surveyors Assistant with Michael Whelan & Associates Pty Ltd
1988	Surveyors Assistant with H Ramsay & Company
1990	Engineering Assistant with NSW Public Works Department, Metropolitan South Region
1991	Engineering Assistant with NSW Public Works Department, Metropolitan Central Region
1991 – 1994	Geotechnician rising to Geotechnical Engineer with Regional Laboratories Pty Ltd and Regional GTS Pty Ltd.
1995 – 2001	Geotechnical Engineer rising to Senior Geotechnical Engineer with Jeffery and Katauskas Pty Ltd.
2002 – 2005	Employed as Consultant then Senior Consultant with Environmental Resources Management, Shanghai, People's Republic of China
2006 – present	Mine Subsidence Engineering Consultants Pty Ltd (MSEC)

Peter joined Mine subsidence Engineering Consultants in August 2006 and has worked on a variety of subsidence studies and reports. He has gained valuable experience in the prediction of mine subsidence parameters, the assessment of mine subsidence impacts on natural features and surface infrastructure and monitoring of surface features during active mining.

Peter has worked on the following projects:

- Subsidence impact reports for Hume Highway and Main Southern Railway - Appin Colliery.
- End of longwall reports for Tahmoor, Westcliff and Metropolitan Collieries.
- Subsidence predictions for the Wyong - Wallarah No. 2 Coal Project
- Photographic survey of the Bargo River for Tahmoor Colliery.
- Subsidence predictions for Longwalls 11A to 18 at Elouera Colliery - Delta Mining Pty Ltd.
- SMP assessments and property subsidence management plans for Austar Coal Mine.
- Subsidence impact assessment, end of panel subsidence reports, annual reviews, and stream impact mapping for the Metropolitan Coal Project – Peabody Helensburgh Coal.
- Subsidence predictions and impact assessments for the Dendrobium Mine, Area 3.
- Subsidence monitoring reports for Longwalls 301 & 302 at Appin Colliery.
- Subsidence predictions and impact assessments for the Moolarben Coal Project - Stage 2.
- SMP/EA Report for Longwalls 34 to 43 at West Cliff Colliery, Area 5.
- SMP assessments and property subsidence management plans for Austar Coal Mine Stage 3.
- Subsidence impact reports to support SMPs and extraction plans at Metropolitan Colliery.
- SMP and SEMP reports for Dendrobium Mine, Area 3A.

- Report on subsidence parameters along a gas pipeline for New Hope Coal.
- Back engineering of subsidence parameters along a gas pipeline at Munmorah for Alinta.
- Subsidence impact assessment for Carmichael Project.
- Subsidence impact assessment for Bylong Coal Project.
- Compliance audit for Ravensworth Underground Mine.
- Subsidence assessment of Aboriginal Heritage rock shelter sites at Ulan Coal mine.
- Preparation of extraction plan subsidence assessments for longwall mining at Moolarben Coal Mine.
- Assessment of monitoring data and provision of monitoring reports for surface features at Metropolitan Colliery during longwall mining.
- Technical advisor for ongoing management of natural and built features affected by mine subsidence at Metropolitan Colliery.
- Assessment of monitoring data and provision of monitoring review reports for surface features at Moolarben Coal Mine.
- Technical committee member for monitoring and management of Transport for NSW assets affected by mine subsidence at Metropolitan Colliery.
- Member of technical committee, reporting to Moolarben Coal on the assessment of monitoring data from the management of an Aboriginal Heritage Site.
- Member of Eastern Tributary technical committee, reporting to Metropolitan Colliery on the assessment of monitoring data from the Eastern Tributary monitoring program.
- Member of Waratah Rivulet technical committee, reporting to Metropolitan Colliery on the assessment of monitoring data from the Waratah Rivulet monitoring program.

He has presented or co-authored several technical papers including:

1. Kay, D.J., DeBono, P.L., Meynink, W.J.C., Buys, H.G. and Pinkster, H. *Probabilistic Approach to Predicting Far Field Horizontal Movements During Mining*. Mine Subsidence Technological Society, Seventh Triennial Conference on Mine Subsidence – A Community Issue. University of Wollongong, NSW, November 2007, pp. 127-140.
2. Kay, D.R., DeBono, P.L. and Waddington, A.A. *Influence of Geology on Valley Upsidence and Closure*. Mine Subsidence Technological Society, Eighth Triennial Conference on Coal Mine Subsidence – Management of Subsidence State of the Art. Kirkton Park, Pokolbin May 2011, pp. 43-52.
3. DeBono, P.L. and Tarrant, G. *An Analysis of Long Term Subsidence at Metropolitan Colliery*. Mine Subsidence Technological Society, Eighth Triennial Conference on Coal Mine Subsidence – Management of Subsidence State of the Art. Kirkton Park, Pokolbin May 2011, pp. 81-88.
4. DeBono, P.L., Barbato, J.P., Mills, K and Walsh, R.V. *A Review of the Accuracy and Reliability of Empirical Subsidence Predictions*. Mine Subsidence Technological Society, Ninth Triennial Conference on Coal Mine Subsidence – Mine Subsidence: Risk Management In Action.. Kirkton Park, Pokolbin May 2014, Vol 2 pp. 461-472.
5. Barbato, J.P. and DeBono, P.L. *Technical Analysis to support the Review of the Mine Subsidence Compensation Act 1961*. NSW Government Department of Finance, Services and Innovation, 2016, pp. 1-37.
6. Kay, D.R., DeBono, P.L. and Montgomery, M. *Improved Understanding of Residual Subsidence Movements after Longwall Mining*. Mine Subsidence Technological Society, 11th Triennial Conference on Coal Mine Subsidence – Subsidence Engineering: From Art to Science. Pokolbin May 2022, pp. 91-110.

ENCLOSURE 2. DR DAVID NEWTON'S CURRICULUM VITAE.

DR DAVID NEWTON

dnewton@wormwater.com.au



DIRECTOR / SENIOR PRINCIPAL ENGINEER



David has worked in the fields of flooding and water resource management since graduating as a civil engineer in 1990. He has experience and expertise in hydrologic and hydraulic modelling, environmental impact assessment, project management, and water strategy and policy. He has worked for engineering consultancies, local government, and the non-government sector on projects ranging from the modelling of small stormwater systems to major river flood studies.

David developed his technical skills in numerical modelling of hydrologic, hydraulic and water quality processes through numerous floodplain management, mining and land development investigations. He has completed surface water impact assessments for many mining projects across Australia. His work with local government and the SEQ Healthy Waterways Partnership included project management and specialist technical advice on water-sensitive urban design policy and guidelines.

David has a PhD from Griffith University where he investigated urban stormwater quality and quantity management.

PROFESSIONAL EXPERIENCE

2007 to present
Director / Senior Principal Engineer
WRM Water & Environment Pty Ltd

2005 to 2007
Technical Officer (part-time), Water Sensitive Urban Design Program
SEQ Healthy Waterways Partnership

2005 to 2007
In-house consultant (part-time)
Maroochy and Pine Rivers shire councils

2001 to 2005
PhD scholar & part-time lecturer / tutor in environment engineering
Griffith University

1991 to 2001
Water Studies Pty Ltd, Brisbane

AREAS OF EXPERTISE

Flood hydrology
Water quality assessment
Water-sensitive urban design
Urban hydrology and stormwater management
Mine site hydrology & water management
Environmental impact assessment
Analysis and design of hydraulic structures
Hydrologic and hydraulic modelling
Flood damage assessment and floodplain management
Expert witness
Project management & technical writing

QUALIFICATIONS

Doctor of Philosophy, Griffith University, 2005

Master of Engineering Studies, University of Queensland, 1994

Bachelor of Engineering (Civil) (Honours), University of Queensland, 1990.

Registered Professional Engineer of Queensland

Member, College of Civil Engineers, Australia

Chartered Professional Engineer, Australia

2001 Chairman, Water Panel, Engineers Australia, Queensland Division.

CAREER HIGHLIGHTS

Best practice guidance for modelling residual voids, QLD (2022)
Wagner vs Harbour Radio Defamation, Grantham Quarry Flooding, QLD (2018)
Maules Creek Coal Project Surface Water Impact Assessment, NSW (2012)
Flood and Stormwater Management Studies, Fitzgibbon UDA, QLD (2010-2014)
Mackenzie River Flood Hydrology, QLD (2010)
Water Supply Scheme ROL Compliance Audits, QLD (2007–2011)
Maroochy Shire Recycled Water Management Strategy, QLD (2007)

Experience

EXPERT OPINION / PEER REVIEW

- NL Varsity vs Gold Coast City Council, Queensland (2022)
- Environment Protection Authority vs Maules Creek Coal Pty Ltd, New South Wales (2021)
- Palmer Leisure vs Gold Coast City Council, Queensland (2021)
- Natural Resources Access Regulator vs Maules Creek Coal Pty Ltd, New South Wales (2021)
- GTH Resorts vs Gold Coast City Council, Queensland (2019)
- Wagner vs Harbour Radio Defamation, Grantham Quarry Flooding, Queensland (2018)
- Wellcamp Airport, Infrastructure charges, Queensland (2018-2019)
- Murphy Schmidt, January 2011 flooding, Queensland (2017)

MINING AND ENVIRONMENTAL IMPACT ASSESSMENT

- Best practice guidance for modelling residual void hydrology and water quality Queensland (2022)
- Central Queensland Coal Project, Flood study and site water balance Central Queensland (2020)
- Ensham Residual Void Project, Water Studies Project Manager Central Queensland (2018)
- Sarsfield Expansion Project, Surface water impact assessment Ravenswood, Queensland (2016)
- Watermark Coal Project, Surface Water Impact Assessment Gunnedah, New South Wales (2012)
- Bengalla Coal Mine Modification, Surface Water Assessment and Water Management Plan Muswellbrook, New South Wales (2011)
- Maules Creek Environmental Assessment, Surface Water Studies Boggabri, New South Wales (2011)
- Water Management Study, Moranbah Gas Project, Moranbah, Queensland (2008)

INTEGRATED WATER MANAGEMENT AND WATER-SENSITIVE URBAN DESIGN

- Fitzgibbon Chase, WSUD Strategy Fitzgibbon, Queensland (2011)
- A Tool to Quantify the Urban Stormwater Component of Observed Stream Flows Melbourne, Victoria (2008)
- Technical Officer, Strategy for Water Sensitive Urban Design in South East Queensland [Secondment] Brisbane, Queensland (2005–06)

FLOOD AND FLOODPLAIN MANAGEMENT STUDIES

- Mount Pleasant Rail Loop Feasibility and Detailed Design Muswellbrook, NSW (2020)
- Wuruma Dam Failure Impact Assessment Eidsvold, Queensland (2017)
- Beardmore Dam Failure Impact Assessment Queensland (2016)
- Mackenzie River Flood Hydrology for Curragh North Mine Pit Expansion Queensland (2009)

WATER RESOURCE ASSESSMENT

- Barron River IQQM Model Cairns, Queensland (1997)

STORMWATER MANAGEMENT

- Fitzgibbon Urban Development Area, Master Flood and Stormwater Management Planning
- Site-Based Stormwater Management Plans

WATER QUALITY

- Water Quality Management Strategy, Pine Rivers Shire Council, Brisbane, Queensland (2007)
- Review of Constructed Waterbodies in Urban Areas South East Queensland (2007)

INSURANCE

- Property flood assessments

Publications

Journal papers

Matthews, C.J., Newton, D.B., Braddock, R.D. and Yu, B. (2007), 'Analysing the sensitivity behaviour of two hydrology models', *Environmental Modeling and Assessment*, Vol. 12, No. 1, pp. 27-41.

Newton, D.B., Jenkins, G.A. and Yu, B. (2007), 'A Process-Based Method of Estimating Exponential Decay Parameters for Particulate Removal in a Gravel Trench', *Water Science & Technology*, Vol. 55, No. 4, pp 227–234.

Conference papers and presentations

Newton, D. and Gissing, A. (2023), 'Shelter-in-place as a flood risk management strategy for vulnerable populations', Paper presented to the 2023 Floodplain Management Australia National Conference, Sydney, May, 2023.

Chen, B. and Newton, D. (2019), 'Elements of a flood disaster – Understanding the 2011 Grantham Flood', Presentation to the 2019 Floodplain Management Australia National Conference, Canberra, 14-17 May, 2019.

Sheehy, D., Markar, S. and Newton, D. (2018), 'Assessing the accuracy of a two-dimensional hydraulic model for dambreak analysis', Proceedings ANCOLD 2018 Conference, Melbourne, 11-12 October 2018.

Cullen, R. and Newton, D. (2013), 'A Methodology to Assess the Effectiveness of Bioretention Basins for Frequent Flow Management', Paper presented at the WSUD 2103 Conference, Gold Coast, 25-29 November 2013.

Newton, D. and Ewert, J. (2009), 'A Simple Method to Estimate Stormwater Harvesting Entitlements from Urban Streams', Proceedings 32nd Hydrology and Water Resources Symposium, Newcastle, December 2009.

Bayley, M.L. and Newton, D.B. (2007), 'Water Quality and Maintenance Costs of Constructed Waterbodies in Urban Areas of South East Queensland', Paper presented to the 13th International Rainwater Catchment Systems Conference/5th International Water Sensitive Urban Design Conference, Sydney, 21-23 August 2007.

Jenkins, G.A. and Newton, D.B. (2005), 'Flood Frequency Estimation for an Urban Catchment Using Continuous Simulation', Paper presented to the 10th International Conference on Urban Drainage, Copenhagen, Denmark, 21-26 August 2005.

Newton, D.B., Jenkins, G.A. and Phillips, I.R. (2004), 'Design of Conjunctive Pervious/Impervious Pavement Systems for Optimal Stormwater Management Performance', Proceedings Novatech, 5th International Conference on Sustainable Techniques and Strategies in Urban Water Management, Lyon, France, June 2004.

Walton, R.S. and Newton, D.B. (2002), 'Preventing an Environmental Disaster: The Challenge of Sustainable Water Management at the Mt Morgan Gold Mine', Proceedings 27th Hydrology and Water Resources Symposium 2002, Melbourne, May 2002.

Newton, D.B. and Walton, R.S. (2000), 'Continuous Simulation for Design Flood Estimation in the Moore River Catchment, Western Australia', Proceedings Hydro 2000, 3rd International Hydrology and Water Resources Symposium, Perth, Western Australia, November 2000.

ENCLOSURE 3. MR ANDREW DURICK'S CURRICULUM VITAE.



Andrew Durick

Director | Principal Groundwater Modeller | Team Lead

Education

- Bachelor of Engineering in Environmental Engineering (Hons) from Griffith University, Brisbane, 1995
- Masters of Applied Science (Mathematics) from Queensland University of Technology, Brisbane, 2005
- Diploma of Business in Frontline Management from Open Learning Institute of TAFE, South Brisbane, 2006

Memberships

- International Association of Hydrogeologists, Member, Australian Chapter
- National Groundwater Association (NGWA)

Employment history

Oct 2006	–	Current	Australasian Groundwater and Environmental Consultants Pty Ltd Director Principal Groundwater Modeller Team Lead
2001	–	2006	Department of Natural Resources, Mines and Water, Brisbane Senior Hydrologist
2000	–	2001	Department of Natural Resources, Brisbane Project Officer – Groundwater Modelling
1996	–	2000	Department of Primary Industries and Department of Natural Resources, Brisbane Environmental Modelling Engineer

Skills

Andrew is the Principal Modeller and Director of Australasian Groundwater and Environmental Consultants Pty Ltd (AGE). He has over 20 years' experience in groundwater modelling. He has an intimate working knowledge of MODFLOW (industry standard modelling code) having investigated improvements to how the model overcomes non-linearities in the numerical solution of the groundwater flow equation during post graduate study. Andrew has worked in both the public and private sectors. During his 11 years working for the Queensland Government in the capacity of a groundwater modeller, he undertook peer review of consultant's work where assessments of potential impacts to the Great Artesian Basin were concerned. In the last 14 years he has focused on groundwater modelling for the mining sector.

Andrew's skills include:

- conceptualisation of complex groundwater systems;
- generation and calibration of 3D groundwater flow models;

Skills (continued)

- implementation of complex mine plans into groundwater flow models through development of in-house modelling software – including aspects of in-pit spoil and longwall goaf;
- ensuring model development and corresponding model output is appropriately aligned to regulatory requirements;
- assessment of model results through sensitivity and predictive uncertainty analysis;
- providing oversight and leadership across all modelling activities undertaken by AGE; and
- auditing and third party review of models developed for impact assessment by industry peers.

Areas of expertise and selected project experience

Water resource assessment

Andrew has experience in both regional and local scale assessments for water resource assessment. The early part of Andrew's career was spent undertaking regional modelling projects for water resource planning and water allocation within the Queensland State Government. He has been involved in the generation of models representing some of the major irrigation areas in Queensland, including those for irrigation of sugar cane along the coastline and some irrigation of small crops inland. Most of these projects focused on surface water – groundwater interaction, in response to the problem of conjunctive use and the need to allocate the water appropriately.

Since joining AGE, Andrew has undertaken projects focused on water supply. This has involved modelling of take from aquifers for water supply for both industrial and potable water supplies. Projects for water resource assessment which Andrew has undertaken include:

- Toowoomba Emergency Water Supply – Looking at using Great Artesian Basin units for temporary water supply options. Modelled for impacts and for determining bore spacings for target extraction rates (*Toowoomba City Council*).
- Campo Arenal Borefield – Modelling for assessment of borefield impacts for various pumping scenarios in Argentina (*Xstrata Copper*).
- Pentland – Looking at water supply and a managed aquifer recharge for a biofuel project. (*Renewable Developments Australia*).
- Beachside Coolum – Simulation of artificial lake (*Lend Lease Developments Pty Ltd*).
- Rainbow Shores – Effluent disposal (*Simmonds and Bristow*).
- Upper Houghton Groundwater model – Model simulating changes to groundwater levels from sugar cane irrigation (*The Upper Houghton Growers Group*).
- Yabulu Refinery Borefield – Model to simulate impacts from borefield extraction (*Queensland Nickel Pty Ltd*).

Mining assessments

Andrew has undertaken groundwater modelling for numerous mines around Australia. These have been at various stages of mine development, from approvals of greenfield sites, through to extensions of existing operations, and then through to operational models assisting clients with groundwater related management decisions. The assessments have involved processing and analysis of field collected data, producing conceptual models of the groundwater systems, and then converting those conceptualisations into models, be it analytical or numerical.

Andrew has developed models and techniques for the assessment of groundwater inflow to both open cut and underground mining areas, with simulation of in pit spoil for open cut pits and goaf/fracture development associated with longwall mines. The techniques developed by Andrew allow for the prediction of mine inflow from individual geologies, which is important for addressing the regulatory requirements.

Areas of expertise and selected project experience (continued)

Beyond coal and metalliferous mines, Andrew has also undertaken work for sand dredging, where some clever techniques were developed to simulate the water balance of a dynamically moving dredge pond. This assessment involved linking MODFLOW to a simple water balance model (in MATLAB) to investigate the water supply requirements for the elevated pond and the changes to the regional water table. Andrew's experience in mining related assessments (subdivided into mining types) includes:

Coal

- Model development for a **new mine** including cumulative impacts from neighbouring mines: Watermark Coal Project (*Shenhua Watermark Coal Pty Ltd*), Eagle Downs Coal Mine (*Bowen Central Coal Joint Venture*), Drake Coal Mine (*QCoal Pty Ltd*), Cameby Downs (*Syntech Resources Pty Ltd/AARC*), Broughton Coal Mine (*U&D Mining Pty Ltd*), Moranbah South (*Hansen Bailey on behalf of Anglo American Metallurgical Coal Pty Ltd*), Moorlands Coal Project (*Environmental and Licensing Professionals Pty Ltd*), Codrilla Coal Mine (*Bowen Basin Coal Joint Venture*), Eastern Creek – Newlands (*KBR, and their client Xstrata*), Saraji East (*BHP Billiton Mitsubishi Alliance Coal Operations Pty Ltd*), Drayton South Revised Mine Plan (*Hansen Bailey on behalf of Anglo American Coal*), Maules Creek (*Aston Resources Limited*), Cameby Downs Expansion (*Syntech Resources Pty Ltd*), Eagle Downs FEL3 (*Eagle Downs Coal Mine*), Harrybrandt Project (*AustralAsian Resource Consultants Pty Ltd on behalf of Yancoal Australia Limited*).
- Model development for **existing mines**/existing model updates: Crinum/Kestrel (*BHP Billiton Mitsubishi Alliance [BMA] and Rio Tinto Coal Australia*), Wilpinjong (*Wilpinjong Coal Pty Ltd*), Ensham Underground (*Ensham Resources Pty Ltd*), Crinum North water licence (*BMA*), Coppabella Underground (*McCollum Consulting*), Sonoma Final Void inflows (*QCoal Pty Ltd*), Boggabri Coal Mine Expansion (*Boggabri Coal*), HVO North – Carrington West Wing (*Coal & Allied*), Burton Pit Spoil Dewatering Design (*Thiess Pty Ltd*), Mt Thorely Warkworth Mine Expansion (*Warkworth Mining Limited*), Newlands Regional Groundwater Modelling (*Glencore*), Bulga Mine Model Update (*Glencore*), Ulan Coal Mine (*Glencore*), Mt Pleasant (*Mach Energy*), Northern Hub (*QCoal Pty Ltd*), Moolarben (*Yancoal*), Ashton Underground (*Yancoal*).
- Coal projects where Andrew has **overseen** modelling and provided advice include: Meteor Downs South, Rolleston Mine, Minyango Coal Mine, Rocky Hill, Taraborah, HVO North/South, West Muswellbrook, Wambo Coal Mine, Mt Arthur North Open Cut, Ellensfield Mine, Elimatta Coal Mine, Dartbrook, Middlemount, Mangoola, and Byerwen.

Metalliferous

- Ernest Henry Mine – Model development and calibration, conceptualisation around the Mt Margaret Fault (*Ernest Henry Mining Pty Ltd*);
- Cadia East – Assessments of impact on groundwater from underground block caving mine (*Newcrest Mining Limited/Cadia Valley Operations*);
- Cloncurry Copper Project – Model of proposed mining (*EXCO Resources Ltd*);
- Pisolite Hills – Bauxite mine – Model development for predicting impacts of mining on Wenlock River (*Cape Alumina Limited*);
- Aurukun Bauxite Project – overseeing development of a regional groundwater model to simulate changes due to proposed bauxite mining (*Hansen Bailey / Glencore*);
- Phu Kham (Laos) – model development of the TSF area including waste rock dump, embankment and surrounding environments simulating seepage from the TSF;
- Phonsavan (Laos) – Assessment of groundwater issues associated with proposed mining (*Pan Aust*);
- Dargues Reef – Model produced to simulate the impacts from the underground gold mine (*RW Corkery/Cortona Resources Pty Ltd*);
- Toms Gully – Using a groundwater model to make inflow estimates (*Hanking Australia Investments Pty Ltd*); and
- Dolphin Tungsten Project – assessing groundwater inflows from marine sands for a mine pit encroaching on the coastline (*King Island Sheelite Ltd*).

Areas of expertise and selected project experience (continued)

Coal seam gas

- QGC model review – Third party review of the modelling undertaken by Golder Associates (*Queensland Gas Company Pty Ltd*);
- Berwyndale and Argyle Gas Fields data review (*Queensland Gas Company Pty Ltd*); and
- Paranui Pilot Project, ATP769 – Modelling for a UWIR (*Westside Corporation*).

Other mining

- Grand Cote Zircon Project, Senegal – Simulation of sand dredge pond and impacts to surrounding regional aquifer (*Mineral Deposits Ltd*).

Groundwater contamination assessments

Groundwater contamination assessments undertaken by Andrew at AGE have involved either assessments of seepage from mine related infrastructure or from industrial use of chemicals that have made it to the groundwater environment. Example projects include:

- Alumbreira – Modelling of sulphate plume from the mine TSF and pumpback system (*Minera Alumbreira Ltd*);
- Army Aviation Centre Oakey – Simulation of PFAS (PFOS & PFOA) resulting from firefighting foam contamination (Department of Defence/AECOM), 2016, 2017, and 2019; and
- Rocklands TSF – overseeing model development to simulate seepage from a TSF near Cloncurry (*CuDeco*).

Other impact assessments

Non-mining related groundwater assessments undertaken by Andrew include:

- Kidston Mine Hydro Power project – Modelling of adjacent pit lakes as balancing storages for a hydro-power scheme to assess any groundwater issues from increasing pit water levels (*Entura Hyrdo Tasmania for their client Genex Power*);
- Wyaralong Dam – Model for determining dewatering rates required during construction of dam wall (*Queensland Water Infrastructure Pty Ltd*);
- Port of Abbot Point Expansion Groundwater Studies and Abbot Point Gateway Growth Project;
- Alcan Gove Pond 6 – Assessment of seepage through pond wall (*Rio Tinto Alcan Gove*);
- Toowoomba Bypass Tunnel – Model to assess dewatering of proposed tunnel (*Connell Wagner Pty Ltd*); and
- Laguna Quays Airport – Assessment of changes to groundwater levels due to runway and drainage (*Laguna Australia Pty Ltd*).

Peer review/expert witness/due diligence

Given his experience in groundwater modelling, Andrew is often approached to review work from other consultants as part of a formal third party or peer review. Some of the reviews undertaken by Andrew have been for the purposes of legal proceedings.

- New Acland Coal Mine Stage 3 – Legal advice and provision of evidence in court, 2015 to 2016 (*New Hope Group/Clayton Utz*);
- Oakey PFAS Class Action – expert witness for hydrogeology for Defence – settled prior to court *Darwen vs Pacific Fisheries* – Review of model and preparation of evidence. This matter was settled prior to the court date (*K&S Darwen*);

Areas of expertise and selected project experience (continued)

- Twin Waters West – Review of modelling for Joint Expert Report on groundwater issues related to housing development (Sunshine Coast Regional Council);
- Crinum Longwall model review – Peer review of modelling identifying model was not fit for purpose (BHP Billiton Mitsubishi Alliance [BMA]);
- Wyaralong Dam EIS and Traveston Dam EIS – Review of groundwater assessments for proposed dams, focusing on data availability, field testing results and conclusions made by the consultants (Queensland Water Infrastructure Pty Ltd);
- Condamine Alluvium – Peer review of modelling undertaken by another consultant (Klohn Crippen Berger Pty Ltd);
- The Range Coal Mine – Due diligence on inflow estimates and identification of issues in the estimate and recommendations for data collection (Reach Environmental Pty Ltd);
- Styx Coal Mine - peer review of model approach and report, including review of model files. (CDM Smith);
- Carmichael Mine – peer review of updated modelling (Bravus Mining and Resources), and
- Baralaba South Coal Mine – peer review of report and model files for EIS (*AustralAsian Resource Consultants Pty Ltd*).

Publications

- Durick, A.M. (2004) Analysis and improvement of the nonlinear iterative techniques for groundwater flow modelling utilising MODFLOW. Masters by Research thesis, Queensland University of Technology.
- Arunakumaren, Jerome; Durick, Andrew and Doherty, John. (1999) A Suite of Software Utilities for Efficient Groundwater Flow Modelling Water 99: Joint Congress; 25th Hydrology & Water Resources Symposium, 2nd International Conference on Water Resources & Environment Research; Handbook and Proceedings. Barton, ACT: Institution of Engineers, Australia.
- Arunakumaren, Jerome; Durick, Andrew and Jensen, Gary. (1999) A Practical Approach to Include Regional Soil Water Processes in Groundwater Flow Modelling. Water 99: Joint Congress; 25th Hydrology & Water Resources Symposium, 2nd International Conference on Water Resources & Environment Research; Handbook and Proceedings. Barton, ACT: Institution of Engineers, Australia.
- Arash Mohajeri, Dr. Pavel Dvoracek, Andrew Durick. (2015) Comparison of different techniques for simulating post-mining voids in groundwater recovery models, Australian Groundwater Conference, Canberra, 2015.
- Kuhanesan S., Durick A.M., Werner A.D., Weeks S.W. and Murphy S.F. (2005) Report 3: Groundwater flow modelling of the Pioneer Valley. Groundwater amendment to the Pioneer Valley Water Resources Plan project. Department of Natural Resources and Mines, Queensland Government, Brisbane.
- Murphy S.F., Kuhanesan S., Foster L.H. and Durick A.M. (2005) Report 1: Conceptualisation of groundwater Resources for the Pioneer Valley flow model. Groundwater Amendment to the Pioneer Valley Water Resources Plan Project. Department of Natural Resources and Mines, Queensland Government, Brisbane.
- J Hillier J Doherty, J Arunakumaren K Bajracharya, E Bengtson S Kuhanesan, D Scriven, A Durick. (June 1997) "Economic and environmentally sustainable use of various water supply sources for irrigation", Land and Water Australia.

Training

- 16th Australian Groundwater School, Sydney, 1997;
- Hydrogeology of Fractured Rocks – Adelaide, 2000;
- Kepner Tregoe Project Management Course, 2002;
- Surface water – groundwater interaction, Darwin, 2002;
- FEFLOW Groundwater Modelling Course – Brisbane, 2007;
- Corporate communication, presented by Bernard McKenna, 2012;
- Calibration, Uncertainty and MODFLOW-USG in Groundwater Vistas, Sydney, 2013;
- Professional indemnity insurance, Planned Cover, 2015; and
- First Aid and CPR, Purple Heart First Aid Training (current).

ENCLOSURE 4. MR JAMIE REEVES' CURRICULUM VITAE.



CV

Jamie Reeves

BA (Hons)

Founding Partner

“My goal is to continue to play a lead role in the development of the best environmental and heritage consultancy in Australia: providing excellence for our people, clients, partners and community stakeholders.”

- Founding Partner of Niche Environment and Heritage
- 25 years as a heritage professional and leader
- Strategic leadership of cultural heritage projects and initiatives
- Expert advice in NSW cultural heritage regulation
- Member Australian Institute of Company Directors
- Committee Member - Mine Subsidence Technological Society

Career overview

Jamie is a Founding Partner of Niche Environment and Heritage. Jamie led the Niche heritage team, then the NSW business and between 2016-2022 led Niche as Managing Director, and now supports and mentors the Niche heritage team while contributing to sustainable growth of Niche. At each step along Niche’s journey Jamie has worked to grow the Niche team and business in a practical and meaningful way. He is dedicated to providing opportunities for team members and stakeholders through the shared success of Niche and its purpose of community and environmental excellence.

During a career that spans 25 years, Jamie has strived to earn the respect of Aboriginal communities, clients, regulators and peers. He has developed an interest in the relationship between Aboriginal heritage and mine subsidence and is a committee member of the Mine Subsidence Technological Society. Jamie’s time is spent contributing at a strategic level to major projects and focussing on building the best cultural heritage and environmental consultancy team in eastern Australia. Jamie prides himself on establishing long-term relationships with clients that benefit both them and the community.

Employment history

2023 - Present	Founding Partner, Niche Environment and Heritage
2016 - 2023	Managing Director, Niche Environment and Heritage
2009 - 2016	Director and NSW Leader, Niche Environment and Heritage
2003 - 2009	Senior Archaeologist, Biosis Research Pty Ltd
1999 - 2003	Environmental Project Manager, Telstra
1998 - 1999	Cultural Heritage Project Officer, Aboriginal Affairs Victoria
1997 - 1998	Cultural Heritage Consultant

Skills

- | | |
|--|--|
| <ul style="list-style-type: none"> - Developing and leading consulting and corporate teams - Project management - Heritage for major projects | <ul style="list-style-type: none"> - Aboriginal community consultation - Strategic planning and advice - Regulatory compliance - Peer review and quality assurance |
|--|--|

Flagship projects

Wentworth to Broken Hill Pipeline (WaterNSW)

As Project Director for this critical infrastructure project Jamie led the team that designed a comprehensive and complex archaeological and cultural heritage assessment and management program. Jamie’s roles included project team leadership, technical input, community, regulator, design and construct project team liaison.

ENCLOSURE 5. DR EMMA MCINTYRE'S CURRICULUM VITAE.



CV

Dr Emma McIntyre

BEnvSc (Hons), PhD (GIS)

Principal Project Manager - Ecology

“I enjoy combining my project management, environmental planning and spatial analysis expertise to provide innovative solutions for my clients and the natural environment.”

- Principal Project Manager within the ecology team.
- Highly developed project management, environmental planning, and spatial analysis skills.
- Thorough working knowledge of and extensive project experience in environmental impact assessment and environmental approvals processes.
- Project experience within a range of sectors: utilities, renewables, local and state government agencies, private sector.

<p>Career overview</p>	<p>Emma is an Environmental Scientist specialising in the fields of environmental impact assessment, environmental planning, and spatial analysis. Emma has over 20 years of experience working in both the government and private sectors. Emma has worked extensively as an environmental consultant in NSW undertaking environmental impact assessments, environmental management plans and spatial applications for a wide range of small to large projects.</p> <p>Emma has prepared and managed environmental impact assessments for large infrastructure projects and has developed impact assessment templates for a range of clients. Emma has also worked on numerous spatial applications including site selection tools for large scale renewable projects and development and hosting of web applications for 5MW solar farm developments. Whilst self-employed, Emma prepared multiple impact assessments, including REFs and EIS, and developed webapps for efficient desktop environmental impact assessments to inform clients of known environmental constraints as part of the early project design phase.</p>	
<p>Employment history</p>	<p>2023 - Present Jan - Dec 2023 2014 - 2022 2009 - 2014 2006 - 2009</p>	<p>Principal Project Manager - Ecology, Niche Principal Environmental Planner, Lodge Environmental Environmental Consultant (self-employed) Consultant, Niche Environment and Heritage GIS Consultant, Eco Logical Australia</p>
<p>Skills</p>	<ul style="list-style-type: none"> - Project planning and management - Environmental impact assessment - Environmental management plans - Communication and client relations 	<ul style="list-style-type: none"> - Spatial analysis applications - Design and development of GIS decision-making and site selection tools - Design and development of webmaps and applications



Dr Emma McIntyre

BEnvSc (Hons), PhD (GIS)

Principal Project Manager - Ecology

Flagship projects Project Management

Project Management - Ecology

In her current role, Emma is managing several flagship projects for the Niche Ecology Team.

Moolarben Coal Complex UG4 Extraction Plan Biodiversity Technical Report (2024)

Emma is currently managing the preparation of the Biodiversity Technical Report for MCO's UG4 Longwalls 409-414 Extraction Plan. Emma has coordinated staff resourcing for the field survey and will oversee preparation of the report to MCO's standards and requirements.

Moolarben Coal Complex OC3 Extension Project BDAR (2023-2024)

Emma has project managed the successful completion of the Biodiversity Development Assessment Report (BDAR) for MCO's OC3 Extension Project. Emma has planned and coordinated the resourcing required from the ecology and spatial teams to finalise the report and data. Emma also provided spatial data analysis of microhabitats as part of the BDAR, and provided quality assurance of the final report.

Transgrid - Hume Link Biodiversity Offsets Strategy (2023-2024)

Emma is Project Manager for the delivery of biodiversity offsets required for Transgrid's HumeLink Project. Emma is responsible for quality assurance, field survey coordination and safety, financial reporting and budget management.

Flagship projects Environmental Impact Assessment & Planning

Environmental Impact Statement

Innovating Energy - EIS for Proposed Bioenergy facility in Nowra (2021-2022)

Emma project managed the EIS and coordinated specialist reports and inputs from subconsultants. Emma also prepared a bulk of the main EIS document for the original project design.

Reviews of Environmental Factors (REFs)

Emma has prepared numerous REFs and associated resources. Key projects include:

- Transport for NSW Minor Works REF packages:
 - o 3 sites on Princes Highway, Batemans Bay (2023)
 - o 4 sites on Snowy Mountains Highway (2023)
 - o 2 sites on Moss Vale Road, Cambewarra (2023)
- Shoalhaven Water proposed water and sewer infrastructure:
 - o Sewer Pump Station at Twin Waters Estate, South Nowra (2023)
 - o Callala Bulk Storage Dam for REMS 1B Project (2022)
 - o Jervis Bay Water Main from Vincentia to Stony Creek Reservoirs (2022)
 - o Bream Beach Water Main upgrades (2022)
 - o Mundamia Urban Release Area water and sewer infrastructure (2022)
 - o Coolangatta Water Main (2022)
 - o REMS 1B Infrastructure upgrades (2020-2021)
- Wingecarribee Shire Council:
 - o Old South Road Upgrades - Stages 1, 2 and 3 (2021-2023)
 - o Centennial Creek Stabilization Works (2022)
- Department of Planning and Environment
 - o Preparation of REF templates and resources for proposed infrastructure to facilitate the Floodplain Management Programme (2023)
 - o Preparation of the Local Government NSW Review of Environmental Factors templates and resources (2019)

Preliminary Environmental Planning and Social Investigation (PESPI)

Emma has prepared two detailed PESPIs for Transport for NSW:

- Coolumbooka Bridge PESPI (2023)
- Brogo River Bridge PESPI (2023)

Ecological Constraints and Opportunities Reports (ECOs)

Emma has provided project management and reporting for the following ECOs:

- Shoalhaven City Council - South Nowra Industrial Area Investigations (2023)
- Wingecarribee Shire Council - Bowral South New Living Area
- Maker ENG - Marshall Mount Road, Yallah

Biodiversity Development Assessment Reports (BDARs)

Emma has provided project management and reporting for the following BDARs:

- FlowPower - Callala Solar Farm (2023)
- Boral - Haulage Route at Berrima (2023)

Flagship projects Spatial Analysis & Applications

Webmap Applications 2018 - 2022

Whilst self-employed, Emma designed and developed a number of webmap applications designed for regular clients to access and to conduct preliminary desktop assessments. The objective was for clients to be better informed of a range of known environmental planning constraints for their selected sites at the early stages of project design. The two main applications included:

- **SiteREF:** Emma collated and hosted relevant spatial information and deigned an app to interrogate these layers and generate a PDF report in a template designed as a desktop environmental constraints assessment. The PDF report could be downloaded or emailed directly to the client's inbox for reference purposes. Information included land zoning and planning controls (minimum lot size, heritage), soil types, acid sulfate soils risk, Plant Community Types (PCTs), NSW Bionet Atlas records within a defined proximity of the site, Biodiversity Values mapping, and Commonwealth Matters of National Environmental Significance.
- **SiteInfo:** This tool was designed for prospective property purchase and included relevant available information such as local land zoning and environmental planning controls (minimum lot size, heritage), slope of the block, location of water and sewer infrastructure, bushfire prone land status, flood prone land status and street frontage.

EPS - NBN Sites Categorisation and Data Integration (2022)

Emma worked as a subcontractor to Environmental Property Services (EPS) to provide all spatial analysis and GIS mapping required for the project. This included data collation and categorisation of NBN sites based on location, proximity to existing service centres and environmental risk management, particularly in relation to bushfire risk. Emma conducted the analysis and synthesised the data into a webmap for data sharing and interrogation purposes.

EPS- 5MW Solar Site Selection and Constraints Mapping (2022)

Emma worked as a subcontractor to Environmental Property Services (EPS) to provide all spatial analysis and GIS mapping required for the project. The objective was to provide a GIS-based decision support tool for selection and prioritisation of suitable sites within Queensland, New South Wales, Victoria and South Australia for 5MW solar farm development. Emma collated all relevant data for the spatial analysis to be performed, including existing electrical distribution network and substation infrastructure, cadastre data, topographic data, digital elevation models (used to derive terrain and slope), vegetation structure, land use, and known ecological and planning constraints information. Emma designed and applied a suitable scoring system, with a weighting system, in collaboration with EPS and the client, to score sites accordingly. Emma prepared a web application for the client to interact with and interrogate the results in a webmap interface.

EPS - NSW Wind Farm Mapping (2022)

Emma worked as a subcontractor to Environmental Property Services (EPS) to provide all spatial analysis and GIS mapping required for the project. This included data collation and mapping of existing and proposed windfarm sites as well as relevant electrical distribution networks to inform environmental impact assessments of multiple wind farm projects.

Central Coast Council - Tuggerah Lakes Wetlands Mapping and Prioritisation (2022)

Emma worked with a local ecologist based on the Central Coast to map Tuggerah Lakes wetlands according to a set of criteria provided by Central Coast Council. A range of information was collected in the field by the ecologist, and Emma then developed and hosted a webmap for data sharing purposes. The ecologist and Council staff were able to edit a subset of map features. Emma and the ecologist then applied the necessary attributes to the wetlands based on a combination of desktop and field assessment to prioritise the wetland areas for funding in the next 2 years.

CityPlan - Port Macquarie Local Housing Strategy - Spatial analysis and web applications

Emma worked with CityPlan to conduct spatial analysis of planning data to provide statistics required for reporting purposes. Emma also developed and hosted webmap applications for sharing with CityPlan staff and Port Macquarie-Hastings Council for online consultation workshops during development of the Housing Strategy. These were conducted in lieu of the originally planned focus groups and workshops during Covid lockdowns, and Emma's ability to provide these resources enabled the project to be completed within the original timeframe.

Locale Consulting - Clarence Valley Rural Strategy Spatial Analysis and Mapping (2021)

Emma worked with Locale Consulting to prepare spatial data and conduct spatial analysis to inform the Clarence Valley Rural Strategy. Emma also prepared the GIS maps for the Strategy report.

Locale Consulting - Jindabyne Master Plan Spatial Analysis and Mapping (2020)

Emma worked with Locale Consulting to prepare spatial data and conduct spatial analysis to inform the Jindabyne Master Plan. Emma also prepared the GIS maps for the Master Plan document.

Department of Planning and Environment - Western Sydney Growth Centres Vegetation Change Detection - Annual Reporting from 2016 - 2022

Emma used high resolution LiDAR and satellite imagery captured specifically for the Western Sydney Growth Centres region to identify and map changes in vegetation each year. Remote sensing techniques including Normalised Difference Vegetation Index was applied as an indication of vegetation condition, and Canopy Height Models were prepared to determine any changes to vegetation structure such as underscrubbing. Spatial analysis of "Extant Native Vegetation" as defined under the now repealed Growth Centres SEPP (2006) was conducted to determine any illegal clearing that had been undertaken within each Growth Centres precinct. Maps were prepared with statistical analysis and provided to the Department to follow up with local councils.