Mark Babister

Panel Chair

Mark is a national leader in floodplain management and analysis. He has successfully completed numerous hydrologic, hydraulic, floodplain management, infrastructure and dam studies. Mark's clear, concise communication style allows him to communicate with all levels of government, stakeholders and the community. Mark has undertaken many infrastructure projects where his key role is to explain the impacts of flooding to a community struggling to understand technical jargon. He has also developed solutions to infrastructure projects that benefit the community both at a regional and a household scale.

Mark is an editor of the 2016 Edition of Australian Rainfall and Runoff, giving Mark a high level of familiarity with current and the direction of future best practice both within Australia and Internationally. Mark has had key roles in the development of a number of national best practice documents. Mark has undertaken a number of expert advice roles including the Queensland floods commission of inquiry, Natural Disaster Insurance Review, Ministerial Advisory Council for the Wivenhoe Manual, and the Brisbane River Catchment Flood Study – Independent Panel of Experts. In 2017 Mark was awarded the Engineers Australia Sir John Holland Civil Engineer of the Year award.

FIRM
WMA Water

SPECIALISATION
Community Engagement on Major Water Resource Projects

Hydrologic / Hydraulic Modelling

Floodplain Management

Flood Frequency, Joint Probability Analysis, Risk Assessments and Monte Carlo Modelling

Computer Programming

Dam Operations

INDUSTRY TENURE
32 years

EDUCATION
Bachelor of Civil Engineering (Honours), University of NSW

Master of Engineering Science, University of NSW

Graduate Diploma in Management, Deakin University

PROFESSIONAL MEMBERSHIPS / PANELS

Engineers Australia, National Committee on Water Engineering, Past Chair

Member of the Australian Rainfall & Runoff Revision Steering Committee

Chair of the Australian Rainfall & Runoff Revision Technical Committee

Former Chair of Sydney Division Water Engineering Panel, Engineers Australia

QLD Ministerial Advisor, Council for Flood Mitigation Manuals

REGISTRATIONS
Registered Professional Engineer Queensland (RPEQ)

Institution of Engineers Australia, Chartered Professional Engineer (CPEng)

National Engineering Register (NER)

RELEVANT AWARDS

- Sir John Holland Civil Engineer of the Year, Engineers Australia 2017

PUBLICATIONS / PRESENTATIONS / PANELS / INQUIRIES / EXPERT WITNESS

- Co-Author – Floodplain Risk Management Guide Incorporating 2016 Australian Rainfall & Runoff in Studies for OEH - 2018
- Australian Rainfall and Runoff Workshop for Engineering Education Australia - 2018
- Editor – Australian Rainfall and Runoff: A Guide to Flood Estimation, Commonwealth of Australia, 2016
- Editor – Australian Rainfall and Runoff Project 15 -2D Modelling of Rural and Urban Floodplains, Engineers Australia 2011
- Contributor - Managing the Floodplain: Best Practice in Flood Risk Management in Australia 2013
- Author - Understanding Floods: Questions and Answers. Queensland Chief Scientist 2011
- Contributor – Australian Emergency Management Handbook Series – Technical Flood Risk Management Guideline: Assessing options and service levels for treating existing risk 2016
- Contributor – Australian Emergency Management Handbook Series – Technical Flood Risk Management Guideline: Flood information to support land-use planning 2016
- Contributor – Australian Emergency Management Handbook 7, Managing the floodplain: Best practice in flood risk management in Australia 2017
- Project Director – Document Techniques to define floodways for OEH
- Queensland Floods Commission of Inquiry 2011 – 2012. Hydrologist assisting the commission of inquiry
- Natural Disaster Insurance Review 2011. Advice on Flood Risk and Floodplain Management.
- Chair - Brisbane River Catchment Flood Study – Independent Panel of Experts – Hydraulics
- Chair - Brisbane River Catchment Flood Study – Independent Panel of Experts – Floodplain Management
- Member - Brisbane River Catchment Flood Study – Independent Panel of Experts – Hydrology
- Revised 2016 Design Rainfall Investigations into the need for and Derivation of Local Techniques
- Peer Review Parramatta River Flood Study for City of Parramatta - 2019
- Subject Matter Expert – Best Practice Strategic Planning for City of Gold Coast – 2019
- Project Director – Review of ARR Design Inputs for NSW – 2018

Ferdinand Diermanse

Panel Member

Ferdinand is a senior researcher/consultant and is an expert in the field of flood risk analysis and flood risk management with over 20 years of work experience. He is currently working for Deltares, The Netherlands, which is an independent institute for applied research in the field of water and subsurface. He has carried out numerous hydrological and risk assessments for a variety of inland and coastal water systems and published various papers on these topics. He has substantial teaching experience and is capable of explaining complex topics to audiences with diverse backgrounds.

Ferdinand participated in the 'Brisbane River Catchment Flood Study – Hydrology phase', as one of the principal investigators. He developed an advanced Monte Carlo Simulation Framework for this project to quantify annual exceedance probabilities of peak discharges and flow volumes.

Ferdinand has participated in several challenging national and international projects. Countries of work experience include Albania, Australia, Bangladesh, Brazil, Canada, Dominican Republic, Ecuador, Egypt, Hong Kong, Indonesia, Islamic Republic of Iran, Ireland, Lao People's Democratic Republic, Liberia, Sao Tome and Principe, South Sudan, Sri Lanka, Tanzania, United States and Viet Nam. Recently, Ferdinand carried out a review for the province of Alberta, Canada, on proposed investments on flood mitigating measures for the City of Calgary. Previously, he led a consortium for a multi-hazard risk analysis for the whole country of Afghanistan, for hazards like floods, droughts, avalanches, landslides and earthquakes. In 2010, he carried out a water resources assessment for South Sudan and advised the Government of South Sudan on this topic in the negotiations with Sudan in the process of forming the new independent country of South Sudan.

FIRM
Deltares

SPECIALISATION
Flood risk analysis

Flood risk management

Hydrology and hydraulics

Inland / coastal water systems

INDUSTRY TENURE
20 years

EDUCATION
Masters of Science (Applied Mathematics), Delft University of Technology, The Netherlands

PhD (Hydrology), Delft University of Technology, The Netherlands

PROFESSIONAL MEMBERSHIPS / PANELS
NRVB - Dutch association for risk analysis

PUBLICATIONS / PRESENTATIONS / PANELS / INQUIRIES / EXPERT WITNESS

Diermanse, F.L.M, D. G. Carroll, J. V. L. Beckers & R. Ayre, 2017. *An efficient sampling method for fast and accurate Monte Carlo Simulations,* Australasian Journal of Water Resources http://dx.doi.org/10.1080/13241583.2017.1304019

Diermanse, F.L.M., D.G. Carroll, J.V.L. Beckers, R. Ayre, J.M. Schuurmans, *A, 2014. Monte Carlo Framework for the Brisbane River Catchment Flood Study,* Proceedings of the HWRS conference in Perth, Australia

Jongejan, R., **Diermanse**, F., Kanning, W., Bottema M., 2019: *Reliability-based partial factors for flood defences,* Reliability Engineering and System Safety (RESS) 193

M Haasnoot, J Kwadijk, J van Alphen, D Le Bars, B van den Hurk F **Diermanse**, A van der Spek, G Oude Essink, J Delsman and M Mens, 2020: *Adaptation to uncertain sea-level rise; how uncertainty in Antarctic mass-loss impacts the coastal adaptation strategy of the Netherlands,* Environmental Research Letters https://dx.doi.org/10.1088/1748-9326/ab666c.

Diederen, D., Liu, Y., Gouldby, B., **Diermanse**, F., and Vorogushyn, S, 2019. *Stochastic generation of spatially coherent river discharge peaks for continental event-based flood risk assessment,* Nat. Hazards Earth Syst. Sci. https://doi.org/10.5194/nhess-19-1041-2019 1041-1053

Dupuits, E.J.C., **Diermanse**, F.L.M. and Kok, M., 2017. *Economically optimal safety targets for interdependent flood defences in a graph-based approach with an efficient evaluation of expected annual damage estimates,* Nat. Hazards Earth Syst. Sci., 17 https://doi.org/10.5194/nhess-17-1893-2017 1893-2017

Klerk, WJ, HC Winsemius, WJ van Verseveld, AMR Bakker and FLM **Diermanse**, 2015. *The co-incidence of storm surges and extreme discharges within the Rhine–Meuse Delta,* Environ. Res. Lett. 10

Diermanse, F.L.M., De Bruijn, K.M. and Beckers, J., 2014: *Importance sampling for efficient modelling of hydraulic loads in the Rhine–Meuse delta,* Stochastic Environmental Research and Risk Assessment March 2015, Volume 29, Issue 3, 637-652.

De Bruijn, K.M., **Diermanse**, F.L.M., Beckers, J.V.L., 2014. *An advanced method for flood risk analysis in river deltas, applied to societal flood fatality risks in the Netherlands,* Nat. Hazards Earth Syst. Sci., 14, 2014 2767–2781

Martin Giles

Panel Member

FIRM
BMT

SPECIALISATION
Hydraulics, hydrology and water resources

Flood risk management

Peer Review

Expert Advice/ Expert witness

Urban flood mitigation

Stormwater management and water quality

INDUSTRY TENURE
30 years

EDUCATION
Bachelor of Civil Engineering (1st Class Honours), University of Queensland

Master of Engineering Studies, University of Queensland

Australian Institute of Company Directors, Company Directors Course (2019)

PROFESSIONAL MEMBERSHIPS / PANELS
Institution of Engineers Australia, Member (MIEAust)

REGISTRATIONS
Registered Professional Engineer Queensland (RPEQ)

Member, Queensland Environmental Law Association

Martin is a Senior Principal with BMT and has 30 years of experience, specialising in hydraulic and environmental investigations. Martin has a First Class Honours degree in Engineering and a Masters of Engineering Studies degree from the University of Queensland.

Martin has completed numerous detailed hydraulic investigations ranging from constrained urban sites to creeks, rivers and floodplains, and has been responsible for the completion of multiple corridor and building designs which minimise flood impacts and provide an acceptable flood hazard. Martin also provides advice in relation to flood risk for a range of developments, with increasing focus on extreme events and climate change.

Martin is an acknowledged expert in Planning and Environment, Land, and Supreme Courts (QLD and NSW).

Martin was the RPEQ certifier for hydraulics for developments on highly constrained sites including the new runway completed as part of the Sunshine Coast Airport Expansion at Marcoola and the RNA exhibition site redevelopment at Bowen Hills.

Martin has been responsible for providing flooding and stormwater management advice and completing modelling in support of the Master Planning of new large-scale developments such as Hamilton Northshore (Brisbane) and Ripley Valley (Ipswich), providing guidance to multi-disciplinary teams.

Martin also provides expert advice to State Government authorities in relation to the approval of developments in its Priority Development Areas including Yarrabilba, Caloundra South, Greater Flagstone, Fitzgibbon and Oxley.

PUBLICATIONS / PRESENTATIONS / PANELS / INQUIRIES / EXPERT WITNESS

- Expert – Surface water (hydrology, hydraulics and water quality) expert for PFAS Class Action in the Federal Court of Australia. Engaged by the Commonwealth of Australia to consider the movement of PFAS in surface waters from Tindal Air Base in the Northern Territory (2019).
- Expert – Rodriguez & Sons v Queensland Bulk Water Supply Authority (Brisbane River Class Action) in the NSW Supreme Court. Engaged by Crown Law on behalf of the State to act as an expert with regard to hydrology (2016-2020).
- Expert – Gateway Motorway Upgrade. Appointed by Transurban to provide expert advice in relation to flood immunity of motorway upgrades (2016 - current).
- Expert – Surface water expert for mine insurer regarding flood claim by Ensham mine relating to levee overtopping (2012-2014).
- Expert – Engaged as an expert by the plaintiff in a Land Court matter against Queensland Rail relating to railway embankment failures in Lockyer Valley in the 2011 and 2013 floods (2014 – 2020).
- Expert – Seppanen v Minister for Economic Development Queensland in the Planning and Environment Court. Engaged by John Seppanen to consider flood impacts associated with large-scale industrial development (2015-2016).
- Expert – Appointed to panel providing expert witness services to Brisbane City Council in relation to Planning and Environment Court appeals. Involved in over 15 matters.
- Expert – Engaged as surface water expert for DES in action against Baal Gammon mine in the Planning and Environment Court for potential discharges and associated water quality impacts (2018-2019).
- Peer Review – Review for Council of all flood studies completed for Lockyer Valley Regional Council subsequent to 2011 flood (2015).
- Technical Advisor – Gateway Upgrade North, Appointed advisor to Queensland Motorways (2014-2015).
- Presenter – Australian Rainfall and Runoff Workshop, Sole presenter of One Day Workshops by Stormwater Queensland, Brisbane and Bundaberg (2017).
- Presenter – "Flood Studies, How survey data is actually used", Queensland Surveying and Spatial Conference 2017.

Tina O'Connell

Panel Member

Tina is an experienced hydraulic engineer currently in the position of Senior Principal Engineer (Hydrology and Hydraulics) with a high level of competency in design of hydraulic structures, flood level and velocity determination. This includes concept design, mathematical modelling (particularly 1D and 2D modelling), design, environmental studies and damage remediation components of projects. Tina's core competency in hydraulic assessments relates to flood impacts at corridor infrastructure (road/rail).

In addition to Tina's core competency, she has also carried out studies relating to Site-based Stormwater Management, Development Flood Impact Assessments, Flood Studies, Flood Plain Management, Water Resources and Dam Studies. She has been integrally involved in Community Information Sessions on road and rail projects across NSW and Queensland.

Tina has worked 23 years in specialist water resources management and design teams in engineering consultancies and seven recent years in state government for the Queensland Department of Transport and Main Roads' Hydraulics and Flooding Team supporting numerous complex hydraulics and flooding studies for a range of linear infrastructure and damage remediation projects throughout the state. This included peer review of the Options Analysis and Business Case of the Gore Highway (Millmerran to Goondiwindi) Pavement Widening and Flood Immunity Rehabilitation Project, Millmerran and Kingsthorpe Urban Stormwater Master Plans for Toowoomba Regional Council and member of the Advisory Group to Lockyer Valley Regional Council for the Lockyer Creek Flood Study and Floodplain Management Study. She was technical peer reviewer of numerous hydraulic reports on the Toowoomba Second Range Crossing and undertook flood immunity and impact studies for the New Grantham Road Access from the Gatton-Helidon Road across the rail line and into QRA's Grantham Reconstruction Area. Her involvement on the Condamine began in 1995 with hydraulic studies for a proposed 120km long Glen Wilga to Tarong railway line.

FIRM
HDR Pty Ltd

SPECIALISATION
Hydrology including runoff routing, flood frequency analysis

Hydrodynamic one-dimensional and two-dimensional modelling packages

Flood Immunity studies

Cross-drainage structures

12d Model / GIS capability

Queensland hydrology of coastal creeks and rivers knowledge including storm surge

Flood Impact Assessment

Extensive knowledge of TMR guidelines, policies, position papers, manuals and standard drawings

INDUSTRY TENURE
30 years

EDUCATION
Bachelor of Civil Engineering (Honours), University of Queensland

Graduate Diploma of Business Administration (Technology Management), Deakin University

PROFESSIONAL MEMBERSHIPS / PANELS
Queensland Department of Transport & Main Roads – Engineering and Technology Specialist Technical Services Panel

Institution of Engineers Australia, Member (MIEAust)

REGISTRATIONS
Registered Professional Engineer Queensland (RPEQ)

Institution of Engineers Australia, Chartered Professional Engineer (CPEng)

National Engineering Register (NER)

RELEVANT AWARDS

- Best Paper, Queensland Water Resources Symposium 2014, Water Panel, Engineers Australia, QLD Division, Brisbane
- TMR Chief Engineer's Award: Development Assessments (Stormwater Drainage), 2013
- TMR Chief Engineer's Award: Road Drainage Training, 2012

PUBLICATIONS / PRESENTATIONS / PANELS / INQUIRIES / EXPERT WITNESS

- O'Connell, Tina. 2020. A Flood Resilient Bruce Highway for North Queensland: Haughton River Floodplain Upgrade. 2020 Digital Floodplain Management Australia National Conference "A Flood Resilient Australia: transforming vision in to action," online.
- Malmsheimer, Travis and O'Connell, Tina, 2020. Balancing Safety and Community Impacts in a Highly Sensitive Floodplain in Central Queensland: Poster Paper. 2020 Australian Water Association and International Water Association Conference, Brisbane.
- O'Connell, T.M. 2016. Hydraulics: using spatial science to pre- and post-process flood modelling. Spatial Sciences Technology Forum, TMR, Brisbane.
- Gonzalez, C and O'Connell, T.M., 2014. Flood immunity and closure of road infrastructure crossing a braided river system: Landsborough. Queensland Water Resources Symposium, Water Panel, Engineers Australia, Qld Division, Brisbane.
- O'Connell, T.M. 2014. Storm tide – Issues for design of bridges/culverts in coastal areas. E&T Forum, Qld Dept. of Transport and Main Roads, Brisbane.
- Training Presenter, TMR's Road Drainage Courses 2011-2016. Delivery of road drainage fundamentals/design training courses to local and regional staff and external parties.
- Training Presenter, TMR's Bridge Construction and Maintenance Courses 2011-2014. Delivery of bridge hydraulics training courses to local and regional staff and externals.
- Doherty, H.M., Weeks, W.D., Niall, R.M., O'Connell, T.M. and Teakle, I.A. 2001. Fast-tracking the Alice Springs - Darwin Railway Project: An Innovation in Culvert Design, National Conference on Hydraulics in Civil Engineering, IEAust, Hobart.
- O'Connell, T.M and Weeks, W.D. 2002. Herbert Master Land and Water Management Plan - Using GIS to Improve Broad Scale Hydrologic Models, National Hydrology and Water Resources Symposium, IEAust, Melbourne.

Steve Clark

Panel Member

Steve Clark, has 30 years' experience as a specialist in the water resources and coastal engineering fields specialising in flood risk and flood risk management. He has an Honours Degree in Engineering and a Masters of Engineering Science from the University of Queensland. Steve is one of the founding Directors of Water Technology Pty Ltd, and was appointed Managing Director in July 2019.

Steve has specialised in the provision of flood warning, waterway & floodplain and coastal risk management services, in particular infrastructure investigations and the potential impact of ongoing climate change processes. Frequently these services have utilised advanced hydrodynamic modelling systems to characterise risks and vulnerabilities throughout Queensland, NSW, VIC Australia and the broader Asian/Pacific region. Steve has provided expert review services on numerous occasions and has provided expert witness services in the Queensland Planning and Environment Court, Land Court and Supreme Court as well as the Victorian Civil and Administrative Appeals Tribunal. He is well versed with the complexities and conflicts that can occur during planning, application and appeal processes.

A significant component of Steve's career has involved community consultation around proposals (both public and private) and community education processes. Steve is an active member of the Floodplain Management Association (FMA), the Flood Community of Practice and Engineers Australia. In particular over the last 2 years Steve has been part of the FMA's Queensland Working Group looking at priorities for Floodplain Management in Queensland, and more broadly opportunities and challenges nationally.

FIRM
Water Technology

SPECIALISATION
Water Engineering

Expert advice and Expert witness services

Climate change adaptation

Risk/vulnerability assessments

Hydraulic assessment and design

Numerical models (hydrologic, hydraulic and water quality) and their application

Environmental monitoring programs.

Flood Warning

Capacity Development

International Development

INDUSTRY TENURE
30 years

EDUCATION
Bachelor of Engineering (Honours), University of Queensland

Masters of Engineering Science, University of Queensland

PROFESSIONAL MEMBERSHIPS / PANELS
Fellow, Engineers Australia

Member, River Basin Management Society

Member, Australian Water and Wastewater Association

Member, Stormwater Industry Association

Member, Queensland Environmental Law Association

REGISTRATIONS
Registered Professional Engineer Queensland (RPEQ)

National Engineering Register (NER)

RELEVANT AWARDS

- Kenneth A. Thiess Prize, 1988

PUBLICATIONS / PRESENTATIONS / PANELS / INQUIRIES / EXPERT WITNESS

- Clark, S. Tate, B. Daly, A. Cunningham, L. Bishop, W, "Flood Planning Levels: incorporating residual risk considerations", 13th Hydraulics in Water Engineering, Sydney, 2017.
- Clark, S. Bishop, W. Cunningham, L. Tate, B. Daly, A., "Utilising Hydraulic Grade Line rather than water surface levels for Flood Planning Levels", 13th Hydraulics in Water Engineering, Sydney, 2017.
- Expert Witness – Aurizon Property v. DTMR - Land Court 2016 (current). Engaged by DTMR to act as an expert with regard to flooding issues associated with the Bruce Highway Upgrade (Vantassel to Cluden) Project.
- Reichard, L. Lobrecht, A. Clark, S. Catalano, C. Tate, B. Cox, D. "Supporting Water Managers Making Effective Decisions by using HydroNET", 35th Hydrology and Water Resources Symposium, Perth, Australia 2014.
- Expert Witness – McConnell Dowell v. Gold Coast City Council PEA 2010 of 2012. Engaged by McConnell Dowell to provide specialist advice with regard to potential hydraulic impacts (and potential mitigation mechanisms) of the proposed Gold Coast Light Rail Project.
- Expert Witness – Mayne v. QR, AbiGroup Contractors, CW-DC Pty Ltd Supreme Court of Queensland No 6346 of 2010. Engaged by AbiGroup Contractors to act as an expert with regard to flooding and associated flood damages alleged as a result of construction of Bauhinia Regional Rail Line.
- Expert Witness – Strathmerton Deviation - VicRoads. Presentation to a panel hearing in Strathmerton regarding the hydraulic assessment and flooding implications of several potential highway alignments.
- Clark, SQ. Wen, L. & Bishop, WA, "RERP Gwydir Wetland Hydrodynamic Model Development Overview". 18th QLD Water Symposium, Brisbane, Australia, 2010.
- Clark, SQ "Hydraulic Roughness Characteristics of the Yangtze River", 16th Queensland Water Symposium, University of Queensland, July, 2007.
- Markar, MS, Clark, SQ, Min Yaowu and Zheng Jing, "Evaluation of Hydrologic and Hydraulic Models for Real-Time Flood Forecasting Use in the Yangtze River Catchment", Australian Journal of Water Resources, Vol 10, No 1, May 2006.
- Betts, HW, Joy, CS, Markar, MS, Clark, SQ, Sterling, E., Gooda, M., Jin Xingping, Wu Daoxi, 2005b. "The Achievements of the Yangtze River Flood Control and Management Project", The 2nd International Yellow River Forum Zhengzhou, 18-21October 2005, China.

Australian Government

Queensland Government

Terms of Reference for an Independent International Panel of Experts for Flood Studies of Inland Rail in Queensland

Final

June 2020

Appointments and secretariat functions to the Independent Panel of Experts are managed by the Queensland Government Department of Transport and Main Roads working in partnership with the Australian Government Department of Infrastructure, Transport, Regional Development and Communications.

Inland Rail

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Document control options

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Project number	
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DMS ref. no.	TBA

Contents

INTRODUCTION

Consistent with the Council of Australian Governments' Transport and Infrastructure Council's priorities, the Commonwealth of Australia and the State of Queensland are committed to working towards improving the efficiency and productivity of Australia's infrastructure and transport systems. Ensuring these systems drive economic growth, increase employment opportunities, support social connectivity and enhance the quality of life for all Australians.

The Inland Rail Program is a further step in ensuring an efficient and seamless national rail system. Inland Rail will provide a new, productive, competitive interstate freight rail corridor to improve the resilience and capacity of the interstate freight network and strengthen inter-regional links across eastern Australia to meet future freight demand.

The Commonwealth has tasked the Australian Rail Track Corporation (ARTC) with the delivery and operation of Inland Rail. This requires the cooperation of the State of Queensland to facilitate the effective development and delivery of Inland Rail and its subsequent operation in the State of Queensland.

The Bilateral Agreement (BA) between the Queensland Government and the Australian Government to facilitate the delivery of Inland Rail was signed on 29 November 2019. The BA includes a provision intended to provide confidence to the Queensland and Commonwealth governments and related communities with regard to the impact of Inland Rail structures on local floodplains. The BA has a requirement to:

> *Establish a panel of independent international experts to advise the Commonwealth, ARTC and the State as to the recommendations regarding the* ***extent, interpretation, assumptions and application of flood modelling****, and best* ***practice for structural design*** *in a floodplain environment, which panel will have members and will operate as agreed by the Commonwealth and State to provide assurance to the parties* ***based on existing flood modelling****.*

Accordingly, the independent panel of experts (the Panel) will provide professional expertise and advice on scientific and technical matters related to best practice flood modelling and design of waterway structures in relation to the Inland Rail in a floodplain environment in Queensland.

Members of the Panel shall have recognised expertise in flood modelling, hydraulics, hydrology or associated disciplines. Ideally, the panel should be comprised of approximately 5 members with no less than 2 members from international companies that have recognised expertise in flood modelling, hydraulics or hydrology.

As envisaged in the BA, the Commonwealth, represented by the Department of Infrastructure, Transport, Regional Development and Communications (DITRDC) and the State of Queensland, represented by the Department of Transport and Main Roads (TMR) will agree the membership of the Panel.

The establishment of the Panel will ensure that experts with appropriate skills are available to provide advice to the governments within the required timeframes and to manage the potential for conflicts of interest.

Membership of the Panel will be ongoing unless a member indicates they no longer wish to remain.

BACKGROUND

The Inland Rail alignment in Queensland crosses diverse terrain, including flood-prone areas like the Condamine floodplain and the Lockyer Valley and river catchments such as the Macintyre River.

Community safety and the potential impact of Inland Rail on flood behaviour is a key concern of many stakeholders along the Inland Rail alignment. ARTC is required to comply with state planning and environmental impact assessment processes, including a detailed assessment of hydrology impacts and design. This will ensure ARTC has appropriate environmental and safety protections in place, as well as adequate mitigation to minimise any potential impacts.

These planning and environmental impact assessments will be primarily conducted through four separate Environmental Impact Statements (EISs) for the Queensland Inland Rail projects subject to evaluation by the Queensland Coordinator-General (OCG). The terms of reference for each EIS include the requirement to describe the existing flood environment, assess the potential flood impact and recommend flood mitigation measures.

ARTC has taken various steps to ensure it has accurate and representative flood modelling. It has:

- engaged specialist flood modelling firm Aurecon to develop custom, place-based flood models
- engaged or funded individual specialists to work independently with community groups
- liaised with independent specialists engaged by other parties
- extensively upgraded its modelling to consider contemporary LiDAR topographical maps (which take into account approved and unapproved surface level structures that cause water flow changes)
- engaged with the community and individuals to calibrate and validate the hydrology and hydraulic modelling.

SCOPE AND ROLE OF THE INDEPENDENT INTERNATIONAL PANEL OF EXPERTS

The role of the Panel is to advise the Commonwealth and Queensland governments on matters in regard to the extent, interpretation, assumptions and application of existing flood modelling, and best practice for design of waterway structures in a floodplain environment.

The Panel will have access to both the hydrologic and hydraulic flood models and will review and validate these to the extent possible in the available time.

The Panel will focus on identifying whether, and to what extent, national and state guidelines and industry best practice has been applied to modelling techniques and outputs that created the existing flood models in four core areas: extent, assumptions, application and interpretation.

Extent

- Applicability and appropriateness for the relevant design stage (e.g. reference/detailed etc.)
- Appropriateness of tool/s selected for flood modelling
- Confirmation that key design criteria are considered reasonable and appropriate compared with typical similar linear infrastructure projects

Assumptions

- Appropriateness of model arrangements and input parameters
- Appropriateness of model calibration process
- Appropriate application of input data (including addressing data gaps)
- Assumptions around land-use (crops etc.)
- Appropriateness of blockage/debris assumptions
- Appropriateness of future events application, e.g. climate change
- Appropriateness of assumed soil conditions

Application

- Appropriate sensitivity analysis to various items e.g. flow inputs, coefficients
- Appropriateness of change indicators
- Appropriateness of structure and embankment representation (depending on the stage of the design)
- Flood frequency analysis

Interpretation

- Achievement of Design Criteria
- Appropriateness of relevant sensitivity analysis
- Confirm Inland Rail-related flood impacts, if any, are comprehensively quantified and interpreted to their local property context
- Appropriateness of the alignment, with regard the related flood impacts, within the current EIS Study Corridor
- Consider whether reasonable and practical steps have been taken to mitigate flood impacts, if any, outside of the project boundary
- Additional information that would be required to be addressed in the Detailed Design phase of the program.

The advice provided by the Panel will include views on the methodologies used for and outputs of the various Inland Rail flood studies commissioned by ARTC, the merits and further development of the approaches offered, the conduct of the studies and peer review of the outputs and recommendations from the studies.

The outputs expected from the Panel are advice and recommendations in respect of:

1. whether the development of the models and their application accords with the relevant requirements of national and state guidelines/manuals (guidelines) for flood estimation and design of structures in flood-prone environments (Attachment A),
2. whether the extent of the floodplain covered by the flood model is appropriate, and if not recommendations as to what additional extent would be appropriate;
3. whether the method, and extent, of calibration of the model accords with guidelines and industry standards for calibration;
4. whether the method for validation of the model accords with guidelines and industry standards and whether the assumptions used underpin the validation process, and the data points used in the validation are appropriate;
5. whether the model adequately:
    a. accounts for the impacts of the reference design; and
    b. whether those impacts are capable of appropriate local mitigation that either removes the impacts or reduces the impact to landholders in the area
6. whether the model is fit for purpose, taking into account the above and any public comments or comments from external stakeholders in relation to the flood model that arises from the public exhibition of the draft Environmental Impact Statement (EIS) for the relevant Inland Rail project; and
7. whether the reference design for the proposed structure meets industry standards for railway structures in a floodplain and if so, whether the reference design is in accordance with best practice.

The Panel may propose additional outputs for consideration of the two governments. In addition to these outputs the governments may seek advice from the Panel in regard to:

1. the development of the scope of works in briefs for tenders in relation to design for Inland Rail in a flood-prone environment;
2. the development of clear and concise translations of technical information and assumptions for communication to non-specialist audiences; and
3. other floodplain related matters in the context of Inland Rail as identified by the governments.

As an advisory body the Panel will not make decisions or recommendations in regard to approvals for the Inland Rail route and engineering design. The Panel will not have any statutory, nor regulatory powers under either Commonwealth or Queensland legislation.

The Panel will provide advice through the Joint Working Group to ARTC on relevant Reference Designs to inform the development of Detailed Designs.

The Panel will work independently of ARTC and the QCG in regard to the development, public consultation and approval processes for the Inland Rail EIS process.

The Panel will have regard for these processes in developing its work program so that where possible its work will be undertaken concurrently with the EIS processes so that its advice is available to help inform QCG's evaluation of the EISs.

The timing and nature of the Panel's reporting on ARTC's flood modelling and reference designs to the governments, including the QCG will be agreed as part of its work program.

Advice provided by the Panel will be used to support assurance related to Inland Rail impacts.

DELIVERABLES AND IMPLEMENTATION

The Panel will provide reports that, when final, will be made publicly available documents. The main purpose of the reports is to provide community assurance about Inland Rail design of waterway structures in flood-prone areas and likely structure interactions with floodwater as modelled by ARTC.

The reports may also be used to inform the QCG review and assessment of comments received in relation to a draft EIS presented by ARTC.

Following the establishment of the Panel it will:

- agree the scope, timeframe and milestones for its work program
- undertake activities according to the scope and timeframe agreed
- consider submissions from community, as relevant to the evaluation of flood models and reference designs against guidelines and industry best practice
- prepare and present draft views, advice and reports to the governments
- seek comments on draft reports as directed
- consider comments in preparing final draft reports for consideration by the governments
- prepare reports to a standard that is suitable for electronic publication by the governments.

GOVERNANCE

The Panel will be managed by a Joint Working Group (JWG) established by the TMR and DITRDC. The departments will have equal decision-making authority over the work of the Panel.

The day to day activities of the Panel will be managed by TMR, including administrative support for coordination of travel, meetings, the provision of information and general administration related to the role of the Panel.

REQUIRED SKILLS AND KNOWLEDGE OF THE MEMBERS OF THE PANEL

Technical expertise and independence

To be considered for the Panel an individual must have demonstrated technical expertise in one or more skill areas such as climatology, geomorphology, hydrology modelling, river hydraulics, floodplain management, flood risk assessment, and design of waterway structures in a flood-prone area.

To be considered for the Panel, individuals should also have:

- memberships and registrations necessary within the nominated areas of technical expertise (i.e. RPEQ, MIEAust, CPEng or international equivalent), or the capacity to achieve such;
- acceptance of a recognised Code of Ethical behaviour (e.g. Engineers Australia); and
- not undertaken paid or unpaid work or activities in relation to either the design, assessment and/or examination of the flood modelling for Inland Rail projects in Queensland.

Ideally, the panel should be comprised of approximately 5 members with no less than 2 members from International companies that have recognised expertise in flood modelling, hydraulics or hydrology.

RESPONSIBILITIES OF THE PANEL

The Panel members will be required to:

- maintain strict confidentiality;
- adhere to the milestones and timelines for the work program as agreed;
- interact and report regularly and communicate fully with JWG and nominated TMR staff;

- engage professionally with stakeholders, including in handling submissions ;
- request and manage information and documentation in a consultative manner; and
- develop high quality analysis and advice as the basis for reports to the governments.

MEDIA

All media and public communications are to be jointly agreed with the Joint Working Group. Panel members must not provide personal opinions or other comments on behalf of the Panel unless previously agreed to by the Joint Working Group.

CONFIDENTIALITY

The Panel will recognise its exposure to confidential information. Improper use or disclosure of confidential information could jeopardise the ability of the Panel to fulfil its role. All information provided to members as part of their role on the Panel should be considered in the first instance "commercial-in-confidence" and must not be divulged to any person without prior written consent of the information provider and the JWG.

Each member of the Panel is to provide a written undertaking (that they will keep information and documents received by them in their role as a member of the Panel, the contents of any meetings, committees or other deliberations of the Panel, confidential unless they are permitted to disclose such information:

- in the course of performing their role as a member of the Panel;
- by the Joint Working Group; or
- by law.

Information will not be considered confidential if it is already publicly available.

All activities of the Panel will be subject to the *Queensland Right to Information Act 2009.*

JOINT WORKING GROUP

The Joint Working Group will comprise the following officers or their proxy or successor:

Joint Working Group Director	TMR Program Director (Rail Planning)
Joint Working Group Director	Director Inland Rail Regional Delivery
Project Manager	TMR Inland Rail
Technical Secretariat	TMR Director (Hydraulics)

ATTACHMENTS

Attachment A – National and state guidelines for flood modelling and design of structures

Attachment B – Flood Models for Inland Rail in Queensland (as at May 2020)

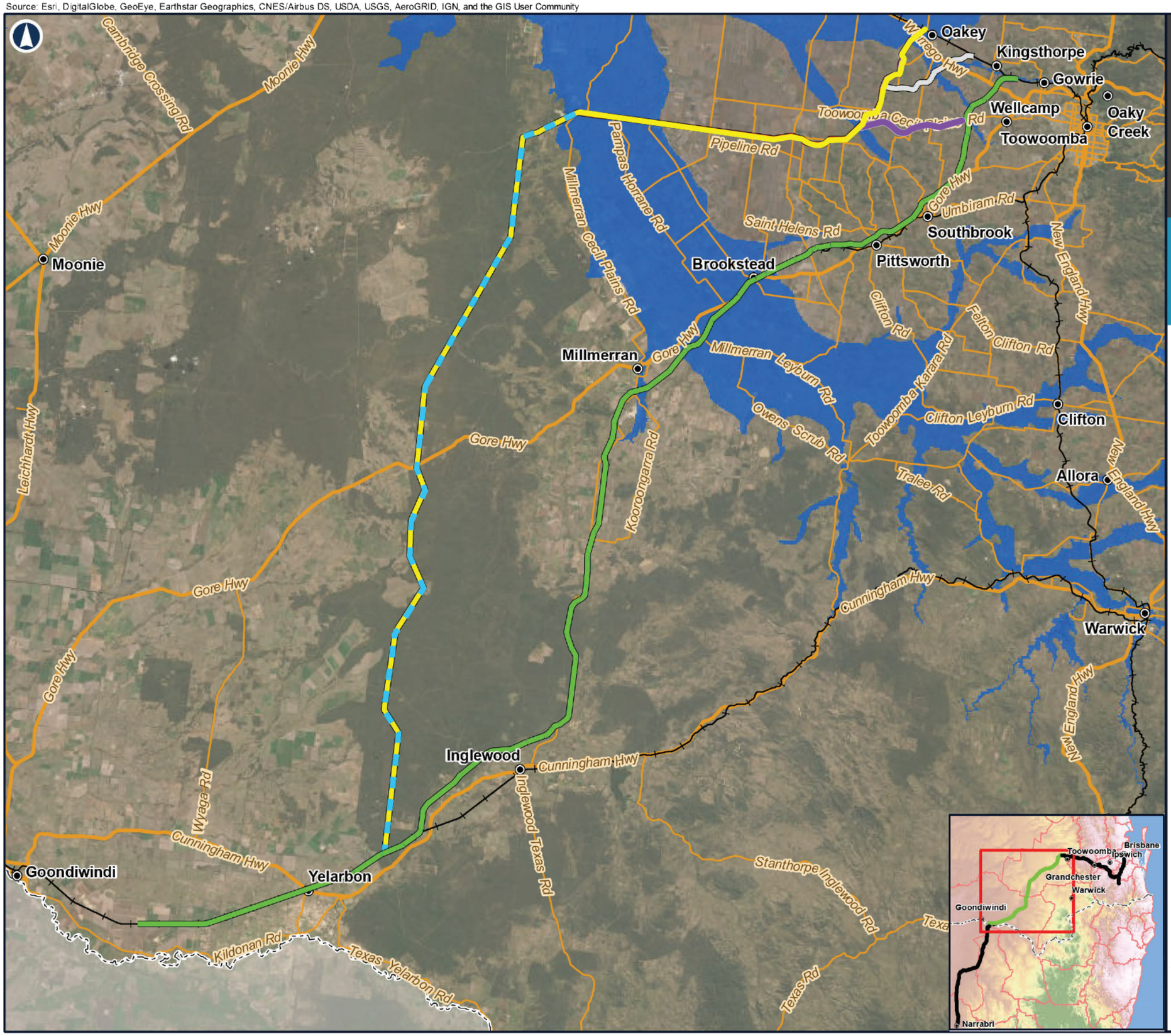
Attachment A – National and State Guidelines for Flood Modelling and the Design of Structures

Publication	Author / Publisher and Date	Access Location
Australian Rainfall and Runoff – national flood estimation guideline	Ball et. al (2019)	http://www.arr-software.org/pdfs/ARR_190514.pdf
Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia	Australian Institute for Disaster Resilience (2017)	https://knowledge.aidr.org.au/resources/handbook-7-managing-the-floodplain/
State Planning Policy – State Interest Guidance Material – Natural hazards, risks and resilience - Flood	Department of Infrastructure, Local Government and Planning (2017)	https://dilgpprd.blob.core.windows.net/general/spp-guidance-natural-hazards-risk-resilience-flood.pdf
Technical Guideline for hydrological and hydraulic modelling	Department of Transport and Main Roads Queensland	https://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Hydrologic-and-Hydraulic-Modelling
Guide to Bridge Technology Part 8: Hydraulic Design of Waterway Structures	AUSTROADS, 2019	https://austroads.com.au/publications/bridges/agbt08
Bridge Scour Manual	Department of Transport and Main Roads Queensland (2018)	https://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Bridge-scour-manual
Road Drainage Manual	Department of Transport and Main Roads Queensland (2019)	https://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Road-drainage-manual

Attachment B – Flood Models for Inland Rail in Queensland (as at May 2020)

Border to Gowrie (B2G) – Hydraulic models
1. Condamine River, large
2. Macintyre River, large (used in B2G and NS2B)
3. Macintyre Brook (Yelarbon to Inglewood), large
4. Westbrook Creek and Dry Creek, medium
5. Gowrie Creek, medium (used in G2H and B2G)
6. Back Creek, small
7. Bringalily Creek, small
8. Macintyre Brook at Bybera Road, small
9. Macintyre Brook at Cremascos Road, small
10. Native Dog Creek, small
11. Pariagara Creek, small
12. Cattle Creek, small
13. Nicol Creek, small
Gowrie to Helidon (G2H)
14. Gowrie Creek, medium (used in G2H and B2G)
15. Intermediate Tunnel Shaft, small
16. Oaky Creek, small
17. Six Mile Creek, small
18. Lockyer Creek, large (used in both G2H and H2C)
Helidon to Calvert (H2C)
19. Lockyer Creek, large (used in both G2H and H2C)
20. Western Creek/Bremer River, medium (used in H2C and C2K)
Calvert to Kagaru (C2K)
21. Western Creek/Bremer River, medium (used in H2C and C2K)
22. Warrill Creek, medium
23. Purga Creek, medium
24. Teviot brook, medium

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



INLAND RAIL

ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.

NSW/QLD BORDER TO GOWRIE

LEGEND

- Localities
- 00 Current Inland Rail alignment
- 01 Yelarbon to Cecil Plains
- 02 Yelarbon to Oakey via Cecil Plains
- 03 Cecil Plains to Wellcamp
- 04 Yargullen to QR West Moreton line
- Existing rail
- Major roads
- Minor roads
- NSW/QLD border
- Condamine river floodplain

0 20 40 km

Coordinate System: GDA 1994 MGA Zone 56

Date: 12/06/2020 Paper: A4
Author: FFJV GIS Scale: 1:800,000
Data Sources: FFJV

Map by: RB Z:\GIS\GIS_310_B2G\Tasks\310-IAC-202003161410_B2G_Milestone5_Alignments\310-IAC-202003161410_Proposed_Forestry_Route.mxd Date: 12/06/2020 15:39

Australian Government

Department of Infrastructure, Transport, Regional Development and Communications

PDR ID: EC20-000332

Mr Gerry McInally
Secretary
PO Box 6100
Parliament House
CANBERRA ACT 2600

Dear Mr McInally

That you for your letter of 19 May 2020 on behalf of the Senate Rural and Regional Affairs and Transport References Committee and its Inquiry into the Management of the Inland Rail project by the Australian Rail Track Corporation and the Commonwealth Government.

In regard to the Committee's requests for information in relation to the establishment of the Independent International Panel of Experts for Flood Studies in Queensland (the Panel) and review of the proposed Cecil Plains route the Department of Infrastructure, Transport, Regional Development and Communications (the Department) is pleased to provide the following information.

Independent International Panel of Experts for Flood Studies (the Panel) in Queensland

Membership of the Panel

On 29 June 2020, the Deputy Prime Minister the Hon Michael McCormack, MP and Queensland Minister for Transport and Main Roads, the Hon Mark Bailey jointly announced the membership of the Panel.

The five members of the Panel are; Mr Mark Babister (Chair) – WMAWater, Ms Tina O'Connell – HDR Design, Dr Ferdinand Diermanse – Deltares, Mr Steve Clark – Water Technology Pty Ltd and Mr Martin Giles – BMT.

Biographies for each of the Panel members are provided at **Attachments A to E**

The Panel's final Terms of Reference (TOR)

A copy of the Panel's final TOR is provided at **Attachment F**.

Update on activities of the Panel

The Panel has commenced work and is currently meeting twice a week as it assesses the data and reports provided by Australian Rail Track Corporation in relation to the 21 flood models and reference designs developed for Inland Rail in Queensland.

A list of the 21 flood models that will be assessed by the Panel is available at Attachment B of the TOR.

The Panel is in the process of finalising its work plan for the assessment of the 21 flood models and reference designs taking in to account when the various Inland Rail Environmental Impact Statements may be released for public consultation.

A copy of the Panel's work plan will be provided to the Committee once it has been finalised.

A copy of the Panel's final report

The Panel will develop a series of reports in relation to the relevant models for each section of the Inland Rail project in Queensland.

The Panel's reports to the Commonwealth and State of Queensland will be publically released as they are competed. The Department will provide copies of the Panel's reports to the Committee as they are published.

Review of the proposed Forestry to Gowrie, via Cecil Plains route

Review process

The Deputy Prime Minister announced an immediate review of the proposed Forestry to Gowrie, via Cecil Plains route to assess whether or not the proposed route would enhance the Inland Rail Service Offering, as defined in 2015 Inland Rail Business Case, over that provided by the Border to Gowrie Reference Design route.

The Government has ask the Australian Rail Track Corporation (ARTC) to gather the data required to enable it to make a like-for-like assessment of the Inland Rail Service Offering attributes; transit time, reliability, cost competitiveness, and availability, of the proposed Forestry to Gowrie and the current Border to Gowrie Reference Design routes.

Independently of the work being undertaken by ARTC's the Department has engaged GTA Consultants (Vic) Pty Ltd to review the data compiled by ARTC to provide assurance that the Service Offering attributes of the two routes can be compared on a like-for-like basis.

A map showing the route options that are under consideration is provided at **Attachment G.**

Progress reports in relation to review activities

No progress reports have been produced.

A copy of the final assessment report

The independent consultants report and the report compiled by ARTC will be released publically following consideration by the Government. The Department will provide the Committee with copies of these reports when published.

Thank you for raising these matters with the Department and I trust this information of assistance to the Committee.

Yours sincerely

Drue Edwards
Director – Inland Rail Operations Branch
Major Transport and Infrastructure Projects Division
10 August 2020

Enclosures
Attachments A to E – Biographies for the Panel members
Attachment F – Final Terms of Reference for the independent Panel
Attachment G – Map of proposed Forestry to Gowrie, Via Cecil Plains route options