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22 June 2020

Executive Director, Energy & Resources
Department of Planning, Industry and Environment
GPO Box 39
Sydney NSW 2001

Attention: Stephen O'Donoghue

Via planning portal

Dear Stephen,

RE: APPOINTMENT OF SUITABLY QUALIFIED AND EXPERIENCED PERSONS

I refer to Conditions 30(a), Schedule 3 of Development Consent SSD 6764 which state:

> ***Water Management Plan***
>
> *30. Prior to carrying out any development under this consent, unless the Secretary agrees otherwise, the Applicant must prepare a Water Management Plan for the development to the satisfaction of the Secretary. This plan must:*
>
> *(a) Be prepared in consultation with DPI Water and EPA, by suitably qualified and experienced persons whose appointment has been approved by the Secretary;*

In accordance with Conditions 30(a), Schedule 3 of Development Consent SSD 6764, Wilpinjong Coal Pty Ltd (WCPL) seeks the approval of the Secretary for the appointment of the following nominated specialists as suitably qualified and experienced persons for the review and preparation of the Water Management Plan, specifically the Surface Water Management Plan and the Site Water Balance for the Wilpinjong Extension Project.

The nominated specialists (**Table 1**) would be engaged by WCPL for review of the relevant components of the Water Management Plan as described below.

Table 1 Nominated Specialists

Team Member	Role
Duncan Barnes	Review the Water Management Plan - specifically the Surface Water Management Plan and Site Water Balance.
Fiona Stark	Review the Water Management Plan - technical review of the Site Water Balance
Paul Delaney	Review the Water Management Plan - technical review of the Water Management Plan

WCPL considers that the proposed team is suitable for the review of the Water Management Plans. The Curriculum Vitae for each contributing suitably qualified persons are attached. A summary is also provided below.

Duncan Barnes BE (Eng) (Hons)

Duncan has over 12 years' experience in the investigation and design of site water management on mining projects. He uses a variety of modelling programs including DRAINS, MUSIC, 12D, Autocad, XP-RAFTS, GoldSim and XP-SWMM. He has been involved with numerous surface water management projects, particularly in the design and analysis of drainage systems (both water quantity and quality), WSUD, site water balances, surface water assessments and erosion and sediment control design. Duncan is CPESC certified for the design of erosion and sediment control works. Duncan has experience in water management audits, detailed dam design and the preparation of various management plans used at mine and quarry sites.

Fiona Stark - B.Eng (Env)

Fiona is a Principal Surface Water Engineer and Registered Professional Engineer Queensland (RPEQ) with over 14 years' experience in surface water investigation, planning, approvals and design. Fiona is an environmental engineer and chartered civil engineer, specialising in surface water modelling, investigation, planning and design. Fiona is particularly experienced in mine water management and stochastic water balance modelling including use of GoldSim software having developed GoldSim models for several design and operations projects as well as portfolio risk assessment models. Fiona has provided training in the use and interpretation of water balance models to several mine sites in Queensland, and her expertise in Goldsim is highly regarded.

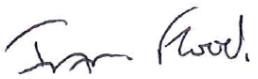
Paul Delaney - BEng(Civil)(Hons), MIE

Paul is a highly experienced Civil Engineer with substantial experience in the pre-construction project management of capital works, stormwater management, and civil engineering design. He has been responsible for client side project management of capital works and development projects from inception through to operation; the project management of multi-disciplinary consultant teams; team leadership of civil engineering design teams; and the preparation of detailed engineering design and tender documentation. Paul has broad skillsets, with particular skills in mine water management, erosion sediment control, and design of civil works.

It would be greatly appreciated if you would consider the qualifications and experience of the above persons proposed to review and prepare the Water Management Plans and provide the Secretary's endorsement in accordance with Conditions 30(a), Schedule 3 of Development Consent SSD 6764.

If you have any further questions or wish to discuss this request, please call (02) 6370 2528.

Yours sincerely,



Ian Flood
Manager Project Development & Approvals
Wilpinjong Coal Mine
Peabody Energy Australia Pty Ltd

CURRICULUM VITAE

DUNCAN BARNES

ASSOCIATE

Civil and Structural Engineering, Asia-Pacific

QUALIFICATIONS

BEnvEng	2007	Bachelor of Environmental Engineering (1st Class Honours), University of Newcastle, NSW, Australia
CPESC	2016	Certified Professional in Erosion and Sediment Control, Australia

EXPERTISE

- Erosion and Sediment Control
- Surface Water Assessment and Management
- Surface Water Engineering Design
- Site Water Balances
- Urban Stormwater Management and Design (including WSUD)
- Site Auditing
- Environmental Management Plans
- Water Quality Monitoring

Duncan has over 12 years' experience in the assessment and design of water management infrastructure using a variety of modelling programs including GoldSim, DRAINS, MUSIC, 12D, Autocad, XP-RAFTS and XP-SWMM. He has been involved with numerous surface water management projects, particularly in the design and analysis of drainage systems (both water quantity and quality), WSUD, site water balances, surface water assessments and erosion and sediment control design (for which he is CPESC certified).

Duncan has experience in water management audits, detailed dam design and the preparation of various management plans used at industrial, commercial, residential, mine and quarry sites and also offers experience in water monitoring and facility closure plans. In addition, he has worked within the environment team supervising coal seam gas drilling in SE Queensland and during secondment placement on the Ravensworth North Project.

Duncan has had experience working on the pre-tender design of the South West Rail Link as part of an alliance drainage team and worked on a Pacific Highway upgrade from Coopernook to Herons Creek. He has also undertaken work on high level infrastructure assessments, designing rail crossings, positioning intersections, strip footing construction inspections and culvert inspections.

PROJECTS

	Erosion and Sediment Control (ESC)
Mount Owen Complex Bayswater North ESCP and Detailed Design (2019)	Involved the conceptual and detailed design (for construction) of water management structures to convey and treat runoff from the proposed Bayswater North dump area at the Mount Owen Complex. This design involved both hydrological and hydraulic modelling in XP-RAFTS.
Mount Pleasant ESC Audit, Hunter Valley, NSW, Australia (2019)	Two-day ESC audit of the Mount Pleasant Mine. The outcome of the ESC audit was a comprehensive action spreadsheet with recommended actions and risk rankings of observed issues. This audit was proceeded by several ESC audits in previous years.

Mount Owen Operations Quarterly ESC Inspections, Hunter Valley, NSW, Australia (2016-Ongoing)	Mount Owen Operations Quarterly ESC Inspections. The outcome of the ESC inspections was a comprehensive action spreadsheet with recommended actions and risk rankings of observed issues.
Hunter Valley Operations Glider Pit ESCP, Hunter Valley, NSW, Australia (2019)	Involved the conceptual and detailed design (for construction) of water management structures to convey and treat runoff from the proposed Glider Pit dump area at the Hunter Valley Operations mine. This design involved both hydrological and hydraulic modelling in XP-RAFTS and detailed design of several dams and conveyance channels.
Camp Hill Wetland Desilting ESCP, Brisbane, QLD, Australia (2019)	Involved in the preparation of an ESCP (report and drawings) for the proposed desilting works at the Camp Hill Wetland.
Albert Street High Rise Development ESCP, Brisbane, QLD, Australia (2019)	Involved in the preparation of an ESCP (report and drawings) for the proposed high-rise development at Albert Street, Brisbane.
Meteor Downs Rail Loop, QLD, Australia (2019)	Involved in the preparation of an ESCP (report and drawings) for the proposed rail loop construction works at the Meteor Downs mine.
Ravensworth Open Cut Pre-Strip ESCP, Hunter Valley, NSW, Australia (2018)	Involved in the design of water management structures to convey and treat runoff from the proposed pre-strip disturbance areas at the Ravensworth Open Cut mine.
Darwin Luxury Hotel, Darwin, NT, Australia (2018)	Involved in the preparation of an ESCP (report and drawings) for a proposed luxury hotel in Darwin.
Moreton Bay Cycleway, Moreton Bay, QLD, Australia (2018)	Involved in the preparation of an ESCP (report and drawings) for a proposed cycleway in Brisbane. The project was undertaken for Brisbane City Council.
Bulga Commonwealth Drill Pad, Bulga, NSW, Australia (2018)	Involved in the preparation of ESCP drawings for the rehabilitation of a number of drill pads on Commonwealth land for the Bukga Underground Coal Mine.
Bulga Underground Quarterly ESC Inspections, Bulga, NSW, Australia (2013-2018)	The outcome of the ESC inspections was a comprehensive action spreadsheet with recommended actions and risk rankings of observed issues.
Erskine Park Transfer Station, NSW, Australia (2018)	Involved in the preparation of an ESCP (report and drawings) for the Erskine Park Transfer Station upgrade works. The ESCP included measures for both the construction and operational phases of the works.
Mount Owen Pre-Strip, NSW, Australia (2018)	Involved in the design of water management structures (concept and detailed) to convey and treat runoff from the proposed pre-strip disturbance areas at the Mount Owen Complex mine.

Mount Pleasant Rail Loop, NSW, Australia (2018)	Involved in the preparation of an ESCP (report and drawings) for the proposed rail loop at the Mount Pleasant mine.
Ipswich Hospital, Ipswich, QLD, Australia (2017)	Involved in the preparation of an ESCP (report and drawings) for Ipswich Hospital construction works.
Ensham Mine, QLD, Australia (2017)	Involved in the preparation of an ESCP (report and drawings) for the Ensham mine in Queensland. The ESCP provided guidance on ongoing ESC management at the mine.
Wambo Coal Mine ESCP, NSW, Australia (2017)	Preparation of a site wide ESCP of the Wambo Coal Mine which included catchment analysis and capacity assessment of all sediment dams at the site. Detailed site catchment plans were prepared for Wambo Coal as part of this project.
Bulga Underground Longwall 8 Drill Pad ESCP, Bulga, NSW, Australia (2016)	Involved in the preparation of ESCP drawings for drill pads associated with Longwall 8 at the Bulga Underground Mine.
Bulga Surface Operations ESCP, Bulga, NSW, Australia (2016)	ESCP drawings and report for a Noise and Visual Bund at the Bulga Coal Mine. The Noise and Visual Bund is a large emplacement dump which extends for approximately 10kms. The ESCP involved conceptual and detailed design of water conveyance structures to safely convey runoff to the toe of the emplacement.
Origin Energy Secondment, Roma, QLD, Australia (2014)	One month Environmental Officer secondment for Origin Energy in the coal seam gas fields of SE Qld (based in Roma). Whilst the role involved the management of a range of environmental factors the primary role was to ensure suitable ESC management of gas pads and the access roads.
	Surface Water Assessment, Management and Design
CCL701 Closure Plan, Gunnedah, NSW, Australia (2017-2019)	Prepared a Surface Water Assessment (SWA) to support a Detailed Mine Closure Plan for the Consolidated Coal Lease 701 (CCL701). CCL701 is the site of the former Gunnedah Colliery which operated for over 100 years until closure in September 2000. The lease covers 5,635ha, for which 951.6ha is owned by Whitehaven Coal. CCL701 encompasses Melville Open Cut, a Coal Preparation Plant site, a Tailings Storage Facility and a number of underground portals. This SWA included the design of water management structures to manage runoff from large disturbance areas including hydrological modelling, site water balances and the development of a monitoring / maintenance program.
Macquarie Coal Preparation Plant Discharge Water Management Strategy, NSW, Australia (2017-2018)	Investigation to address the Environment Protection Licence (EPL) 1360 notice of variation which requires a Discharge Water Management Study (DWMS) for the Macquarie Coal Preparation Plant (MCPP). This investigation specifically addressed the requirements of condition U1.2 which included a detailed catchment plan, predictions of runoff volumes and water quality over time, an assessment against water quality limits and details of practicable measures to achieve the relevant objectives and prevent pollution of the receiving environment upon mine closure.

OCAL Complex Mine Closure Plan, Surface Water Assessment, NSW, Australia (2016)	Prepared a Surface Water Assessment (SWA) to support a Detailed Mine Closure Plan for the OCAL Complex which encompasses the West Wallsend Colliery (WWC), the Macquarie Coal Preparation Plant (MCPP), the former open-cut, Westside Mine and the former Teralba Colliery (Northgate and Southgate sites). This SWA included an assessment of the Westside Final Void including a water balance, spillway design (conceptual and for construction) and a final void water quality assessment.
Tarrawonga Water Management Plan, Boggabri, NSW, Australia (2016)	Preparation of a Water Management Plan (WMP) to satisfy project approval conditions for the continuation of the Tarrawonga open cut mine, near Boggabri. Furthermore, the WMP was prepared in consultation with the relevant regulators and incorporated a Water Balance, Erosion and Sediment Control Plan and Surface Water Monitoring Program.
Abbey Green Rehab Drainage Design, Hunter Valley, NSW, Australia (2015)	The project involved hydrological and hydraulic modelling to undertake a detailed design of the proposed water management structures at the Abbey Green Rehab area of the MTW mine. The detailed design involved the preparation of design drawings, a report detailing the methodology, assumptions and results of the design and a construction cost estimate.
Muswellbrook Coal Mine Surface Water Management Study, Muswellbrook, NSW, Australia (2015)	Undertook a surface water study for the Muswellbrook open cut coal mining operation located in the Hunter Valley, NSW. The focus of the study was to develop a final void landform design in accordance with the approved Mining Operations Plan (MOP) focussing on assessing existing water management infrastructure and developing the design of water management structures to be implemented during each of the remaining MOP phases. The study also addressed the risks associated with adequate sizing of water storage structures and the advantages of strategic rehabilitation and water management planning.
Mount Thorley Water Management Design, Hunter Valley, NSW, Australia (2015)	Desktop review and site inspection of the existing water management structures at the MTW mine in order to recommend improvements to the water management system. The recommended improvements were then conceptually designed and documented in a report.
Pine Dale Coal Mine, Stage 2 Extension Surface Water Assessment, NSW, Australia (2014)	Preparation of a Surface Water Assessment (SWA) for a proposed extension to the Pine Dale Coal Mine in the Western Coalfields region. The key aspects addressed within the Surface Water Assessment include the identification of potential surface water impacts as a result of the Proposal, a description of the proposed mitigation and management measures to be implemented to address these potential impacts, licensing requirements, recommendations for ongoing surface water monitoring and a site water balance. The site water balance includes a discussion on water sources, water security and the potential for discharges from the Site
West Wallsend Colliery Pit Top Dam Assessment, NSW, Australia (2013)	Included an assessment of the water management system at the West Wallsend Colliery pit top area. This included hydrological modelling of the site, dam capacity calculations and detailed design (for construction) of dam augmentation works.

Chain Valley Colliery, Surface Water Assessment, Chain Valley, NSW, Australia (2012)	The Surface Water Assessment included standard ESC and rehabilitation measures to ensure the compliance with the site's statutory requirements and minimising the risk of pollution to downstream waterways due to disturbance works. The control measures included upstream clean water diversion drains, downstream sediment fences and the revegetation of disturbed areas (including hydromulch on cut/fill batters). A gravel surface was applied to all the hardstand areas immediately following earthworks to minimise erosion at the site.
	Site Water Balance
CCL701 No 5 Entry Boxcut Water Balance, Gunnedah, NSW, Australia (2017-2019)	Site water balance of the No 5 Entry Boxcut to make an assessment of the likely annual water volumes available for water use on the property. Due to the limited soil data available, the water balance investigation was intended as a high-level assessment of the possible water volumes likely to be available for farming purposes.
Tarrawonga Coal Mine Water Balance, Whitehaven Coal, NSW, Australia (2018)	Detailed daily time-step water balance of the Tarrawonga Coal Mine in GoldSim to assess both water security and the volume/frequency of potential site discharges. The project also involved a report to document the methodology, assumptions and results of the water balance investigation.
New Acland Final Void Water Balance, Qld, Australia (2017)	Detailed daily time-step water balance of the proposed New Acland Mine Final Void in GoldSim to assess the potential for potential overflows and offsite discharges. The project also involved a salinity balance and a report to document the methodology, assumptions and results of the water balance investigation.
Rocglen Coal Mine, NSW, Australia (2017)	Detailed technical assessment of the preferred final landform option (including the final void) at the Rocglen Coal Mine (RCM) in response to questions and issues raised by the Department of Planning and Environment (DP&E). This technical assessment included a final void water and salinity balance, an assessment of groundwater inflow rates and long-term localised groundwater levels, a final void water quality assessment, recommendations pertaining to managing potential surface water and groundwater risks, a design of water management structures and monitoring and maintenance requirements.
Westside Final Void Water Balance, NSW, Australia (2016)	Detailed daily time-step water balance of the Westside Final Void in GoldSim to assess the potential for potential overflows and offsite discharges. The project also involved a report to document the methodology, assumptions and results of the water balance investigation.
McCahills Water Balance (Townsville), Qld, Australia (2016)	Preparation of a site water balance of the MaCahill's waste management facility for inclusion into a site Stormwater and Wastewater Management Plan. The objective of the water balance was to assess both water security and the volume/frequency of potential site discharges. The project also involved a report to document the methodology, assumptions and results of the water balance investigation.
Pine Dale Coal Mine, Stage 2 Extension Water Balance, NSW, Australia (2014)	Detailed daily time-step water balance of the proposed Pine Dale Coal Mine Stage 2 Extension layouts in GoldSim to assess both water security and the volume/frequency of potential site discharges. The project also involved a report to document the methodology, assumptions and results of the water balance investigation.

Chain Valley Colliery Extension Water Balance, Chain Valley, NSW, Australia (2012)	Detailed daily time-step water balance of the proposed Chain Valley Colliery extension to assess both water security and the volume/frequency of potential site discharges. The project also involved a report to document the methodology, assumptions and results of the water balance investigation.
	Stormwater/Water Quality Design
Woodlawn Bioreactor Leachate Management Audit, NSW, Australia (2019)	Independent leachate management audit of the Woodlawn Bioreactor site. The audit included consultation with regulators, an assessment of the leachate management system (including the leachate treatment plant) and improvement recommendations.
Erskine Park Waste Facility Stormwater Design and Surface Water Design, NSW, Australia (2017)	Surface water assessment and stormwater design of the proposed waste transfer station at the Erskine Park Resource Management Facility in Sydney. The project was classed as a State Significant Development (SSD) and included the design of pits/pipes, rainwater tanks, an on-site detention system and a bioretention basin.
McCahills Stormwater and Wastewater Management Plan, Townsville, QLD, Australia (2016)	Prepared Stormwater and Wastewater Management Plan for the MaCahill's waste management facility in support of an application for an amendment to their Environmental Authority (EPPR00757513). The plan included an assessment of the surface water and leachate management system, the design of additional water management structures, a site water balance, environmental management recommendations and surface water monitoring plan.
Auckland Airport Water Efficiency Plan, New Zealand (2016)	Prepared a water efficiency plan for Auckland Airport to identify key trends in water consumption and identify opportunities for improved water efficiency. The plan identified that the key water consuming areas of the Airport were the International and Domestic Terminal Buildings (e.g., lavatories and passenger showers) and the sanitary waste disposal facility. Key external controlled water users were identified as maintenance facilities and in-flight catering services.
Kooragang Island Surface Water Assessment, NSW, Australia (2014-2015)	Development application surface water assessment for a proposed expansion of Boral's waste recycling facility on Kooragang Island (Newcastle). Included an assessment of water demand, supply and reuse, flooding, stormwater quality and quantity, groundwater, ESC and the monitoring/maintenance program. The project also included a site water balance and design of water management structures including a number of infiltration basins.
Kennedy Cove Stormwater Design, NSW, Australia (2014)	The project involved a catchment analysis, development of a hydraulic model of the network, development of options to address the environmental issues being experienced and a multi-criteria analysis of the proposed options. Parameters considered included constructability, maintenance, operation, security, cost, etc. Reporting on the options developed was undertaken with a view to Council implementing the preferred option.
Karuah East Hard Rock Quarry Water Management Plan, NSW, Australia (2012)	Preparation of the Environmental Management System for the Karuah East Hard Rock Quarry (Hunter Quarries). This included the preparation of various management plans including a Water Management Plan and a Pollution Incident Response Management Plan.

South West Rail Link Stormwater Design, NSW, Australia (2011)	Worked as part of a drainage team that designed all of the drainage including cross drainage (culverts), longitudinal drainage (cess drains, pit/pipe networks, diversion drains) and additional local roads and car parks for a 11km section of a new rail line to the south of Sydney from Glenfield to Leppington.
Coopernook to Herons Creek Pacific Highway Upgrade Cross-Drainage Works, NSW, Australia (2010)	Coopernook to Herons Creek, Pacific Highway Upgrade, TCA – Designed longitudinal and cross drainage for the Coopernook to Herons Creek, Pacific Highway Upgrade. This primarily involved hydraulic modelling in DRAINS.
Northlakes Subdivision Drainage Design, NSW, Australia (2010)	Developed stormwater management plan for numerous stages of the large residential subdivision. 12D was used to design the pit and pipe network. Water quality modelling was undertaken in MUSIC and the DRAINS model developed for water quantity was reviewed.
Wyong Car Park Drainage Design, NSW, Australia (2010)	Designed stormwater drainage system for a commuter car park at Wyong (adjacent to the train station). Involved iterative detailed design using both 12D and DRAINS. The client for this project was Transport Infrastructure Development Corp (TIDC).
University of Newcastle, Ourimbah Flooding Assessment, NSW, Australia (2010)	Flooding assessment of the Ourimbah University Campus. Involved hydrological and hydraulic modelling in XP-SWMM and assessment in HEC-RAS.
Waurn Ponds Carpark, VIC, Australia (2010)	Designed water quality devices including rain gardens, bio-retention swales and gross pollutant traps at a major shopping centre car park in Geelong, Victoria. Involved MUSIC modelling and working with Council to get their approval for the design.
	Structural Inspections
Hunter Economic Zone, Newcastle, NSW, Australia (2009)	Carried out numerous construction inspections of a strip footing for a sewer main to be placed in a mine subsidence area. Regular inspections were undertaken on average 3 times a week for several months.
Alphine Way, Thredbo, NSW, Australia (2009)	As part of the RTA's requirements for ongoing road safety, inspections of culverts for stormwater drainage were conducted to identify faults and drainage issues present which could lead to failure. Over 100 culverts were inspected as part of this project. The RTA was very pleased with the quality and timing of the inspections.
Southern Region, NSW, Australia (2009)	Over 400 culvert inspections at the, Kings Highway, Goulburn Road, Federal Highway, Crookwell Road and the Old Hume Highway through Goulburn. Many of these culverts were located in urban areas and provided differing challenges to the ones on rural roads and highways. The RTA was very pleased with the quality and timing of the inspections.
	Water Monitoring
Allworth Quarry Water Monitoring, NSW, Australia (2012)	Included the preparation of the Environmental Management System for the Allworth Park Quarry (Tricon Mining Equipment). This included the preparation of a Water Management Plan and a Water Monitoring Program which included monthly monitoring over several years.

Theiss, Newcastle Harbour, Newcastle, NSW, Australia (2009)	Hunter River / Newcastle Harbour water quality monitoring. A small area in the harbour was found to be contaminated from previous BHP work. A sheet pile wall was required, prior to dredging works, so no contaminants could escape into the harbour. Three rigs were used to drive the piles into the ground. In order to do this piling they required suitable water quality monitoring to ensure that they weren't having an adverse effect on the harbour. The monitoring included going out on a boat for three months (six days a week) and undertook hourly water quality monitoring and water sampling two days a week.
	Environmental Management
Wambo Coal Mine Bi-annual Subsidence Monitoring, Hunter Valley, NSW, Australia (2017-Ongoing)	Bi-annual subsidence monitoring at the Wambo Coal Mine. He monitoring included recording the type and location of subsidence, and features including maximum width, length and depth of cracking. Photographs were taken and the depth of cracking was measured using an incremental string line with a weight attached to the end.
Confidential Client, Australia, Hunter Valley, NSW (2011)	Prepared a Sinkhole Rehabilitation Plan for a confidential client in the Hunter Valley.

CURRICULUM VITAE

FIONA STARK

SENIOR SURFACE WATER ENGINEER

QUALIFICATIONS

BEng	2005	Bachelor of Engineering (Environmental) (Hons), University of Queensland
CPEng	2010	Chartered Professional Engineer Civil Queensland (Civil)
RPEQ	2010	Registered Professional Engineer (RPEQ No. 10889)

EXPERTISE

- Hydrologic and Hydraulic Modelling
- Mine Water Management
- GoldSim Modelling
- Flood Hazard and Risk Assessment
- Floodplain Management
- Levee and Diversion Design
- Dam Consequence Assessments

Fiona is an environmental engineer and chartered civil engineer, specialising in surface water modelling, investigation, planning and design. Fiona has undertaken water balance and management studies, hydrologic and hydraulic analyses for a range of mining, industrial, road design, local government and approvals projects.

Fiona is particularly experienced in mine water management and stochastic water balance modelling including use of GoldSim software having developed GoldSim models for several design and operations projects.

Fiona has significant experience in hydrologic and hydraulic modelling, flood hazard and floodplain risk management. Her experience including a number of structural flood mitigation projects for local governments. She is experienced in the design of levees and creek diversions, particularly in the mining industry and is familiar with the requirements of Australian Rainfall and Runoff 2016.

Fiona is an experienced project and team manager, she has held roles as the as a project manager or lead for large interstate multidisciplinary projects, as well as managing Jacobs' (then SKM's) Brisbane surface water team for two years. Fiona is an experienced user of geographical information systems, particularly ArcGIS.

PROJECTS

Mine Water Management and Water Balance Modelling

Glencore Copper - Mt Isa Mines – Water Projects Water Balance Modelling

Mount Isa Mines are just about to complete a large program of mine water management infrastructure upgrades to achieve compliance of a 1% Annual Exceedance Probability across both their George Fisher and Mount Isa Mines. This included: development of a water quality and quantity water balance model using GoldSim and calibration and verification of the model to recorded data. The model was then used to review and assess the proposed infrastructure and system changes on compliance as well as annual and interim reporting on completed projects.

Fiona was responsible for supporting Mount Isa Mines assess their plans to improve compliance as both a project manager and technical specialist. The assessment requires a fast turn-around on all assessments to support Glencore meet their program and technical rigour to maintain the complex water balance model amid the multiple changes on site.

BHPB – Water Balance Model Uplifts – Stage 1	Fiona held a key role as technical lead in a major project to upgrade all of BHP Billiton's water balance models for its operating Queensland mines. The upgrades included standardisation of the methods for rainfall runoff, releases, modelling storages, transfers and demands. The project involved interaction with sites, assessment of options and presentation of predictions for a 10-year analysis of the proposed mine plan. The project also involved a major review of the current Trigger Action Response Plans (TARP)s and consideration of the regional and site-specific factors influencing the amount of water to be stored each mine site. Fiona had a key role in the development of the revised TARPs. Fiona was also responsible for the delivery of the Poitrel and Peak Downs Mine Models.
BHPB - Preliminary Design of Levee for Isaac River at Poitrel	Fiona was responsible for Project Management of all the preliminary technical studies and the documentation of the concept design for a levee for BHP Billiton's Poitrel Coal Mine. The project supported the progression of the Mine pit to the west and south and into the Isaac River floodplain. Fiona supported the identification study for this Project. This included managing groundwater, geotechnical and flooding assessments and development of a cost-effective option for the Project. Fiona was also the technical lead for the flooding assessment and determination of levee heights.
Rio Tinto Iron Ore – Definitive Engineering Study (DES) West Angelas Deposit C and D	RTIO are undertaking DES for their West Angelas Iron Ore Mine Deposits C&D in the Pilbra, WA. This required hydrologic and hydraulic assessment of a number of design events to size infrastructure including levees, drains and culverts. Fiona was the senior modeller and lead on surface water inputs. Fiona's role included refinement of the PFS RORB hydrologic model to satisfy the requirements of Australian Rainfall and Runoff 2016 including Monte Carlo assessments. Fiona was also responsible for supervising and managing the hydraulic modelling, reporting and liaison with the design team.
BHP Billiton - Central Regional Water Network Strategy – Phase 1	This study was a strategic water management and infrastructure planning study for BHP Billiton's mine affected water pipeline the Central Regional Water Network (CRWN). The study included: linkage and Development of a GoldSim model to represent the CRWN links between four of BHP's Bowen basin mines; and Identification of system constraints (bottlenecks) and opportunities for improvement in water security. Fiona was responsible for developing the GoldSim model to assess the water requirements and opportunities to release water across the combined network.
South32 - Groote Eylandt Mining Corporation (GEMCO) – Water Balance Model and Supply Assessment	This project involved significant updates to the GEMCO GoldSIM water balance model to represent key transfers, catchments and water inventory. The analysis included assessment of an alternative method to introduce stochastic groundwater inflows to the surface water model based on the depth of water within each quarry and the probability of a given groundwater inflow rate based on uncertainty in the surrounding bore sampling. The study was used to characterise the potential for water shortfalls or excess and was used by GEMCO to support investment decisions regarding the future operation of the site. In addition to the water balance assessment a one-dimensional flood model of the adjacent creek systems was developed and an extent of inundation provided to GEMCO for the 1 in 20 and 1 in 100 AEP flood events. Fiona was the project manager and technical lead responsible for the modelling and delivery of the project.
Glencore Copper - Lady Loretta Mine – Water Balance Modelling Support	Fiona has supported Lady Loretta Mine in a range of surface water assessments over the past few years as well as the continued improvement of their water balance modelling. This has included, a major uplift to represent for changes to the site, calibration and verification, assessment of the Design Storage Allowance and wet season predictions.

BMA - Blackwater Mine – 2015 Water Balance Update	This project was to provide BMA with an update to their Blackwater Mine Water Balance model. This included significant updates to the GoldSim model to incorporate the contaminant transport module, representation of storages as reservoirs and inclusion of stochastic climate data. In addition to the model updates the model was updated for revised site data and used to assess the potential for water shortfalls in the future. The model was then used to examine and report on the benefits of six options to reduce the risk of water deficits. Fiona was the project manager and technical lead responsible for the modelling and delivery of the project.
BHPB - Gregory Crinum Mine – Water Balance and Closure Assessment	This project involved modelling of water quality and quantity at Gregory Crinum mine post closure. The analysis included development of a GoldSim stochastic water balance model of the mine until the end of mining operations and through closure. The analysis also included assessment of options to change pit connections to the adjacent creek through SymHyd modelling and modelling of potential backwater and overtopping flows. Fiona was the project manager and technical lead responsible for the development of the water balance model, assessment and reporting.
RTCA – Dams and Diversions Surveillance	Fiona was responsible for the 2017 inspection and RPEQ sign off for the annual dams and diversions surveillance inspections and reports for RTCA's Hail Creek and Kestral Mine. Fiona has also supported the assessments which included Blair Athol Mines for the past three years.
BMA Regional Water Strategy – Phase 1 (2012 – 2013) **& Phase 2** (2014 – 2015)	This study was a strategic water management and infrastructure planning study for all of BHP Billiton's raw water pipeline infrastructure within the Bowen Basin. The study included: Development of a simplified GoldSim model to represent all of BMA's Bowen Basin existing mines and growth sites; Liaison with BMA and sites to confirm water requirements and predicted production profiles to inform projected raw water demands; Review of all raw water infrastructure to confirm current capacity restrictions; and Identification of system constraints (bottlenecks) that may constrain water supply and thereby production; Assessment of options to improve raw water supply to sites. Fiona was responsible for developing a GoldSim model to assess the water requirements and flood risks across an entire portfolio of mines within Queensland's Bowen basin. The model is now being used to develop infrastructure plans for the client across the basin.
New Acland Stage Three EIS & Site Water Management Support	The project involved baseline studies, impact assessment and development of mitigation measures for the expansion of an open cut coal mine in the darling downs. Fiona was responsible for project management and delivery of the surface water resources component of the EIS. This included an options assessment for Lagoon Creek and 6 km diversion of Lagoon Creek. Tasks included existing environment hydrology and hydraulics including the development of models, diversion design, development of a mine water balance using GoldSim software, impact and mitigation assessment and negotiations for environmental authority conditions with regulatory agencies. Fiona has continued to support site with approvals and water management support over the last several years from 2007 to 2018.
BMA Saraji East EIS (Phase 1)	The Saraji East project involved project management for the proposed Saraji East Coal mine located in the Bowen Basin. Fiona worked as the discipline lead for the surface water studies before transitioning to the role of 2IC project manager. Fiona was responsible for coordinating multidisciplinary teams and liaison with the client design team to develop the Project description and to deliver the projects EIS (ongoing). Fiona was also responsible for managing the delivery of the surface water resources chapter of the EIS.

CURRICULUM VITAE

PAUL DELANEY

TECHNICAL DISCIPLINE MANAGER

Civil Engineering, APAC

QUALIFICATIONS

1984	Bachelor of Engineering (Civil), (Hons)

EXPERTISE

- Water Management
- Flooding and Hydraulics
- Water Quality and ESC
- Design/Study management

Paul is a Civil Engineer with broad experience across the infrastructure, mining and urban development sectors. He has been responsible for client side project management of development projects; project management of multi-disciplinary consultant teams; specialist surface water investigations reports; and the preparation of detailed engineering design and tender documentation.

Paul has specialist skills in stormwater management, hydraulics, and water sensitive urban design and is highly experienced in the design of civil works. He enjoys leading and contributing to multi-disciplinary teams, and delivering high quality technical solutions which meet client needs.

PROJECTS

Paul leads a team of civil and environmental engineers with a strong focus on water management and ESC for mining clients

Rum Jungle	Project Manager for surface water components of project involving rehabilitation of this historic and highly contaminated mine site in NT. Aspects include flood behaviour on the Finniss river, design of levies and diversions, treatment of pit water, and erosion and sediment control for major earthworks.
United Wambo	ESCP designs for several pit shell clearing and haul road
Hunter Valley Operations	Quality review of multiple designs for ESCP works including contour banks, drop structures and several large sediment basins
Hillview Quarry	Surface water assessment to support EIS for a new quarry
Ravensworth Mine	Investigation and design of final landform drainage, conveyance channels, and sediment basins at several locations
Patton's Slipway	EIS Soils and Water assessment for redevelopment of an existing marina in Careening Cove, Kirribilli.
Hunter Valley Operations	Project director and technical review for design of several large sediment basins
Port Stephens Koala Sanctuary	Design management for detailed design of project civil and structural works. This project involves the construction of facilities for eco-tourism and care of injured koalas, and includes new tourist centre and hospital buildings, roads and carparks, and glamping sites.
Monaro Concrete Batching Plant	Audit of water management system at a large concrete batching plant in response to EPA Notice

West Wyalong Solar Farm	Surface Water Assessment for EIS on a solar farm located near West Wyalong, involving assessment of erosion and sediment control, hydrology and flooding.
Yarrabee Solar Project	Surface Water Assessment for PEA and EIS on a large solar farm proposal in western NSW. Including impact assessment for flood behaviour, catchment yield and soils.
NSW Planning	Peer Review of surface water assessments for several proposed solar farms, carried out as part of management plan reviews for NSW Department of Planning
Mangoola Mine	Design for staged construction of a levee to protect the pit from flooding, and divert upslope surface runoff into a mine water dam, while protecting the existing riparian environment downstream of the works during construction.
EPA Technical Assessments	Technical Assessments for the NSW EPA of infrastructure associated with 15 waste reduction projects to verify compliance with Deed of Agreement.
Austral Mine	Surface water reporting for an annual audit
Eagleton Hard Rock Quarry	Water Assessment for EIS on a proposed new quarry north of Raymond Terrace and located within water authority's drinking water catchment, and requiring extensive water quality controls.
South-West Rail – Strategic Corridor review	Strategic review of flooding and surface water issues along an identified railway corridor, as technical input to a strategic review of the proposed rail corridor.
OCAL Mine Closure	Design managemneet and quality reviewer for design of a dam spillway and several kilometres of channels to safely convey discharge from a 10,000 year rainfall event. Completed inspections during construction.
Maules Creek Mine	Design of surface water drainage for northern out of pit dump to provide stable conveyance of surface water from surface, and minimise visual impact of the dump, which is over 100m high.
Stotts Creek Recycling Facility	Development of a stormwater and leachate management strategy for a proposed quarry and recycling centre south of Tweed Heads.
Werris Creek Mine	Review and update of Water Management Plan to address regulator comments and include offsite irrigation of mine water.
Mangoola Mine	Review of surface water impact assessment criteria to differentiate between flow and no flow condition. Compliance checking of erosion sediment controls on multiple catchments
Bulga Underground Mine	Feasibility design and cost estimate for 5Ha laydown area for mining machinery.
OCAL Mine Complex	Preparation of cost estimates for proposed closure activities including water management, TSF capping, demolition of surface infrastructure, and mine sealing. Detailed design of spillways for final void and TSF.
Bulga Noise Visual Bund	Design review of surface drainage design including contour drains and multiple drop structures.
Mt Arthur Coal Mine	Project Director for engineering design for updating surface water management system, and detailed design of pumps and pipes

North West Rail Project	Seconded to TfNSW to provide peer review of design documentation, specifications, and contract documentation for a new railway line involving substantial civil engineering works including viaducts, permanent way and railway stations.
Maules Creek Coal Project	Project Manager for engineering design of enabling infrastructure for a new coal mine near Gunnedah, including over 10km of access road, railway, and water supply as well as on-site mine infrastructure area, haul roads, and site water management dams.
ARTC Hunter Valley Alliance	Civil Engineering lead in an alliance with Leighton Contractors to deliver multiple passing loops to augment the capacity of ARTC's Hunter Valley freight network.
Thornton Business Park	Water cycle management strategy and detailed engineering design for a 35 Ha industrial subdivision to mitigate peak flows whilst maintaining environmental flows.
Bulahdelah Bypass	Concept design of stormwater management and preparation of Surface Water section of the EIS for this project.
Hunter Economic Zone	Prepared a Water Cycle Management Plan for industrial estate over 1000Ha in area.
Erskine Park Creek Rehabilitation	Detailed design for the rehabilitation of an eroded creek through an industrial development site, and incorporating bio-retention basins for an adjacent industrial subdivision.
Harrington Park and Gledswood Hills	Review of detailed design for multiple stages including bulk earthworks, retaining walls, roads, stormwater, retention and bio-retention basins for two residential subdivisions each with over 1000 lots.
New Lambton Gardens	Flood modelling and detailed engineering design of trunk drainage system for new residential estate with over 300 lots. The scheme incorporated 5 cascading retention basins.

MEMBERSHIPS

Current	Member Engineers Australia