20 November 2024

Department of Planning, Housing and Infrastructure
GPO Box 39
SYDNEY NSW 2001

Attention: **Mr Stephen O'Donoghue, Director, Resources Assessments**

via email: Stephen.ODonoghue@planning.nsw.gov.au

Dear Mr O'Donoghue

RE: TARRAWONGA COAL MINE - FINAL VOID AND MINE CLOSURE PLAN

Whitehaven Coal Limited (Whitehaven) is currently preparing the Tarrawonga Coal Mine Final Void and Mine Closure Plan in accordance with Condition 65 of Schedule 3 of the Tarrawonga Coal Mine Project Approval (11_0047). Condition 65 of Schedule 3 requires the Final Void and Mine Closure Plan be reviewed by suitably qualified and experienced person/s whose appointment has been endorsed by the Secretary of the Department of Planning, Housing and Infrastructure (DPHI). The relevant extract from Condition 65 of Schedule 3 of Project Approval (11_0047) can be found below:

> *65. The Proponent shall prepare and implement an updated Final Void and Mine Closure Plan (as a component of the overall Rehabilitation Management Plan required under condition 64 of schedule 3), following consultation with the Secretary. A draft plan must be prepared and submitted to Resources Regulator by the end of December 2019, and a final plan must be prepared and submitted to Resources Regulator by the end of December 2024. Each version of the plan must:*
>
> *(a) be subject to independent review and verification by suitably qualified, experienced and independent person/s (including a groundwater expert) whose appointment has been approved by the Secretary;*
>
> *…*

Whitehaven is seeking the endorsement of the Secretary of the following experts to review the Final Void and Mine Closure Plan:

- Dr Noel Merrick (HydroAlgorithmics Pty Ltd) – review and verification of groundwater components of the Final Void and Mine Closure Plan.
- Mr Damian McGarry (HydraLogic) – review and verification of the surface water and drainage components of the Final Void and Mine Closure Plan.

The Curriculum Vitae of the above suitably qualified and experienced experts are attached, with a summary provided below.

Dr Noel Merrick

Dr Merrick is a groundwater modeller, hydrogeologist and geophysicist with a wide range of experience in groundwater science. Since and co-authoring the Murray Darling Basin Commission (MDBC) modelling guidelines), Dr Merrick has undertaken more than 300 peer reviews of modelling studies and groundwater assessments for industry and government infrastructure and mining projects in New South Wales, Victoria and Queensland. In November 2019, Dr Merrick was awarded the inaugural Groundwater Professional Award by IAH Australia for lifetime achievement in hydrogeology for services to education, research and industry.

Dr Merrick was responsible for the preparation of the Groundwater Assessment for other Whitehaven-owned mines including the Groundwater Assessment for the Vickery Extension Project and Maules Creek Continuation Project.

Mr Damian McGarry

Mr McGarry specialises in water planning and flood risk management with over 33 years' experience in the water industry providing specialist engineering services in hydraulics, hydrology, integrated water management and strategic flood risk management for local governments in Southeast Queensland.

Mr McGarry's core skills include strategic planning and policy development, computational analysis and modelling, model calibration and verification, design event flood estimation, probable maximum floods estimation, and assessments of stormwater quality infrastructure. Mr McGarry has undertaken numerous flood studies, stormwater management plans, stormwater quality assessments, and hydraulic assessments (including peer reviews) for various urban development and mining projects.

It would be greatly appreciated if you would consider the above details regarding the qualifications and experience of the above persons and provide the Secretary's endorsement in accordance with Condition 65 of Schedule 3 of the Project Approval (11_0047).

Please do not hesitate to contact the undersigned if you wish to discuss.

Yours sincerely
WHITEHAVEN COAL LIMITED

Matt Hollis
Superintendent - Environment

Enclosure 1 – Dr Noel Merrick's Curriculum Vitae
Enclosure 2 – Mr Damian McGarry's Curriculum Vitae

ENCLOSURE 1
DR NOEL MERRICK'S CURRICULUM VITAE

Noel Merrick

Senior Principal Hydrogeologist

Qualifications

PhD (Groundwater Management)	University of Technology, Sydney	2000
GradDip (Data Processing)	New South Wales Institute of Technology	1980
MSc – research (Geophysics)	University of Sydney	1977
BSc	University of Sydney	1971

Biography

Noel is a groundwater modeller, hydrogeologist and geophysicist with 50 years of experience in groundwater science. He retired in May 2009 from the University of Technology, Sydney, where he was Associate Professor and Director of the National Centre for Groundwater Management. He ran courses in Groundwater Modelling, Groundwater Geophysics and Groundwater Policy and Management. As a researcher, he pioneered methods for resource sustainability quantification and management, particularly using optimisation techniques, and has been engaged in research projects with the Aquaculture, Rice, Cotton and Contaminant CRCs. He was a member of the NSW working group that drafted the State Groundwater Policy documents and advised the Office of Water on prescriptive elements of the Aquifer Interference Policy (2012). In November 2019, he was awarded the inaugural Groundwater Professional Award by IAH Australia, for lifetime achievement in hydrogeology for services to education, research and industry.

Noel has participated on a number of expert panels as the water expert for the NSW government. He regularly reviews groundwater resource models for Commonwealth and state government departments. He has also been a long-time member of the Murray-Darling Basin Independent Audit Group – Salinity, covering the ACT and the basin States.

Currently, he is a member of Technical Advisory Panel for the Office of Groundwater Impact Assessment (Queensland). He has presented expert witness testimony at several court cases in NSW, Queensland and New Zealand. Having authored the peer review section of MDBC groundwater flow modelling guidelines, he has been heavily involved in peer reviewing groundwater modelling studies in NSW, Victoria, Western Australia and Queensland.

Professional history

Director, Senior Principal	Heritage Computing Pty Ltd	2020-
Technical Director	SLR Consulting Australia	2019-2020
Director, Senior Principal	NPM Technical Pty Ltd t/a HydroSimulations	2016-2019
Director, Senior Principal	HydroAlgorithmics Pty Ltd	2013-2019
Director, Senior Principal	Heritage Computing Pty Ltd t/a HydroSimulations	2010-2016
Director, Senior Principal	Heritage Computing	1980-2010
Associate Professor	University of Technology, Sydney	2005-2009
Acting Director	National Centre for Groundwater Management, UTS	2004-2008
Research Scientist	UTS Institute for Water and Environmental Research Management	2001-2008
Senior Lecturer	Groundwater Modelling and Geophysics, UTS	1992-2005
Lecturer / Senior Lecturer	University of N.S.W.	1987-1992
Senior Hydrogeologist	Department of Water Resources, N.S.W	1987
Geophysicist /Hydrogeologist	Water Resources Commission, N.S.W	1972-1986

Suitably qualified expert

- Federal Department of the Environment: Foxleigh Mine Groundwater Monitoring Plan
- NSW Department of Planning & Environment: Wilpinjong Coal Surface and Ground Water Response Plan
- Department of Planning & Environment: Metropolitan Mine LW20-22 , LW23-27, LW301-303 Extraction Plans

- ❑ NSW Department of Planning & Environment: Duralie and Stratford Coal Mine Groundwater Management Plans.

Mining projects

- ❑ Development of longwall coal models: South Galilee and Galilee (Qld); Metropolitan, Bulli Seam Operations, Dendrobium and Tahmoor (Southern Coalfield); Ulan and Wilpinjong (Western Coalfield); Narrabri and Caroona (Gunnedah Coalfield); Wambo, Spur Hill and Doyles Ck (Hunter Coalfield) (NSW).
- ❑ Development of open cut models: Duralie and Stratford (Gloucester); Tarrawonga and Vickery (Gunnedah).
- ❑ Development of density-coupled solute model for lithium mine (Argentina).
- ❑ Peer reviews of numerous mining models: e.g. Carmichael (Galilee, Qld), Clermont Qld, Kestrel Gregory Crinum Qld, Coppabella Qld, Latrobe Vic, Phulbari (Bangladesh), Bickham, Abel, Moolarben, Wilpinjong, Boggabri, Ulan, Dendrobium, Ashton, Narrabri, Maules Creek, Caroona, Watermark, Mt Owen, Liddell, Drayton South, West Wallsend, Neubeck, Mandalong, Werris Ck, Airly, United, Gloucester Gas Project, Brandy Hill, Bylong, United (all NSW), etc.

Quarrying projects

- ❑ Membership of the IHAP Panel for the Somersby Fields Project (sand quarry).
- ❑ Development of a groundwater model for Calga Sand Quarry.
- ❑ Expert witness at the NSW Land and Environment Court: Rocla's Calga Sand Quarry.
- ❑ Expert witness at the Qld Land Court: East End Mine.
- ❑ Peer review of groundwater assessments: Central Coast Sands Quarry, Somersby; Brandy Hill Quarry, Raymond Terrace; Balranald mineral sands; Hawsons iron.

Water Resource Investigations

- ❑ Development of finite element groundwater flow model: Port Botany reclamation; Sydney Airport Third Runway; Eastern Distributor & Airport Link tunnels (Sydney).
- ❑ Development of regional water resource models: Lower Namoi, Mooki, Botany Sands, Buronga (all NSW).
- ❑ Development of solute transport models: Buronga, Helensburgh.
- ❑ Peer reviews of numerous models and groundwater investigations:
  - infrastructure (Badgery's Creek airport, Epping-Chatswood Rail Link),
  - water supply: Parkes-Forbes, Upper Namoi, Murrumbidgee, Upper Nepean (NSW); Perth, Pilbara, Albany (WA); Bribie Island. North Stradbroke Island, Pioneer (Qld); Adelaide Plains (SA); Corangamite, Loddon, Campaspe, Anglesea (Vic); Murray-Darling Basin (3 states); Canterbury (NZ); Baruun Naran (Mongolia),
  - sewage (Gerringong; Cronulla) and waste (Castlereagh),
  - contamination (Botany; Mascot; Homebush; Pasminco & Incitec Newcastle),
  - irrigation (Swagman-Farm software; Coleambally NSW; Werribee Vic) and salinity (Padthaway SA, Eastern Mallee NSW/Vic),
  - seawater intrusion (Pioneer Qld; Uley SA; Albany WA), swamps (Newnes NSW).

Environmental Impact Assessment

- ❑ Preparation of groundwater assessments: Baralaba, Galilee and South Galilee (Qld); Metropolitan, Bulli Seam Operations, Tahmoor, Duralie, Stratford, Tarrawonga, Wambo, Wilpinjong, Vickery, Caroona, Spur Hill (NSW);
- ❑ Development of water level and water quality triggers for groundwater management plans: Metropolitan Mine NSW; Duralie NSW; Stratford NSW; Springvale NSW; Angus Place NSW. Peer review: Foxleigh, Qld.

Contaminated Site Assessment

- ❑ Development of groundwater contamination models: Botany Sands (Orica); Boolaroo (Pasminco); Boolaroo (Incitec); Sydney Domestic Airport; Mt Piper (Delta Electricity); Blenheim (NZ).

Professional Training

- ❑ Supervision of 20 PhD research projects;
- ❑ Supervision of 72 Masters research projects;
- ❑ Academic lecturer from 1987 to 2009;
- ❑ Presenter, National Groundwater Schools (1975+);
- ❑ Presenter, specialist introductory and advanced modelling short courses from 1997;
- ❑ Chairman and presenter, "Water in Coal Mining" schools 2011 (Brisbane), 2012 (Newcastle), 2013 (Adelaide).

Publications / conference papers

- ❑ Keynote Speaker at seven conferences (four international);.
- ❑ Over 500 report and journal publications.

ENCLOSURE 2
MR DAMIAN MCGARRY'S CURRICULUM VITAE

Damian McGarry
CURRICULUM VITAE

Qualifications
Bachelor of Engineering (Civil)
University of Queensland 1990

Registered Professional Engineer Queensland
RPEQ 6045
Certificate IV in Project Management

Academic Affiliations
Adjunct Associate Professor University of the Sunshine Coast (2010 – 2018)

Industry Affiliations
Member Engineers Australia (MIEAust)
Member Floodplain Management Australia

Employment Journey
Director, HydraLogic (June 2011- Current)
Director, McGarry and Eadie (2010-2011)
Principal Engineer, Sunshine Coast Regional Council (2008-2010)
Principal Engineer, Maroochy Shire Council (2004 – 2008)
Director, Hydra Logic Engineering (1997 – 2004)
Graduate and Senior Engineer, Brisbane City Council (1990 – 1996)

Damian is a Civil Engineer with 33 years professional experience. For the past three decades Damian has provided specialist engineering services in hydraulics, hydrology, integrated water management and strategic flood risk management for local governments in South East Queensland. Throughout his career Damian has played a key role in promoting contemporary water management strategies across South East Queensland and interstate.

Damian's interests lie in delivering integrated planning, policy and strategy outcomes for urban water management, flood risk management and climate change vulnerability.

Damian has practised as a technical specialist, a construction manager and principal engineer. This experience has provided him with the knowledge and proven ability to deliver significant outcomes across the water management sector.

Damian is the founding Director of HydraLogic. Through HydraLogic Damian provides technical support and strategic advice on specialist flooding and water planning matters to planners, designers, decision makers and risk managers. Damian's services are often applied to 'bridge the gap' between the technical engineering analysis and practical interpretation and implementation for decision makers.

Damian is a sought after project mentor and strategist, providing project planning, project support and communication strategies to help scope, guide and successfully deliver client projects.

Damian is an engaging confident speaker and a well-known workshop facilitator who has delivered hundreds of workshops and presentations to thousands of industry professionals.

As an Adjunct Associate Professor Damian supported the University of the Sunshine Coast's Faculty of Science, Health, Education and Engineering.

Damian McGarry
CURRICULUM VITAE

Damian's core skills include:

Strategic Planning and Policy Development for:
- total water cycle management planning;
- policy development for flood risk management;
- strategy development and implementation;
- stormwater quality infrastructure planning;
- flood mitigation infrastructure planning;
- disaster management; and
- climate change vulnerability.

Technical Specialist:
- computational analysis and modelling;
- model calibration and verification;
- design event flood estimation;
- probable maximum floods estimation; and
- economic analysis for flood damage estimation.

Data Collection
- Static flood data collection systems;
- ALERT Radio Telemetry rainfall and stream height networks;
- Enviromon configuration, operation and maintenance;
- Aerial Laser Scanning (ALS) and ground survey for terrain and floor levels; and
- Coordination of Disaster Management and Flood Information Centres.

Project Support Services
- Project planning;
- Project mentoring;
- Communication strategies;
- Report writing;
- Contract management;
- Risk assessments;
- Workshop facilitation;
- Project coaching; and
- Project strategies.

Selected Project Experience

Lake Entrance Boulevard – Flood Mitigation Options Assessment
Developed a detailed 2D HEC RAS flood model for Lake Entrance Boulevard. The model was calibrated to peak historical flood levels. The calibrated model was used to understand the characteristics of significant residential flooding experienced at this location. A series of flood mitigation options were developed to test the effectiveness of various mitigation approaches to reducing the frequency and impact of significant rainfall events on this location.

McArthur River Mine Mine Levee Wall Stability and performance assessment - Peer Review
Independent peer review of the mine levee wall stability performance assessment. The assessment undertaken by others considered the performance of the mine levee wall for a 0.1% AEP flood event for current and future climate conditions.

Flood Management Operations Plan – Noosa Council
Preparation of a flood management strategy for Noosa Council to identify priority areas for flood management and to guide future investment. The strategy included stakeholder consultation, the preparation of strategic framework, and stakeholder workshop facilitation.

Flood Warning Intelligence System – Scoping Study
A scoping study undertaken for Noosa Council to inform the procurement of a flood warning intelligence system. The study defined the role of flood intelligence systems, reviewed a selection of proprietary flood intelligence platforms, interviewed local government stakeholders in SEQ, and provided recommendations for Council's investment in a flood intelligence system.

Flood Risk Management Studies Scoping and Tender Documentation - Southern Downs Regional Council
An extensive review of Council's existing flood information followed by preparation of a background discussion paper. Following consultation with SDRC management, the findings were used inform the preparation of tender documents to update a series of flood risk management assessments across the local government area.

Flood Emergency Management Plan – Lorient By Mosaic
Preparation of a flood emergency management plan (FEMP) for the riverside Lorient development. The plan covered flood characteristics of the area, sources of flood intelligence, triggers, actions, and role responsibilities.

Flood Hazard Assessment – Valdora Road, Maroochy River
Preparation of a flood hazard assessment to support a subdivision application. To inform the assessment a detailed 2D HEC RAS flood model was developed using boundary conditions imported from a regional parent model of the floodplain. The 2D rain-on-grid assessment was validated using a localised WBNM hydrology model.

Flood Impact Assessment – Hoopers Road, Kunda Park
A detailed flood impact assessment to identify the optimised extent of developable land whilst limiting potential impacts to remain within the subject property. This assessment involved the development of a detailed 2D HEC RAS flood model using boundary conditions imported from a regional parent model of the floodplain.

Coastal Hazard Adaptation Strategy – Noosa Council
Permanent inundation mapping for Noosa River estuary for projected timeframes of 2040, 2070 and 2100. Inundation mapping and animations included inundation time contour (frequency and duration) bands for each inundation extent for each projected time period. Land uses and major infrastructure data were extracted from within each time band to inform an economic impact assessment (undertaken by others) of future permanent inundation due to mean sea level rise.

Sunshine Coast Council Stormwater Management Strategy
Preparation of a strategy framework informed from extensive internal Council stakeholder consultation. This Council wide strategy for stormwater management establishes a vision and objectives which align with Council's Environment and Liveability Strategy. The objectives are pursued through a range of policy directions and delivered via a structured Action Plan.

Stormwater Network Vulnerability Assessment
Technical assessment of potential vulnerability to tidal inundation of the urban stormwater drainage network associated with the lower Noosa River estuary. The assessment utilises Mean High Water Springs (MHWS) and the Highest Astronomical Tide (HAT) tidal planes to determine which elements of each stormwater network may be inundated by backflow conditions. A network vulnerability assessment for each of these tidal planes was conducted for existing (2018) and future climate conditions for 2040, 2070 and 2100. This assessment has considered 1,108 independent stormwater networks comprising 8,816 pipes and 7,852 stormwater pits and manholes.

Stormwater Backflow Prevention Study
Spatial and technical analysis of coastal stormwater networks to identify networks with existing and future backflow potential for the Sunshine Coast Council. Backflow inundation occurs when the tailwater outlet flood levels of the stormwater network exceed the ground surface levels at a connected stormwater pit or manhole without there being a direct connection of surface inundation between the outlet and pit or manhole. Within the limits of the study area 3,613 independent stormwater networks comprising 26,870 stormwater pits and manholes were included in the broad-scale assessment. Of these networks, 662 were found to possess some potential for backflow across the range of inundation events tested. Following a broadscale risk assessment 28 sites were prioritised for conceptual design of backflow prevention.

Six Mile Creek Flood Model Upgrade
Technical coordination and project support role for Noosa Council. HydraLogic undertook an initial scoping project for the upgrading of the old 1D flood model and amalgamation of hydrologic models from across the catchment. HydraLogic prepared the tender brief and assisted with the tender evaluation. HydraLogic provided technical support and project coordination on behalf of Noosa Council to the successful consultants. HydraLogic also facilitated two community reference group meetings to gather anecdotal flooding observations from residents and inform them of the study findings. The combined hydrologic model was completed in WBNM and the 2D hydraulic modelling in TUFLOW.

Old Noosa Road Bridge Replacement Hydraulic Assessment
The Old Noosa Road timber bridge crossing of Six Mile Creek was identified by Noosa Council for replacement due to structural deterioration and load limits. Noosa Council engaged HydraLogic to undertake an analysis of bridge's existing hydraulic characteristics and to investigate potential changes in localised flood conditions due to possible options for upgrading the bridge and associated roadway. HECRAS hydraulic modelling in 1D and 2D domains was undertaken to inform the assessment.

Flood ALERT Station Identification
HydraLogic was engaged by Noosa Council to identify preferred locations for the positioning of ALERT radio telemetry flood gauges in the target areas of Cooroy and Pomona townships and reaches of Kin Kin Creek floodplain. The site selection process commenced with a preliminary desktop assessment to identify potential gauge sites within the target areas. A multicriteria analysis (MCA) was then developed to evaluate and compare the overall suitability of each site for flood

monitoring. A site inspection was then conducted to make site based observations and confirm assumptions of the MCA. A prioritised list of preferred gauge sites determined for each of the three target areas. Six new ALERT radio telemetry flood gauges have now been installed at the recommended locations.

Flood Alert Consequences for Noosa Council
HydraLogic provides technical support to the Noosa Council's Local Disaster Coordination Centre. Through this role it was identified that flood Alert warnings generated and issued through the Bureau of Meteorology's Enviromon software needed to be accompanied by a summation of likely consequences associated with each gauge and each level of alert. HydraLogic identified and collated approximately 600 likely consequences of flooding associated with the Minor, Moderate, Major and Extreme flood classifications of Enviromon.

Flood Risk Assessment for Noosa Planning Scheme
HydraLogic was engaged to provide technical support towards Noosa Council's preparation of a new planning scheme. To inform and support the provisions and mapping of the new planning scheme with regards to flooding, HydraLogic prepared a flood risk assessment of the lower Noosa River. Noosa River Flood Risk Assessment adopts a simple and transparent methodology to score and rank relative levels of risk across the flood affected communities in the lower Noosa River. The results of the assessment spatially identify locations within the community likely to possess higher relative risks to flooding. The locations of higher relative risk are then each assessed for potential strategic directions to manage the risk.

Noosa Council Flood Management Plan
Working in collaboration with Noosa Council, this project included a full inventory assessment of flooding resources and the development of a structured online repository for these resources. The project also included an organisation wide flood management capacity assessment to identify core objectives and key activities to advance Council's flood risk management capabilities. These objectives and outcomes were documented and adopted as the Noosa Council Flood Management Plan.

Noosa River Flood Model Upgrade
Technical support and project management role for Noosa Council. This engagement began with the preparation of a scoping document and subsequently a tender brief to guide the upgrading of the Noosa River Flood Model. The engagement continued with the provision of technical support and guidance to Council and the consultants and peer review of the consultant's findings and reports to ensure they were to a high standard and satisfied Council's project objectives.

Dr Pages Road Hydraulic Analysis and Design
Technical analysis and project support for Noosa Council. This project began with the preparation of a local catchment hydrologic model and series of 1D hydraulic models to determine preliminary culvert sizes for the upgrade of Dr Pages Road, Cootharaba. Basic training in WBNM was provided to Council officers and ongoing technical support and peer review of final designs and analysis.

Bradman Ave Flood Risk Management Strategy
Technical support role to the Sunshine Coast Council. The role included preparing the project plan, preparing tender documents, assessing technical reports and documenting these assessments, technical communications with the primary consultant and preparing final reporting documents on behalf of the Council.

Flood Risk Management Scoping Report for proposed Solar Farm at Valdora, on Queensland's Sunshine Coast.
Principal consultant for the preparation of the *Flood Risk Management Scoping Report.* The solar farm is proposed to be located within a significant floodplain replacing sugar cane. The site and its access are impacted by existing flooding conditions which are projected to worsen over time due to climate change.

Montessori International Flood Risk Assessment
Principal consultant for the preparation of a detailed flood risk assessment for the proposed relocation of the Montessori School to Forest Glen. The assessment included and evaluation of potential flood risks to proposed school facilities using a two dimensional hydraulic model with direct rainfall applied.

Total Water Cycle Management Planning across SEQ
Project support roles to assist with the preparation and delivery of Total Water Cycle Management Plans as required by EPP (Water) for Sunshine Coast Council, Logan City Council and Gold Coast City Council. Project support role includes project planning, workshop facilitation, communication strategies and document authoring.

RPEQ certification of Total Water Cycle Management Plans
Provided RPEQ certification for Moreton Bay Regional Council's Total Water Cycle Management Planning process. Engaged to provide technical direction and RPEQ certification for Sunshine Coast Council, Gold Coast

City Council and Ipswich City Council Total Water Cycle Management Plans.

Stormwater Quality Management Strategy for Stockyard Village development Mt Isa.
Principal consultant for the preparation of a stormwater quality management strategy. Project included the development of a runoff reduction optimisation analysis tool which utilises 37 years of rainfall and evaporation records to size onsite detention areas for infiltration and evapotranspiration to reduce stormwater pollutant discharge from the site.

Climate Change Development Adaptation Guideline, Sunshine Coast Council.
Principal consultant for the preparation of development guidelines for adaptation strategies for coastal developments in flood sensitive locations. This project was undertaken in collaboration with Climate Planning Pty Ltd, Blackburne Jackson Design and DLA Piper.

Strategic Stormwater Quality Infrastructure Planning, Brisbane City Council.
Preparation of a Strategic Stormwater Quality Infrastructure Planning discussion paper for the Priority Infrastructure Planning Team to guide future investments and investigations. This project led to a subsequent engagement to develop a stormwater quality infrastructure estimation tool (SQISE) used for establishing an initial investment estimate for broad scale application of stormwater quality infrastructure across Brisbane City. This tool utilises Monte Carlo style analysis.

Total Water Cycle Management Planning Guidelines for Local Governments in SEQ, Department of Environment and Resource Management
Primary author of guidelines to assist local governments in SEQ to prepare total water cycle management plans for their local government areas.

Priority Infrastructure Planning for stormwater quality infrastructure
Project leader responsible for preparing Priority Infrastructure Plans and Infrastructure Charges Schedules for stormwater quality infrastructure.

Critique of WSUD Retrofit Approaches in SEQ
Commissioned by WaterByDesign to author a discussion paper providing a critique of three WSUD retrofit approaches of local governments in SEQ. This paper provides an insight into the infrastructure delivery process and compares the effectiveness of each approach against the stages of delivery.

Maroochy North Shore Climate Change Vulnerability Assessment
Project leader responsible for project coordination, workshop facilitation, analysis and reporting. The vulnerability assessment covered infrastructure, environment, finance, local economy, public health, liability, planning and policy.

Maroochy River Value Economic Analysis
In collaboration with CSIRO the Maroochy River Value Economic Analysis undertook a desk top study to identify economic elements within the local community which are underpinned by the health of the Maroochy River. The study derived a total annual "value" of the River and demonstrated the relationships between local economies and natural assets.

Flood Damage Estimation for Maroochy River Catchment
Project leader for developing a catchment wide flood damage model for the Maroochy River. The project derived locally based stage-damage curves to inform a flood damage estimation model. The model included damage elements for: residential; commercial; industrial; open space; agriculture and roads. The model derives an annual average damage value from an aggregated series of design flood estimations up to the PMF.

floodReady are you? Community Flood Awareness Campaign
Project leader for preparing a community flood awareness campaign. The project included issue identification, brand development, communication strategies and campaign implementation. *floodReady are you?* branding and advertising is a generic community awareness package available for adoption by any relevant agency.
www.floodready.gov.au

FKP Residential Development Pty Ltd vs Maroochy Shire Council
Expert witness for Sunshine Coast Regional Council (formerly Maroochy Shire Council) in defence of appeal against conditions for infrastructure contributions.

Guidelines for Integrated Water Management
Project leader for the preparation of guidelines for integrated water management to support Planning Scheme Codes and Planning Scheme Policies for integrated water management.

Maroochydore Principal Activity Centre
Principal engineer responsible for Structure Plan elements and Planning Scheme Policy relating to integrated water management. Included preparation of

two dimensional flood models with consideration of climate change, tsunami, storm tides and freshwater flooding.

Effluent Reuse Task Force
Coordination of the effluent reuse taskforce report on recycled water management options for Maroochy Shire. Project included issue identification, options analysis, triple bottom line assessment and reporting.

Flood Emergency Mapping for Maroochy River Catchment
Project leader for the preparation of high resolution flood emergency planning maps for the Maroochy River Catchment. Mapping included freshwater and storm tide events and was based upon a compilation of flood studies projected onto ground terrain data derived from aerial laser scanning.

Sippy Downs Town Centre Integrated Water Management Planning
Project leader for the coordination of an integrated water management plan for Sippy Downs Town Centre Master Plan. Project included preparation of Local Area Codes, Planning Scheme Policies and detailed concept design for implementation of urban water management strategies within the Master Plan precincts.

Minimum Energy Loss Culvert – Dixon Road Mountain Creek
Principal engineer for the analysis and design of a minimum energy loss culvert for the upgrade of Dixon Road, Mountain Creek.

ALERT Radio Telemetry Flood Monitoring Network
Principal engineer for the ALERT radio telemetry flood monitoring network for Sunshine Coast Regional Council. Network management and development including site selection, procurement, installation, calibration and Enviromon configuration.

Bridgewater Creek Constructed Wetland
Construction manager and site engineer for the Bridgewater Creek constructed wetland retrofit project. This $2.7M project transformed an underutilised suburban park, bisected by a long concrete channel, into one of Brisbane's first constructed wetlands.

Road and Drainage Construction Management
Construction management and site engineer for Brisbane City Council's relief drainage and road rehabilitation program.

Flood Insurance Assessment Reports

Completed over 300 site specific flood assessment reports for insurance claims relating to major flood events across NSW and SEQ. Reporting process included site inspections, data analysis, flood risk assessments and final reporting.