

10 November 2021



Stephen O'Donoghue

Director – Resource Assessments
NSW Department of Planning, Industry and Environment
Level 30, 320 Pitt Street
Sydney NSW 2001

Dear Stephen,

Re: Tahmoor South SSD 8445 Water Management Plan Team Endorsement Request

Tahmoor Coal Pty Ltd seeks endorsement by the Planning Secretary for the below changes to the team of suitably qualified and experienced persons to complete the Tahmoor South Project Water Management Plan and its associated sub plans.

Consent Condition	Management Plan/Component	Suitably Qualified Person/s
Part B, B34	Water Management Plan (overarching document containing generic Tahmoor Coal material and management measures from Surface Water and Groundwater Management Plans)	Michelle Grierson, Senior Environmental Scientist Umwelt (Australia) Pty Ltd
B34 (e) (i)	Site Water Balance (appendix to Water Management Plan)	Camilla West, Senior Water Resources Scientist Tony Marszalek, Director and Principal Water Resources Engineer Hydro Engineering & Consulting Pty Ltd
B34 (e) (ii)	Salt Balance (appendix to Water Management Plan)	Camilla West, Senior Water Resources Scientist Tony Marszalek, Director and Principal Water Resources Engineer Hydro Engineering & Consulting Pty Ltd
B34 (e) (iii)	Erosion and Sediment Control Plan (appendix to Water Management Plan)	Michelle Grierson, Senior Environmental Scientist Umwelt (Australia) Pty Ltd
B34 (e) (iv)	Surface Water Management Plan (appendix to Water Management Plan)	Camilla West, Senior Water Resources Scientist Tony Marszalek, Director and Principal Water Resources Engineer Hydro Engineering & Consulting Pty Ltd
B34 (e) (v)	Groundwater Management Plan (appendix to Water Management Plan)	Will Minchin – Hydrogeologist Maxime Philibert - Hydrogeologist SLR Consulting
B34 (e) (vi)	Long-term Water Management Strategy (appendix to Water Management Plan)	Camilla West, Senior Water Resources Scientist Tony Marszalek, Director and Principal Water Resources Engineer Hydro Engineering & Consulting Pty Ltd

Copies of the suitably qualified persons curriculum vitae are attached to the end of this letter. Please do not hesitate to contact me if you have any questions or concerns regarding the above on mobile: 0438 284 106 or email: zina.ainsworth@simecgfg.com.

Yours sincerely,

Zina Ainsworth

Manager Environment and Community - Tahmoor Coking Coal Operations, SIMEC Mining

SIMEC MINING

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Michelle Grierson

Senior Environmental Scientist



An experienced Environmental Scientist with a proven track record in environmental management and community liaison in the mining and metals industry. Michelle is highly skilled in maintaining environmental compliance with approval conditions; monitoring and reporting; and managing environmental impacts (both onsite and subsidence). Michelle has extensive knowledge of mining approvals and reporting requirements and has produced and reviewed various Management Plans including Landscape, Surface and Groundwater Quality and Management, PIRMPs, Bushfire, Noise, Air Quality, Traffic, and Lighting. Michelle has also completed multiple End of Panel and Extraction Plan reports, Mine Operations Plans, Rehabilitation Costs Estimates and Annual Reports and has assisted in the development of Extraction Plans including providing information for relevant subplans. Michelle has worked in underground mining, conducting groundwater sampling, water balance flow monitoring and reporting for WaterNSW and the Dams Safety Committee. In previous roles, Michelle has conducted subsidence monitoring and impact reporting for natural features and built features.

Michelle has successfully managed relationships across all corporate levels from chief operating officers to front-line employees, community representatives and government agencies in the collection and delivery of effective environmental data and information for a range of mining projects. Michelle has also undertaken consultation with stakeholders as part of community consultative committees as well as liaising with landholders.

Michelle has qualifications in risk management and auditing and has also undertaken training in monitoring and evaluating noise as well as basics in occupational hygiene. Achievements include being selected to attend the South32 Health, Safety and Environment Lead Team Meetings for the Australia Region, which involved being a full -time member of the team as well as the Secretary for over a year.

Qualifications/Affiliations:	Bachelor of Environmental Science with First Class Honours. Graduate Certificate in Organisational Communication.
Years Experience:	10
Specialisation:	On Site Environmental Management, Subsidence Monitoring and Impact Reporting, Groundwater Monitoring and Management, Environmental Risk Assessment, Environmental Management and Compliance Auditing, Incident investigation and Action Close out.
Key Clients:	Department of Defence, NPWS, Shoalhaven Coal, Holcim Australia

Relevant Project Experience

Management Plan Reviews | Confidential | 2021 - Ongoing |

Michelle is currently assisting a confidential client in the review of a range of environmental management plans, including air quality, noise and traffic management plans.

Russell Vale Colliery Extraction Plan | Project Manager |

Wollongong Coal Limited | 2021 - Ongoing | Michelle is currently assisting Wollongong Coal in the development and completion of the Russell Vale Colliery Extraction Plan and its associated sub-plans. This currently involves liaising with the client, developing the Extraction Plan Main Document and reviewing relevant sub-consultant plans.

Department of Defence Secondment | Project Manager | Directorate of Environment, Planning, Assessments and Compliance (DEPAC) | 2020 |

Michelle was placed on secondment with Defence for three months in 2020. This involved providing environmental impact assessment and exercise planning services to assist with the Defence internal environmental assessment process on a range of infrastructure projects. Michelle also assisted in compliance requirements, including updating of a key base operational

environmental management plan and completing an annual EPBC Act compliance report. Michelle demonstrated an ability to understand the key environmental risks of Projects and identify pragmatic measures to be enforced to ensure Defence met their environmental obligations. This was undertaken with reference to the EPBC Act and Defence environmental policy and procedures.

National Parks and Wildlife Service (NPWS) Secondment | Project Manager | NPWS | 2020 |

Michelle was seconded to NPWS for 3 days a week in their Resort Environmental Services Team. Michelle assisted NPWS in developing a Kosciuszko National Park NPWS Alpine Resorts Environmental Management System (EMS) Framework and assurance program. The purpose of the EMS Framework was to provide clarity to the Resorts Environmental Services Team (REST) NPWS regarding their environmental obligations and the requirements of the KNP Plan of Management (POM). The framework also included the introduction of various management plans for the ongoing management of the alpine resort regions. During this secondment, Michelle demonstrated her strong technical

abilities, particularly in statutory and policy review and environmental gap analysis.

Icon Water Secondment | Project Manager | Icon Water | 2019-2020 | Michelle was seconded to Icon Water, ACT's supplier of essential water and sewerage services for one year. Michelle's role at Icon Water includes supporting their Impact Assessment and Approvals team in determining environmental and planning approvals for ACT/NSW in regard to proposed business activities. This work included environmental impact assessment in the field, environmental advice report preparation and submitting and obtaining approvals (e.g. Development Approval applications, Environment Significance Opinions, tree removal licenses, Nature Conservation Licences, NCA approvals, etc.). Michelle has also conducted compliance inspections for Icon Water, reviewing site compliance obligations against current standards. Through this secondment, Michelle demonstrated her adaptability to undertaking environmental impact assessment under varying jurisdictions.

Cooma Road Quarry Management Plan Updates | Project Manager | Holcim Australia Pty Ltd | July - August 2019 Michelle was responsible for reviewing and updating Cooma Road Quarries Environmental Management Plans, including their Environmental Management System, Rehabilitation, Noise, Transport, Air Quality and Blast management plans.

Lynwood Quarry EPBC Compliance Report | Project Manager | Holcim Australia Pty Ltd | April 2019 Michelle was responsible for the production of the 2018 EPBC Compliance Report for Lynwood Quarry. This included compiling the report for Holcim's Lynwood Quarry, outlining specific compliance conditions with the Commonwealth's EPBC Act, evaluating compliance, and providing evidence for the report.

Monitoring of Impacts to the Marine Environment of Jervis Bay | Spotless Defence Services | 2018 – Ongoing | Michelle has been a part of a team responsible for designing and implementing an aquatic survey program, and reporting on the marine environment in Jervis Bay, NSW. Undertaken as part of Defence's broader environmental management system, the monitoring and reporting program targets introduced marine pest species, threatened shorebirds, seagrass beds, and marine mammals. The aim of the program is to develop a risk based, economical and time efficient management plan for monitoring the impact of Defence activities on the marine environment of Jervis Bay.

This project demonstrates current experience in the conduct of site surveys, and the interpretation of ecological data and observations into practical management recommendations.

Air Activities Environmental Management Plan | Defence | January – April 2019 | Michelle was part of a team responsible for the review and update of the Air Activities EMP covering Air Force operations. This update formed part of the changes to the Defence Strategic Environmental Plan and included a gap analysis, supplementary report and risk assessment as well as an update to the Planning Guides and Procedure Cards.

Maintenance of the Maritime Activities Environmental Management System | Defence | 2019 | Michelle has been a key team member in the review and update of the Marine Activities Environmental Management System (MAEMP). She has assisted in reviewing and updating existing documentation

including the Commanding Officers Guides to Environmental Compliance for both Ships and Shore Establishments.

This project has required a practical understanding of Navy activities and potential impacts on the environment, an understanding of environmental risk and management, and an ability to communicate effectively through the preparation of handbooks.

Agnes Banks Rehabilitation Environmental Management Plan | Project Manager | Dixon Sands | 2020 | Michelle was responsible for the creation of the Dixon Sands Agnes Banks Rehabilitation Environmental Management Plan, including incorporating relevant consent conditions and monitoring requirements.

Nelligen Soft Soil Treatment Works | Environmental Advisor | Eurobodalla Shire Council | October 2018 – March 2019 Michelle was responsible for the on-site management of environmental compliance issues on the initial Soft Soil Treatment works for the upgrade to Nelligen Bridge. Duties included:

- Monitoring compliance with management plans.
- Monitoring and advising construction staff on best environmental practice.
- Conducting site inspections including advising on maintenance of erosion and sediment control structures, management of clean water drainage, spill management, stockpiles, waste, noise, dust and weed management.
- Monitoring and reporting on water quality results, incidents, and site inspections to RMS and EPA.
- Consultation with RMS and EPA representatives during and after site visits/inspections.
- Acting as the direct environmental contact between Council, the RMS and the EPA.
- Provision of incident response management advice, including extreme weather event response.

South32 Illawarra Coal | Environmental Specialist and Water Balance Officer | Wollongong | NSW | 2015-2018 Within this role Michelle was responsible for effectively managing all environmental compliance matters at Dendrobium Mine. This includes maintaining compliance with government approved management plans, EPA regulations, Development Consent conditions and reporting requirements.

Key aspects of the Environmental Specialist role included successful management and involvement in pre-feasibility discussions, risk assessments and site inspections. Once construction was approved Michelle managed the permits to work, permits to disturb, controlled activity approvals, landscape management plan compliance, sediment control and project reporting. Michelle has also conducted Pollution Incident Response Management Plan training with Mine Site Personnel and maintains good, open and honest communication with site workers. Michelle has also coordinated the remediation of erosion impacted areas, including dam walls and roadways. Specific construction style projects supervised by Michelle include:

Dam maintenance activities including sediment removal and disposal:

- Contractor management, engaging contractors to complete work, completing and overseeing permits to work, permits to disturb and controlled activity approvals.
- Coordinating contractors relocating dam water for maintenance activities.
- Implementing and inspecting sediment control structures.
- Coordinating sediment disposal, including liaising with site contacts regarding utilising coal stockpiles for disposal.
- Closing out permits

Removal and relocation of pipeline infrastructure:

- Coordinating contractors to complete civil works in relation to the removal of redundant pipelines and the installation of new drains and pipework for the control of sediment runoff from an underground portal.
- Designing new pipeline and drainage plan.

Redundant infrastructure management:

- Mine Operations Plan and Rehabilitation Cost Estimate updating and reporting and submission for the removal of previously unknown redundant infrastructure.
- Monitoring and inspections of redundant sites.
- Coordination of maintenance activities on redundant sites, including sediment erosion control and fencing repairs.
- Overseeing removal of redundant infrastructure including the removal of transformers.

Involvement in pre-feasibility discussions regarding infrastructure upgrades:

- Attending meetings to discuss options for the upgrades/installations of carparks, substations and office buildings.
- Providing advice on approvals required to complete works.
- Providing assistance on determining suitable locations for infrastructure upgrades.

Key aspects of the Water Balance Officer role included:

- Michelle managed all day to day mine site environmental issues, including maintaining compliance with management plan and approval obligations including dust monitoring, noise monitoring, water quality monitoring, weed monitoring and removal, site inspections, incident management, spill response, community liaison and contractor management. During this time Michelle also managed for a period of leave coverage Emplacement Monitoring at West Cliff Mine, which included flora and fauna monitoring such as camera trap installation and review, threatened species monitoring, flora surveys, aquatic ecology monitoring and data review, report writing and compliance tracking, and submission to government.
- Michelle frequently produced and reviewed various management plan commitments and maintained strict compliance with their obligations.
- Michelle conducted successful liaison with government agencies, including the EPA, the Dam Safety Committee,

and the Department of Planning and Environment; as well as the consent-mandated Community Consultative Committee on:

- Compliance regulations;
- Impacts;
- Monitoring results, and
- Actions.
- Michelle successfully managed Dendrobium Mine's onsite groundwater monitoring program, including monitoring and reporting on water flows and water quality, simplifying reporting data, maintaining water sampling and reporting compliance reports, and liaising with the Dam Safety Committee and WaterNSW on emerging issues.
- Michelle had success in roles of both Chair and Secretary of the Dendrobium Mine HSEC Committee, and development and implementation of programs to improve safety and community/environmental awareness on site. Michelle was also an active member of the Dendrobium Mine Community Consultative Committee, which met bimonthly to discuss any issues or approvals relating to the Mine.
- Secretary and Operational representative member of South32 Australia Region Health, Safety and Environment Lead Team Forum.

BHP Billiton Illawarra Coal | Graduate Landholder Relations Advisor and Compliance Officer | Wollongong | NSW | 2014-2015. Michelle successfully moved into a Landholder Relations role in 2014 and implemented various Landholder Land Use Agreements requiring extensive consultation with landholders, while maintaining the company's ability to operate in a social context. This involved liaising directly with landholders to explain potential impacts to properties and develop and negotiate mitigation solutions. Michelle was also responsible for the negotiation and execution of Landholder access agreements for the installation of exploration drill rigs; seismic surveys; as well as survey and monitoring activity. She also managed the coordination of the End of Panel Report process, writing and compiling the final report before sending to government agencies. Key responsibilities of this role included liaising with stakeholders, handling public complaint enquiries and disputes including organising inspections and claims for subsidence damage caused by the mine, and letter writing and external communications development.

Landholder Relations and Compliance:

- To ensure compliance with approved management plans and the company's ability to operate in a social context, Michelle successfully negotiated and executed a range of Land Use Licence Agreements with landholders, requiring the development and implementation of comprehensive landholder engagement plans.
- Michelle successfully negotiated and executed a unique landholder agreement to address risk of bore damage and to ensure continued water supply for property irrigation during the underground mining process; whereby the company delivered and installed temporary water tanks and water delivery. This resulted in acceptance and agreement by the landholder who was previously

opposed to access and resistant to the negotiation process.

- Michelle coordinated the End of Panel Reporting process, including reviewing tenders for external consultant reports, managing report budgets, providing feedback on accepted and unaccepted consultant proposals, organizing report due dates, reviewing and providing critique on final reports (including Flora and Fauna, Subsidence, Archaeology, Water Quality), before writing and compiling the final report for submission to government agencies.
- Michelle has assisted in the production of Extraction Plans for various mining approvals, including providing and collating information for Biodiversity, Land, Heritage and Subsidence Monitoring plans.
- During this time, Michelle was also the Secretary for the Dendrobium Mine Community Consultative Committee, organising meeting schedules, site visits, and taking and distributing minutes.

BHP Billiton Illawarra Coal Environmental Field Team | Graduate Environmental Officer | Wollongong | NSW | 2011-2014. Michelle effectively planned daily workloads for the environmental field team located at Cordeaux Colliery and supervised environmental field crew activities associated with subsidence impact monitoring. This work included undertaking water quality, swamp, soil, water flow, groundwater, slope, and flora and fauna monitoring, managing data inputs and outputs for reporting purposes, maintaining compliance with Subsidence Management Plan Conditions, using mapping software such as ArcGIS and updating data systems to standardised formats.

Subsidence impact monitoring and reporting:

- Michelle managed the development and delivery of daily work plans for the environmental field crew activities in relation to subsidence monitoring and reporting.
- Conducted pre-mining natural feature mapping and inspections as well as post mining natural and built feature inspections.
- Created Impact Monitoring Reports and provided reports to government agencies for review.
- Managed all enquiries from Government and Approvals team and implemented plans and actions to collect and return data and information required.

DR CAMILLA WEST

AREAS OF EXPERTISE

- Surface water impact assessment
- Water and salt balance modelling
- Conceptual mine water management
- Surface water monitoring program design
- Streamflow and water quality assessment
- Surface water trigger investigation
- Surface water-groundwater connectivity assessment
- Water Accounting Framework reconciliation

EDUCATION

PhD Environmental Engineering, The University of Queensland – 2018

Bachelor of Environmental Science with Honours, Griffith University - 2004

PROFESSIONAL HISTORY

Senior Water Resources Scientist – Hydro Engineering & Consulting Pty Ltd. (Jul-2018 to present)

Postdoctoral Research Fellow – The University of Queensland (Jan-2017 – Jul-2018)

Senior Water Resources Scientist – CH2M (Jun-2010 – Dec-2015)

Water Study Leader – Santos (Jan-2009 – Jun-2010)

Water Resources Scientist - Golder Associates (Jan-2006 – Jan-2009)

EXPERIENCE

Camilla West has over thirteen years' experience in water resource management for the public and private sectors, with particular experience in water management for mining and coal seam gas development. Camilla specialises in surface water impact assessment, water quantity and quality modelling, streamflow and water quality assessment and surface water monitoring program design. Camilla also has experience in surface water-groundwater interconnectivity, hydrological and hydraulic modelling and sediment and erosion control. Camilla has extensive national and international experience, having worked in remote mine environments of far North Queensland, Fiji and the Philippines. As a Postdoctoral Research Fellow with The University of Queensland, Camilla represented Austrade and the Sustainable Minerals Institute at the 2017 Mining Strategic Excellence Conference in Santiago, Chile and was co-author of Water in Mining (Austrade, 2017).

REPRESENTATIVE PROJECT EXPERIENCE (RECENT)

- Tahmoor Coal Mine (Tahmoor South) – NSW (Tahmoor Coal). Preparation of the Surface Water Baseline Study, Surface Water Impact Assessment, Surface Water Flood Study and Water Management System and Site Water Balance for the Tahmoor South Environmental Impact Study. Preparation of Response to Submissions in relation to surface components of the Tahmoor South Environmental Impact Study.
- Tahmoor Coal Mine (Western Domain) – NSW (Tahmoor Coal). Preparation of Surface Water Technical Reports for two Extraction Plans and Response to Submissions. Monthly and bi-annual review of the environmental performance of the Project in relation to surface water (water resources and watercourses) in accordance with the Water Management Plan. Detailed investigation of surface water level and streamflow characteristics in response to trigger exceedances.
- Tahmoor Coal Mine (Tahmoor North) – NSW (Tahmoor Coal). Streamflow impact assessment, water licencing investigation and assessment of creek remediation progress.
- Dendrobium Mine – NSW (South32). Preparation of a Surface Water Assessment as a component of the Development Consent Application for Area 5 and Area 6 of the Dendrobium Mine located in the NSW Southern Coalfield. Works included water balance modelling, hydrological modelling of underground mine impacts on swamp hydrology, soil moisture data interpretation and analysis, surface water impact assessment and Response to Submissions.
- Metropolitan Mine – NSW (Metropolitan Coal). Annual and bi-annual environmental performance review of the Metropolitan Coal Project in relation to surface water resources in the Metropolitan Coal underground mining area and surrounds. Investigations in relation to water level trigger exceedances. Development of a water balance model for the Woronora Reservoir to assess potential impacts of mining activity on water loss from the Reservoir.
- Wongawilli Colliery – NSW (Wollongong Coal). Preparation of a Surface Water Technical Report in support of the Wongawilli Colliery modification application. Works included characterisation of baseline surface water resources, review of operational water management system and water licencing requirements, assessment of potential surface water impacts and recommendation of monitoring, mitigation and management measures.
- Mount Pleasant Operation – NSW (MACH Energy). Preparation of a Surface Water Assessment as a component of the Environmental Impact Statement in support of a State Significant Development Application for the Mount Pleasant Optimisation Project. Works included characterisation of baseline surface water resources, conceptual design and assessment of operational and final landform water management system, operational water and salt balance modelling, final void water and salt balance modelling including assessment of climate change effects, surface water impact assessment, Hunter River Salinity Trading Scheme (HRSTS) and water licencing assessment and recommendation of monitoring, mitigation and management measures.
- Mangoola Coal Mine – NSW (Glencore). On-going water balance model review and Water Accounting Framework reconciliation.

- Tarrawonga Coal Mine – NSW (Whitehaven Coal). Preparation of a Surface Water Assessment and Site Water Balance to support the Tarrawonga Coal Life of Mine Modification. Works included characterisation of baseline surface water resources, conceptual design and assessment of operational and final landform water management system, operational water and salt balance modelling, final void water and salt balance modelling including assessment of climate change effects, assessment of potential surface water impacts and recommendation of monitoring, mitigation and management measures.
- Moolarben Coal Complex – NSW (Moolarben Coal). Surface water quality assessments and trigger investigations in accordance with the Moolarben Coal Surface Water Management Plan.
- Ulan Mine Complex – NSW (Ulan Coal). Interpretation and analysis of soil moisture monitoring data and assessment of potential seepage rates from Ulan irrigation schemes to inform the Ulan Coal Mine water and salt balance model.
- Ashton Coal Mine – NSW (Ashton Coal). Preparation of a Surface Water Technical Report as a component of the Longwall 205 – 208 Extraction Plan. Water balance calibration, water inventory reconciliation and TARP water quality investigations.
- Upper Hunter Mining Dialogue – NSW (NSW Mining). Collation and reporting of Upper Hunter mining proponents Water Accounting Framework and Infographic Fact Sheet.
- Sunrise Mine – NSW (Clean TeQ). Site water balance, final void water balance, water supply review, harvestable rights assessment and Surface Water Management Plan update for an approved nickel, cobalt and scandium mining project in Central NSW.
- Cadia Valley Operations – NSW (Newcrest Mining). Preparation of modification Surface Water Assessment, on-going site wide water balance modelling, development of stochastically generated climate dataset for incorporation in site wide water balance model and on-going Water Accounting Framework development and reconciliation.
- Cowal Gold Project – NSW (Evolution Mining). Preparation of a Hydrological Assessment as a component of the Cowal Gold Project Underground Mine Environmental Impact Assessment. Works included characterisation of regional hydrology and water quality; post-closure water management system design; update and simulation of site water balance model; final void water balance modelling with consideration to climate change effects; assessment of surface water impacts; specification of monitoring, mitigation and management measures and response to DPIE Water and NRAR advice.
- Century Lead/Zinc Mine – QLD (MMG & New Century Resources). Revision and simulation of the Century water balance model to simulate the tailings hydraulic mining operation at the Century Mine and to assess the availability of makeup water supply from the Evaporation Dam.

ANTHONY MARSZALEK

AREAS OF EXPERTISE

- Water supply design
- Water balance modelling
- Surface water management
- Environmental engineering
- Dam design
- Hydraulic and hydrologic modelling
- Engineering construction
- Surface water impact assessment

EDUCATION

Master of Engineering Science, University of Queensland - 1987.

Bachelor of Engineering (Civil) First Class Honours, University of Queensland - 1984.

PROFESSIONAL HISTORY

Director – Hydro Engineering & Consulting Pty Ltd. (Nov-2015 to present)

Principal Water Resources Engineer - Gilbert & Associates Pty Ltd (1999 to Nov-2015)

Manager - Woodward-Clyde Darwin – (1995 to 1996)

Senior Civil/Water Resources Engineer - AGC Woodward Clyde Pty Limited (1989 to 1999)

Civil/Geotechnical Engineer - AGC Woodward Clyde Pty Limited (1987 to 1989)

Water Resources Engineer – AGC Woodward Clyde Pty Limited (1986 to 1987)

EXPERIENCE

Mr Marszalek has over 30 years' experience in projects relating to water resources, mining and civil and environmental engineering. His experience has included water quality and environmental impact assessment studies for a range of resources projects, planning, design, cost estimation and construction supervision of dams, water supplies, drainage and hydraulic structures, water resource evaluation/feasibility planning, water and sediment control management design and planning, the design and operation of meteorological, hydrographic and water quality monitoring networks, computer modelling of ground and surface water resources/supplies and study of groundwater recharge systems. Mr Marszalek has experience throughout Australia and South-East Asia.

EXPERTISE

Water Supply

- Appraisal, investigation and design of ground and surface water supply schemes
- Demand estimation
- Supply reliability assessment
- Water supply system modelling
- Pipeline network modelling
- Catchment yield modelling
- Infrastructure design and cost estimation

Water Management

- Site surface water layout/drainage planning, design and integration
- Water balance model development for prediction of water surplus/deficit
- Preparation of water management plans
- Erosion and sediment control design
- Groundwater recharge studies
- Irrigation scheme design/modelling
- Stream impact assessment

Hydraulic Studies

- Flood routing modelling
- Hydraulic studies using 1 and 2-D modelling software
- Creek diversion system and stabilisation works design
- Creek subsidence impact assessment studies
- Design of dams, energy dissipators, erosion protection and sediment controls

REPRESENTATIVE PROJECT EXPERIENCE (RECENT)

- Cadia-Ridgeway Gold/Copper Mine – NSW. (Cadia Holdings – Newcrest Mining Limited). Water supply and water management system modelling and planning, mine surface water impact assessments for project approvals (Cadia Hill, Ridgeway & Cadia East) and on-going compliance, preparation of erosion/sediment control plans, operational review of water and mine waste management, design of major creek diversions (hydrologic and hydraulic modelling), development of calibrated water balance model, design of baseflow monitoring network and assessment of baseflow impacts, tailings disposal prefeasibility and feasibility water balance, water supply options studies.
- Cowal Gold Mine – NSW (Barrick & Evolution Mining). Drainage design, water balance modelling, surface water impact assessment including interaction with Lake Cowal, final void modelling.
- McPhillamys Gold Project – NSW (Regis Resources). Mine surface water impact assessment for project approvals, design of baseline surface water monitoring, licensing assessment, participation in community forums, regulatory liaison.
- Ashton Coal Mine – NSW (Yancoal). Development and updating of regulatory water management plans (approved by DP&E), development of calibrated water balance model, water balance forecasts, rehabilitated landform drainage design, streamflow monitoring assessment, water impact (trigger) assessments.
- Stratford and Duralie Coal Mines – NSW (Yancoal). Water balance modelling, creek diversion design, development of irrigation, water and rejects management plans and surface water EIS reporting (since initial EIS).
- Hunter Valley Coal Mines – NSW - (Glencore – Bulga, United, Mt Owen, Liddell, Ravensworth, Mangoola, Ulan). Calibrated water balance model development, flood and water management studies, EIS/EA surface water impact assessment reporting, site water management plan development/input, drainage design.
- Tahmoor Colliery – NSW (Xstrata Coal NSW & SIMEC Mining). Studies assessing hydrology and water balance of Thirlmere Lakes as part of submission to NSW Government Inquiry, including Inquiry meetings and presentations, EIS surface water impact assessment for mine expansion, calibrated water balance model development, regulatory meetings and negotiation, water management plan development.
- Mt Arthur Coal Mine – NSW (BHP Billiton). Water balance modelling for large open cut coal mine, preparation of Environmental Assessment reports, regulatory presentation, preparation of site water management plan and components, flood hydraulic modelling of Hunter River, tailings management planning.
- Mt Pleasant Coal Mine – NSW (MACH Energy). Development of predictive water balance model, preparation of reports to support consent modification, drainage planning and design, pipeline design.
- United Wambo Coal Mine Project – NSW (United JV). EIS water management studies, including mine water balance modelling and water management planning; design of creek diversion.
- Wilpinjong Coal Mine – NSW (Wilpinjong Coal Pty Ltd). EIS water management studies, including mine water balance modelling and water management planning, flood study.
- Metropolitan Coal Mine – NSW (Peabody Energy). Environmental assessment studies for proposed longwall mine extension within Sydney water supply area, including water balance modelling, catchment yield modelling, presentations to regulatory agencies, input to water management and catchment management plans and on-going monitoring assessments, streamflow monitoring design.
- Broken Hill South Operations – NSW (Perilya Resources). Development of water balance model for tailings storage facility.
- Bowdens Silver Project – NSW (Bowdens Silver Pty Limited). Peer review of surface water impact assessment.
- Century Zinc/Lead Mine – Qld (MMG Ltd). Site water balance modelling for large open cut mine, including regulatory reporting/presentations, assessment of spill risk and consequences and preparation of expert evidence for the Land Court.
- Ernest Henry Copper Mine – Qld (Glencore). Development of site water/salinity balance model with interactive menus for site use.
- Kestrel Coal Mine – Qld (RTCA). Flood study for predicted subsided creek impact assessment, including hydrologic and hydraulic (2-D) modelling, design of remedial measures.
- Confidential Project - Qld. Flood and water balance studies for proposed final voids adjacent to major river, including beneficial use options, approvals studies for underground mine expansion including water balance model development.
- Oaky Creek Coal Mine – Qld (Glencore). Development of calibrated water and salt balance model, preparation of water management plans, surface water management options design, final void water balance and creek dispersion modelling.
- Collinsville Coal Mine – Qld (Glencore). Development of calibrated water and salt balance model, preparation of water management plan and creek flood modelling.

- Rolleston Coal Mine – Qld (Glencore). Preparation of expert reports and appearance as expert witness in Land Court in relation to surface water supply issue.
- Dendrobium Mine – NSW (South32). Creek water quality modelling for proposed discharge of water treatment plant brine.
- BHP Mitsubishi Alliance – Multiple sites – Qld & NSW. Development of water balance models for existing and planned regraded final voids.
- Frances Creek Iron Ore Mine – NT (Territory Iron). Water balance modelling (calibration and forecast) and site water management plan development for decommissioned multi-pit open cut iron ore mine.
- Cedar Creek – Qld (Private client). Flood and impact assessment of filling on adjacent property on flooding potential and sedimentation impacts.
- Chandler Project – NT (Tellus Holdings). Revision of surface water impact assessment (EIS) for proposed secure waste facility in sensitive desert environment, including consideration of access roads, rail and surface infrastructure.
- Gunnedah Solar Farm – NSW (Overland Sun Farms). Flood assessment for proposed solar farm near Namoi River as part of EIS.

AFFILIATIONS AND PROFESSIONAL REGISTRATIONS

Registered Professional Engineer, Queensland.

TECHNICAL PAPERS

'Preventative and Remedial Environmental Engineering Measures to Control Acid Mine Drainage in Australia', *Engineering Tomorrow Today - The Darwin Summit, National Engineering Conference, Darwin, NT, 21-24 April 1996*, The Institute of Engineers Australia.

'The Bribie Island Aquifer: A Case Study'. Co-authors L.T. Isaacs and W. Kotecki. *International Conference on Groundwater Systems Under Stress, Australian Water Resources Council Conference Series No. 13, Brisbane 11-16 May 1986*.

'Managing Water on Waste Dumps During a Mining Operation'. Co-author M.C.Lee. *ACMER Workshop on Water Management in the Mining and Quarrying Industries, Brisbane, 24-25 February, 1999*.

'Quantification Of Mine-Related Effects On Streamflows'. Co-authors L.M.Gilbert & W.C.Boughton. *AusIMM Water in Mining Conference 2006, Brisbane*.

Will Minchin

Profession:	Hydrogeologist	Key Experience:
Qualifications:	MEngSci, Groundwater Studies - UNSW 2001 Bachelor of Enviro. Eng (Hons) - UNSW 2000	Water resource analysis & conceptualisation
Contact Details:	M: +61 (0)432 812 773 E: will.minchin@watershedhg.com	Groundwater / surface water analysis and modelling
Will is based in Nowra, on the south coast of NSW, AUSTRALIA.		Application of MODFLOW

Will has worked as a hydrogeologist and groundwater modeller since 2002. His focus has been on hydrogeological studies involving data analysis, groundwater and surface water modelling, groundwater-surface water interactions, groundwater and conjunctive resource management, teaching and peer review.

During his career, Will has been heavily involved in groundwater modelling projects, primarily for regional water resources studies, but also for EIS, site-scale and excavation and mine inflow and dewatering jobs. He has worked on groundwater resource investigations relating to water supply and extraction management, and to land use and climate change. He has also provided training to clients and colleagues, both in groundwater modelling and GIS.

Will has worked as a consultant hydrogeologist in Australia, UK and Canada:

Hydrogeologist / Director	Watershed HydroGeo	NSW	2016-
Senior Hydrogeologist	HydroSimulations	NSW	2013-16
Senior Hydrogeologist	GHD	VIC / NSW	2008-13
Senior Hydrogeologist	Entec UK (now Wood Group)	UK	2003-07
Hydrogeologist	Gartner Lee (now AECOM)	CANADA	2002-03

In the past decade Will has been the Technical Lead on numerous state-wide / catchment-wide / local-scale groundwater studies, including providing hydrogeological advice and numerical modelling of PFAS contamination at RAAF Williamtown, delivering EIS assessments for mines in NSW (mainly within the Sydney Basin) and QLD, assessing the extraction of mineral-rich brines, modelling groundwater extraction impacts on watercourses and GDEs (e.g. Ovens Valley, chalk streams in southern England), state-wide and regional 3D hydrogeological mapping projects, and modelling for civil applications, such as rail and sewer tunnels.

Solute Transport Modelling

- Led the groundwater modelling study, including building the regional geology model and subsequent solute transport and groundwater flow model, of two adjacent high value aquifers, focussing on PFAS contamination from RAAF Williamtown (NSW). Also provided hydrogeological advice and information at community information sessions. Work has continued at this site, with groundwater modelling used to test proposed remediation options.
- Conceptualised and constructed density-dependent solute transport and groundwater flow models for three brine extraction operations (one operational, two prospective) in the Qinghai, China. This informed the operator and potential investors about the expected recovery rate and total resource at the three sites.

Groundwater - Surface Water compliance reporting and modelling

- Will has carried out several rounds of compliance reporting for mines in NSW, assessing the environmental performance of these with respect to declining groundwater levels, effects on watercourses and GDEs.
- Will has carried out surface water (rainfall-runoff) modelling, including the use of AWBM and bespoke models, for a number of applications
- Provided analysis of impact-control sites to identify whether mining projects have affected the hydrology of watercourses. This includes development of a number of tests for multiple indicators that are relevant to water resources and ecology.

Groundwater Modelling - EIS and other assessments

Groundwater Assessment for impact assessment, including data analysis, modelling and reporting, for numerous mining developments, of which most are coal mines unless noted:

State	Location	Operator/client	Description	Dates
NSW	Dendrobium Mine	South32	Numerous EIS/SMP applications, management plans, compliance reporting	2014-
	Tahmoor Mine	Glencore / SIMEC		2013-
	McPhillamys Gold	Regis	Assistance with EIS assessment	2017-19
	Wilpinjong Mine	Peabody	Wilpinjong Extension EIS assessment	2015-16
	Analysis/modelling for other mines: Moolarben, Mt Pleasant, West Wallsend (Hunter), Appin/BSO (Southern Coalfield)			
SA	Olympic Dam Wellfield	BHP	GAB spring impact assessment	2019-20
QLD	Baralaba North	Cockatoo Coal	Continued Operations Plan EIS assessment	2014
	Teresa Coal Project	Linc Energy	EIS assessment	2012-13

Water Resource Assessments

- Conceptualised and constructed a groundwater–surface water model of the Ovens Valley in northern Victoria (2008-12). This incorporated a custom 2-D recharge and runoff model linked to a MODFLOW-SURFACT groundwater model. This was used for climate change and groundwater extraction scenarios to help the regulator manage the Lower Ovens GMA, and is to be used for further assessments for significant entitlement applications.
- In 2017 carried out an assessment of groundwater and surface water data in the Upper Ovens WSPA (VIC) for the North East CMA as part of the 5-year review of the Management Plan enacted in that area (w/ Groundwater Logic / WaterTech).
- In 2018, reviewed water resource modelling, specifically the climate change assessment, of the Lower Ovens GMA (VIC) for Goulburn-Murray Water.
- Developed a regional groundwater model of East Gippsland (VIC) as part of DSE's 'ecoMarkets' programme (2008-10). This project's aims were to complete a model capable of simulating baseflows and depth to water table across the East Gippsland CMA area.
- East Hampshire and Chichester Chalk Block, southern England (2005-07). Development of a regional-scale recharge model and linked MODFLOW model to improve estimates of abstraction impacts to meet the EU Habitats Directive.
- Hardham Basin recharge model, southern England (2006-07). Construction of a distributed 2D recharge and runoff model to link to a groundwater model to assess sustainable yield at a public water supply abstraction and help investigate freshwater inputs to nearby wetland sites.
- Test and Itchen Groundwater Model (2003-05). Complementary recharge and groundwater models of the Test and Itchen river catchments were constructed and refined for the UK

Environment Agency and the largest regional water company. This model facilitated assessment under the EU Habitats Directive but water resource planning.

- Drought Prediction Model for the Test and Itchen catchments, southern England. Consecutive dry winters in 2005-06 necessitated an attempt to provide advice on the short- / medium-term effects of meteorological scenarios on water resources. Will carried out the modification/ simplification of existing models and provided modelling training to EA staff.

Expert Witness and Independent Technical Reviews

- 2018-20: provided expert opinion to the Australian Federal Government on hydrogeological aspects of PFAS contamination (i.e. 'fate and transport') at RAAF Williamtown, NSW.
- 2018: provided Peer Review of the Groundwater Assessment for a sand quarry near Newcastle, NSW. Also provided review in an appeal against the quarry approval.
- 2016: Will provided independent analysis of climatic records and groundwater-surface water interactions and peer review of related documents regarding the effects of underground mining and rainfall patterns on World Heritage-status lakes near the Southern Coalfield, NSW.
- 2012: provided hydrogeological review to a NSW Shire Council in regard to an EIA for a gold mining development with the potential to impact on that Shire's water supply.
- 2010: represented Goulburn-Murray Water (G-MW) as an Expert Witness at a Victorian Civil and Administrative Tribunal hearing involving two irrigators in the Lower Ovens, a local objector and the water authority. This involved review of other Expert's statements, many of which made reference to earlier work (including numerical modelling) done by Will, production of Witness Statements and cross-examination at the hearing.

Groundwater Modelling - groundwater estimation and control for excavations

Numerical and/or analytical modelling of groundwater inflows and radius of influence around proposed tunnels and shafts, for the following projects, amongst others:

- Woodlands North Housing Development (Singapore).
- East Yarra Main Sewer and Sandgate Sewer Tunnel (both for Melbourne Water).
- Sugarloaf Pipeline (Pipelines Alliance).
- Abu Dhabi Main Sewer (McConnell Dowell).

Training

2014-18: Will presented several groundwater modelling training courses (for various providers).

Publications / conference papers

- Manewell, N. and Minchin, W. (2019). *A novel approach to representing longwall induced fracturing in groundwater models*. Australian Groundwater Conference, Brisbane, November 2019.
- Minchin, W., Brown, S. 2017. Use of MODFLOW-USG and Connected Linear Networks (CLNs) to represent Deformation and Fracturing above a Longwall Mine. (poster) MODFLOW & More, USA.
- Minchin, W., Nicol, C., Merrick, N.P. (2015). *Methods for simulating longwall mining in groundwater models*. Australian Groundwater Conference, Canberra, November 2015.
- Nicol, C., Campbell, I., Pidsley, D., Minchin, W, Merrick N.P. (2013). Employing Hydraulic and Ecological Field Data in an Integrated Model to Assess Bore Field Impacts on Aquatic Ecology. MODFLOW & More, USA.
- Minchin, W, Bolger, P., Nicol, C. and Lovell, D. (2010). *Spatially-distributed catchment modelling of the Ovens Valley, NE Victoria*. 'Groundwater 2010', Canberra.
- Minchin, W, Bolger, P. and Nicol, C. (2010). *Keeping the Geology in Hydrogeology*. Poster at 'Groundwater 2010' conference, Canberra.
- Ross, D., Watson, S., Duggleby, J., Gasca-Tucker, D., Minchin, W, Soley, R., Packman, M. (2007). Quantifying the impacts of a well-field on an SPA/Ramsar Wetland. IAH Congress.