ENGINEERING FOR PUBLIC WORKS

ISSUE NUMBER 23

www.ipweaq.com

Winner Projects over $10 million | Winton Shire Council & Peak Services
Resurrection of the Waltzing Matilda Centre, Winton

WE ARE DELIGHTED TO WELCOME, REECE CIVIL AS AN IPWEAQ PRINCIPAL PARTNER!

reece civil

Reece Civil is dedicated to partnering with the civil industry to develop and deliver innovative global solutions that build a sustainable future.

As Australia's largest local distributor and solutions provider, we capitalise on our end-to-end model, market-leading products and technical expertise to collaborate with future-focused partners to deliver projects that lead to a better tomorrow.

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We ensure our extensive product range and comprehensive solutions align with modern compliance. And through Reece Cares, we drive initiatives that help create thriving and sustainable communities and promote the health and wellbeing of trades.

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COMING UP

EVENTS

Register Online

12 – 14 October:
Annual Conference, Cairns

23 – 24 November: Public Works Professionals Orientation, Brisbane

23 November: Art Exhibition

22 – 23 February 2022: Bridge Management Symposium, Brisbane

PUBLIC WORKS TV

Register Online

Dates to be confirmed:

Pedestrian and Cycle Network Improvement Plan - Bli Bli State School Precinct

Protection of Survey Marks

Best Practice Installation of FRC & SRC Pipes

PROFESSIONAL DEVELOPMENT

Register Online

16 September:
Sprayed Bitumen, Emerald

21 – 22 September:
Unsealed Local Roads, Brisbane

28 September: Sprayed Bitumen, Darwin

19 October: Pavements, Materials and Geotechnical Masterclass, Brisbane

26 October: Erosion and Sediment Control Level 2, Brisbane

26 – 28 October: Bridge Inspection Levels 1 & 2, Brisbane

3 November: Managing Risks on Lower Order Roads, Townsville

4 November: Stakeholder and Community Engagement, Brisbane

10 November: QUDM, Brisbane

11 November: Type A, B, & D Sediment Basin Design, Brisbane

11 November: Native Title and Cultural Heritage, Mackay

17 November: Assessing Heavy Vehicle Access to Bridges, Toowoomba

1 – 2 December:
Supervisors Workshop, Darwin

LEARNING HUB

Register Online

Queensland

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IPWEAQ ANNUAL CONFERENCE

CAIRNS CONVENTION CENTRE | 12-14 OCTOBER

REGISTER NOW!

12	540+	2	3	1	3	55
streams	delegates	Workshops	Tech Tours	Masterclass	Keynotes	Speakers

Please join us for the 2021 IPWEAQ Annual Conference to be held at the Cairns Convention Centre, 12-14 October 2021.

4.6
DELEGATE RATED

Sponsorship and exhibition opportunities available

please contact
Monica Robertson on
3632 6802 Monica.Robertson@ipweaq.com

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https://ipweaq.eventsair.com/ipweaq-2021-annual-conference/

#IPWEAQ21

Queensland

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540+ professionals will converge on Cairns for this must-attend event and the premier gathering for our sector. Don't miss it!

KEYNOTE SPEAKERS

Dr Richard Harris SC OAM:
Australian anaesthetist at the forefront of the 2018 Thai Cave rescue, saving the lives of twelve young soccer players.

Lehmo:
Renowned comedian who plays Jim Gibson, government liaison officer in *Utopia*.

Stephen Yarwood:
Former Lord Mayor of Adelaide and contemporary Urban Planner. Stephen is joining us as our Conference MC.

TECHNICAL TOURS

1. City Centre Masterplan
2. Boral Quarry and Bitumen Plant
3. Cairns City Waste Facilities Tour

WORKSHOPS

- Women in Public Works Engineering Masterclass
- Workshop for Elected Members
- Professionals Over 35

PANEL DISCUSSION

Planning for more resilient and sustainable communities in vulnerable locations

THE GREAT DEBATE

Technology will make engineering redundant, which will no doubt generate a robust discussion!

SOCIAL FUNCTIONS

- Excellence Awards gala dinner/ceremony
- Welcome Function – In the Tropics
- Conference Closing Function

All activities and events are included in your full conference registration. Early bird registrations opening late June!

We look forward to welcoming you to Cairns at the premier gathering of those working in the public works sector in Queensland

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Contact Senior Manager, Events & Marketing
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PUBLIC WORKS PROFESSIONALS ORIENTATION

Set your career in the right direction

Up to 12 CPD hours

Location: Brisbane
Venue: Public Works Professionals, 6 Eagleview Place, Eagle Farm
Date: 23-24 November 2021
Time: 8:30am to 4:00pm (each day)

This two-day intensive provides an understanding of the industry to support new professionals joining the public works sector at any stage of their career. Designed in consultation with industry, the program provides big-picture context and essential knowledge to assist professionals to competently navigate the sector.

Who should attend?

- Professionals from other sectors new to public works in Queensland
- Recent graduates
- Contractors undertaking public works projects
- Professionals moving between private and public sector organisations

Benefits

- information and knowledge facilitating an understanding of the sector not otherwise gained by work experience alone;
- provides context on how the public works sector enhances the quality of life for Queensland communities, and how delegates can contribute;
- increases understanding of the relationships between public and private organisations;
- builds resiliency, enthusiasm, and pride for working in the sector;
- supports attraction and retention strategies;
- includes complimentary IPWEAQ membership for current financial year with access to member-only resources and discounts.

Day one:

- ✓ Roles and responsibilities of each level of government
- ✓ Community expectations – Levels of Service and communication
- ✓ Record keeping and governance
- ✓ Managing natural disasters
- ✓ Engineering a sustainable future – smart cities, innovation and circular economies
- ✓ Critical thinking
- ✓ Networks and involvement in the sector

Day two:

- ✓ Native title and cultural heritage
- ✓ Managing infrastructure assets
- ✓ Site visit
- ✓ Career opportunities and goal setting
- ✓ Pathway to registration

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FROM THE EDITOR

Juliet Schaffer
Editor

This issue features technical papers from across Queensland and the Northern Territory from eliminating boil water events on the Cassowary Coast (page 62) to establishing artificial reefs and fish-attracting devices off the Darwin coastline (page 73).

In this issue, we also introduce a new section, Engineering Queensland featuring two engineers: one from the private sector and one from the public sector to share their experiences of working beyond our cities and coastline. And complementing Engineering Queensland, we have two Member Profiles from members working beyond the Great Dividing Range: Geoff Rintoul (Cunnamulla) and Cody Granger (Kingaroy). See Member Profiles on pages 22-31.

With the 2021 excellence awards just weeks away, we look at past winners of Woman in Engineering on pages 32 to 37. We look forward to celebrating the achievements of our 2021 winner when announced at the awards dinner and ceremony in Cairns, 12 October.

We've been fortunate to be able to host in-person events and look forward to seeing you at the Annual Conference in Cairn, 12-14 October and at the Art Exhibition, 23 November. If you're new to the public works sector, whether as a graduate or from another sector, please join us for the second Public Works Professional Orientation, 23-24 November.

If you have any news to share, ideas for articles or a Member Profile, please contact me.

See you in Cairns!

2021 EXCELLENCE AWARDS PROJECT NOMINATIONS

The cover of this issue of EPW features the 2019 winning project for Projects over $10 million from Winton Shire Council and Peak Services. Who will win the 2021 awards? The nominees are:

Asset Management

- Bundaberg Regional Council Stormwater Management Strategy
- Asset Rationalisation, Cassowary Coast Regional Council
- Asset Physical Condition Inspections, Central Highlands Regional Council
- Sustainable Road Pavement Management Plan, City of Gold Coast
- Green Infrastructure Portfolio - Asset Management Plan, Moreton Bay Regional Council
- The Strategic Local Government Asset Assessment Project, National Heavy Vehicle Regulator
- Total Asset Management Strategy Project (TAMS), South Burnett Regional Council, GenEng Solutions, ATC Consulting

Coastal Engineering

- Holloways Beach Stabilisation, Cairns Regional Council, BMT, GHD
- Surfers Paradise Sand Backpass Pipeline Project, City of Gold Coast
- Redcliffe, Scarborough Cliffs Stabilisation Project, Moreton Bay Regional Council
- Maroochy Groyne Project

Community Road Safety (New)

- School Traffic Management Plans and Improvements, Brisbane City Council
- Broadbeach 30 km/h Area Speed Zone, City of Gold Coast
- Pedestrian and Cycle Network Improvement Plan - Bli Bli State School Precinct, Sunshine Coast Council
- Local Government Temporary Traffic Management Harmonisation Initiative Project, Toowoomba Regional Council

Environment and Sustainability

- Wildlife Awareness Monitors, Brisbane City Council
- Carbonmastic SMA 7 Asphalt trial, City of Gold Coast, Austek Asphalt
- Road Reseal & Rehabilitation Program FY 20/21, Sunshine Coast Council
- Kleinton Waste Management facility, Toowoomba Regional Council
- Southern Suburbs Rising Main, Townsville City Council, BMD

Innovation

- Kingsford Smith Drive upgrade, Brisbane City Council
- Thargomindah Water Cooling Project, Bulloo Shire Council, Peak Services, NRG Services
- Stormwater Management Strategy, Bundaberg Regional Council
- Freight Priority System, City of Gold Coast
- Palm Beach Foamed Asphalt Trial - QLD First, City of Gold Coast, Stabilised Pavements Australia
- The AI enabled Stormwater Inspection System, Moreton Bay Regional Council
- The Strategic Local Government Asset Assessment Project, National Heavy Vehicle Regulator
- Maroochy Groyne Project, Sunshine Coast Council

Innovation and Sustainability in Water

- Thargomindah Water Cooling Project, Bulloo Shire Council, Peak Services, NRG Services
- Stormwater Management Strategy, Bundaberg Regional Council
- Urraween Reservoir - Floating Roof and Liner Replacement, Fraser Coast Regional Council
- Total Asset Management Strategy Project (TAMS), South Burnett Regional Council, GenEng Solutions, ATC Consulting

Projects under $1 million

- Sandgate Foreshore Traffic Management Enhancements, Brisbane City Council
- Stormwater Management Strategy, Bundaberg Regional Council
- Cassy Lives Skate Park Upgrade, Gladstone Regional Council
- Welsh Street Footpath, Gladstone Regional Council
- Renewal of the Amarina Culvert, Mooloolaba, Sunshine Coast Council, Interflow Pty Ltd

Projects $1 to $2 million

- Flinders River Crossing/Glentor Road, Flinders Shire Council
- Kowanyama Airport, Kowanyama Aboriginal Shire Council
- Lake Moondara Stage 4 Pipeline Replacement, Mount Isa Water Board

- Maroochy Groyne Project, Sunshine Coast Council
- 2.Tobruk Memorial Drive Toowoomba Escarpment Lookout, Toowoomba Regional Council
- Labona Airstrip – Extension, widening and sealing of the Labona Airstrip, Wagners (Principal Contractor for Bravus)

Projects $2 to $5 million

- CityLink Cycleway Trial, Brisbane City Council
- Thargomindah Water Cooling Project, Bulloo Shire Council, Peak Services, NRG Services
- Tennis Centre Roof, Cairns Regional Council
- Gold Coast Oceanway - Palm Beach North, City of Gold Coast
- Hughenden 4.3ML Tank construction, Flinders Shire Council
- Boyne Island Wastewater Treatment Plant Pond Relining and Pump Station, Gladstone Regional Council
- Caboolture to Wamuran Rail Trail, Moreton Bay Regional Council
- Orealla Crescent Bridge Replacement, Noosa Council
- Paroo Shire Council DRFA Project, Paroo Shire Council, Proterra Group
- Western Shires TMR Rest Area Upgrade Program, Proterra Group
- Murgon CBD Footpath Reconstruction, South Burnett Regional Council
- Atherton Water Quality Improvement Plan, Tablelands Regional Council
- Tummaville Road Bridge Replacement, Toowoomba Regional Council
- Brisbane CBD Burst Mains Replacement, Urban Utilities
- Proserpine Main Street streetscape upgrade, Whitsunday Regional Council

Projects $5 to $10 million

- Cairns Court House Refurbishment, Cairns Regional Council
- Tully Grandstand, Cassowary Coast Regional Council
- Surfers Paradise Sand Backpass Pipeline Project, City of Gold Coast
- Flinders River Alderley Crossing Bridge, Flinders Shire Council
- The Mill at Moreton Bay water park and place space, Moreton Bay Regional Council
- The Strategic Local Government Asset Assessment Project, National Heavy Vehicle Regulator
- Supply and Construction of Recycled Water Reuse Main and Southern Suburbs Rising Main – Cleveland Bay Purification Plant to Murray Sporting Complex Plus Branch to South Townsville, Townsville City Council

Projects $10 to $20 million

- East and West Creek Projects Toowoomba, Department Transport and Main Roads and Toowoomba Regional Council
- Hughenden Recreational Lake, Flinders Shire Council
- Indoor Sports Centre - South Pine Sports Complex, Moreton Bay Regional Council
- Coondoo Creek Bridge Replacement Project, RoadTek
- Kleinton Waste Management Facility, Toowoomba Regional Council
- Southern Suburbs Rising Main, Townsville City Council, BMD

Projects over $20 million (New)

- Indooroopilly Riverwalk, Brisbane City Council
- Cairns Esplanade Dining Precinct, Cairns Regional Council
- Quilpie Shire Council 202 DRFA Project, Quilpie Shire Council, Proterra Group
- Exit 57 Intersection Upgrade, RoadTek
- Toowoomba Regional Council Principal Depot, Toowoomba Regional Council

Road Safety Infrastructure (New)

- New 'No U-turn' signage, Brisbane City Council
- SAMs for School, Brisbane City Council

Casy Lives Skate Park.

Thargomindah Water Cooling Project.

Tully Grandstand.

Queensland

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UP TO 7 CPD HOURS

PAVEMENTS, MATERIALS AND GEOTECHNICAL MASTERCLASS

There have been many recent developments in pavement design, its construction and monitoring practices. It is critical that technical and engineering professionals have a practical understanding of the selection and performance characteristics of pavement materials to achieve desired performance characteristics and low whole-of-life costs.

This Masterclass will provide attendees with a unique opportunity to learn from technical experts while providing an opportunity for a technical exchange of ideas between TMR, Local Government and private sector technical staff.

Who should attend?

This Masterclass is suitable for practitioners involved in the design, construction, and maintenance of road pavements. Typical attendees include:

- Engineers
- Designers
- Technical Officers
- Project Managers
- Inspectors

Outcomes

Attendees with learn about:

- TMR's 4 Year Technology Strategy for pavements, materials and geotechnical
- up-to-date data and technical developments in asphalt and sprayed seals (e.g. recycled glass in asphalt, EME2, MRTS18 update, pilot sealing specifications, TN186, crumb rubber research/ pilot specifications).
- advances in recycling and the role we play in sustainability and resilience.
- Bridge deck wearing rehabilitation techniques
- Risk based Auditing and Materials Testing for Quality
- Geotechnical solutions for Natural disaster events

Topics

- Recent updates and developments in asphalt and sprayed seals
- Proposed approach for high friction and coloured surfacings
- Recycled materials – what can be done now and current research
- Highlights of MRTS104 asphalt geosynthetics Specification & Foamed Bitumen (FB) - Improvement to resilience to flooding
- Bridge asphalt DWS rehabilitation – Metro and North Queensland learnings
- Materials testing
- Case studies - Natural disaster events and responses by Geotechnical Section

This Masterclass is a collaboration between IPWEAQ and the Department of Transport and Main Roads.

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PRESIDENT'S REPORT

Craig Murrell

This is my last report as President after six years on the Board: two years as CQ Branch President, two years as Vice President and two as President.

As many of you would be aware, the Board comprises eight volunteers who meet four times per year to receive reports and plans from the CEO plus updates from key members of the IPWEAQ and QWD teams, and presentations from various team members on developing initiatives. We have been fortunate as a Board that the Institute has been in great hands only requiring the quarterly endorsement of those reports and plans.

I was fortunate enough to join the Board in 2015 when the then new CEO, Leigh Cunningham joined the Institute early September 2015. The appointment of the CEO is an important role of the Board as this is the person who makes the thousands of daily decisions which accumulated deliver the Institute to a place of strength and growth, or not.

The Institute under Leigh's leadership has become an organisation which has exceeded expectations and as a Board member since the start of Leigh's term, I had a bird's eye view of how extensive this achievement has been. Most members would be unaware of the dire financial situation as it was back in 2015 which Leigh rectified then established a sound foundation for future growth. The Institute has also exceeded the expectations of our founding Presidents, several of whom have visited us at the new premises in Eagle Farm.

The new facilities in Eagle Farm will certainly go down as one of Leigh's defining legacies and like most visitors, when the Board arrived at the new premises for the first time, we were blown away by what Leigh had created. Every element of the new facilities was chosen by Leigh from the floorboards to each piece of furniture to each of the 44 pieces of Aboriginal art, which will be featured in an art exhibition in November.

Further evidence of the growing stature of the organisation was witnessed at this year's Board elections with 14 nominations received for seven positions (with the President traditionally unopposed, with the Vice President stepping into that role). I was fortunate during my three terms on the Board to have been elected unopposed as in the past, volunteers would step forward to fill any vacancies. It is great to see more members coming forward wanting to be involved in what is now a thriving organisation.

As Chair of the current Board, my role was similarly made easy with a governance framework and supporting policies which enabled effective oversight. Seren McKenzie, the immediate Past President set the benchmark for the conduct of meetings with a disciplined Board, focussed deliberations and with all meetings finishing on time, which I did my best to emulate.

I leave the Board with an Institute that has seen growth in membership of between 10-12% each year for the past six years,

with Glenda Kirk, NQ Branch President.

six years of net profits, a staff of almost 30 up from 10 when Leigh arrived, revenue now in excess of $4.5 million, and an extraordinary facility in Eagle Farm. I would love to lay claim to all of this since it just happens to coincide with my time on the Board, however I was merely an observer with a front row seat. So it is with pleasure that my final task is to announce that we have renewed the contract of our CEO for another three years so my successors can also enjoy the view from the Chair.

I appreciate the opportunity that presented to become an IPWEAQ President. And thank you to my fellow Board members and to our staff.

ELECTION REPORT

The election for the IPWEAQ Board in 2021 witnessed a record number of nominations for the eight positions on Board with 14 nominations received. The following members will be declared elected at the AGM to be held in Cairns, Wednesday 13 October 2021:

- President
  - Angela Fry
  (GHD Pty Ltd)
- Vice President
  - Andrew Johnson
  (Somerset Regional Council)
- At-Large
  – Sarah Hausler
  (McCullough Robertson)
- At-Large
  – Sean Rice
  (Proterra)
- NQ Branch President
  – Glenda Kirk
  (Mareeba Shire Council)
- CQ Branch President
  – Adam Doherty
  (Dileigh Consulting)
- SEQ Branch President
  – Jo O'Brien
  (Tonkin)
- SWQ Branch President
  – Dereck Sanderson
  (TMR)

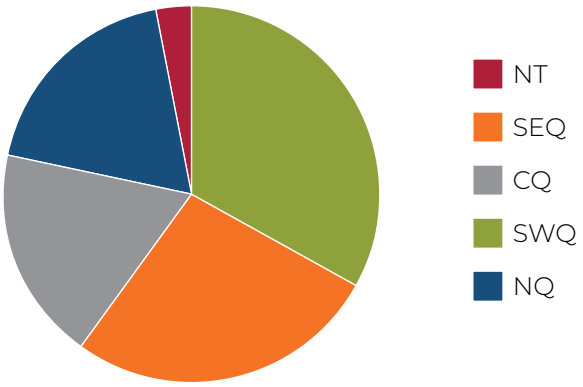
This is the first year the elections were conducted electronically since the new constitution was adopted October 2019 and, as only Voting Members received the link to access the voting portal, there were no invalid votes.

Total Voting Members: 1,125

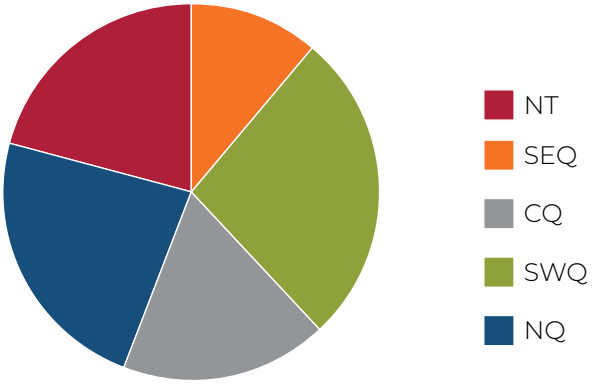
Total voters: **205**

% of Voting Members: **18.2%**

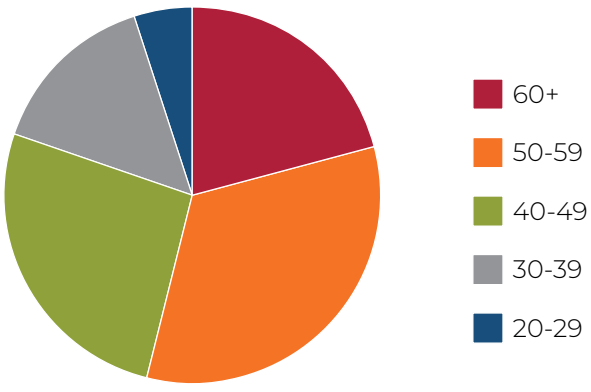
Total votes cast per Branch



% of Branch members who voted



Age of voters



Youngest voter
24

Oldest voter
74

CEO'S REPORT

Leigh Cunningham

On the day I write this report, I celebrate six years with IPWEAQ which is also six years since I left Singapore to return home to Queensland after 21 years overseas and interstate. When I woke on the morning of 31 August 2015, I was living with my mum and stepfather in Brisbane which I thought would be a longer-term arrangement since my husband was sailing around the world in a yacht race. At the time, my nephew, Jack predicted I would last three months to which I replied, "Why would I leave this? My meals are prepared, my washing, ironing and errands all done and those undertaking these tasks appear grateful for it." Three months later, I moved to an apartment at Portside.

I'm grateful though for those three months living with my mum and the opportunity to spend all of my non-working hours with her after so many years away, and just four years later she would no longer be that person.

My favourite moments of the past six years include:

- My first Annual Conference in Mackay when I discovered first-hand how passionate public works engineers are as they talked to me about their projects as if I would have any idea what they were talking about. And to this day, this is what I love most about this job – these people.
- Our first Bingo at the 2016 Annual Conference when I discovered how competitive engineers are – turn anything into a competition and it will be successful.
- Celebrating 1,000 members in 2020 and planning to get to 2,000 in much less time than 48 years.
- Fitting out our new premises in Eagle Farm. Any fit-out is stressful – things go wrong but COVID added a whole new dimension eg disappearing supplies and long waits for every little thing but it was worth the pain and frustration.
- Working with great people who are passionate about making our sector the best it can be.
- Launching the Every Community Needs an Engineer calendar and campaign.
- Establishing the NT Branch with the inaugural committee led by Chair, Peter McLinden (LGANT) – a great group of enthusiastic professionals.
- Not having any 'Crocodile Rock' moments so far ie getting on stage with the band to sing any song let alone a challenging one.
- Creating Engineering for Public Works with the first issue launched March 2016.
- Creating an inclusive, relevant, vibrant community for anyone who wants to be involved.

Unfortunately, it is still five weeks to the Annual Conference in October but it's going to be another exceptional gathering of the extraordinary people who make our sector what it is – who doesn't want to live in Queensland, especially now. I'm looking forward to catching up with you to celebrate another challenging year which flew by faster than ever, possibly because I'm just one year away from turning 60.

If you haven't renewed your IPWEAQ membership, please do so before you register for the Annual Conference to save $500. Thank you all for being a part of our community!

See you in Cairns! No bathrobes this year though.

Bingo, 2016 Annual Conference

Great people to work with

New premises - before

New premises - after

WE ARE DELIGHTED TO WELCOME IPWEAQ ENTERPRISE PARTNERS, INNOVYZE AND TRIMBLE!

Innovyze®

AN AUTODESK. COMPANY

Innovyze is a global leader in building innovative, industry-leading software for the water industry for over 35 years, serving thousands of clients including the largest utilities, ENR design firms, consultancies and refining plants around the world.

Their ground breaking Emagin artificial intelligence (AI) and machine learning (ML) solutions are designed to predict and optimise water operations and processes for utilities, food and beverage plants, and industrial facilities accelerating adoption of AI to transform the water industry.

Software is continuously updated to ensure it remains innovative and cutting edge incorporating new modelling techniques and new functionality that our customers need.

Trimble

Trimble is transforming the way the world works by delivering products and services that connect the physical and digital worlds.

For over 40 years, Trimble has been creating unique solutions that help customers to improve their productivity, quality, safety, compliance, and sustainability.

Our focus has grown from pioneering Global Positioning Systems (GPS) technology, to connecting the physical and digital worlds utilising our core technologies in positioning, modelling, connectivity, and data analytics.

With technology that enables asset related data sourced from GIS, BIM, Survey and Engineering domains through the feasibility, approvals, design, and construction phases, paired with operational data from field workers and remote asset monitoring,

our solutions offer efficiencies and confidence to asset operators to make informed decisions through the operational lifecycle of their assets.

Trimble is proud to bring new innovations to Australian public works, utilities and government clients and we look forward to partnering with IPWEA Queensland and supporting you, the members, to solve day to day challenges by connecting your physical and digital worlds.

Trimble - Transforming the way the world works.

https://www.trimble.com

FELLOW APPOINTED

Congratulations Angela Fry, awarded Fellowship in recognition of her 15+ years' service to the public works sector and the Institute, most recently as Vice President and incoming President.

RPEQ ASSESSMENT BOARD

Following the retirement of Andrew Gibbs and Graeme Wills from the RPEQ Assessment Board, we are delighted to announce the appointment of two IPWEAQ Fellows to the Board:

Martin, Crow, Manager, Infrastructure Planning, Rockhampton Regional Council. Lorna Oliver, Manager Technical Services, TMR.

We look forward to working with you to deliver IPWEAQ's Assessment Scheme.

Our sincere thanks to Andrew and Graeme for their decades of service and commitment to the profession.

Andrew has also retired from the Mackay Regional Council and will be applying his skills to home renovation. Andrew joined IPWEAQ in December 1997 and won the President's Award in 2015, joining the Assessment Board the same year.

Emeritus Member, Graeme, is retiring after 40+ years' in public works. Joining IPWEAQ in February 2003, Graeme was President of the CQ Branch from 2011 to 2015 and has been on the Assessment Board since 2016.

CELEBRATIONS

Chris Smith, District Engineer, Goondiwindi Regional Council and his wife, Anya, have welcomed another boy to their clan, Monty, little brother to Angus and Charlie.

Three generations of engineers?

Adam Doherty, Director, Dileigh Consulting Engineers, and his family are celebrating the birth of his granddaughter Mackenzie to his daughter Ashleigh.

CAREER CHANGES

Congratulations to the following members on their new positions. Our best wishes for your new roles:

Andrew Ryan has been appointed Director of Facilities Management at the University of the Sunshine Coast. This will add another sector to his career experience with previous roles at Moreton Bay Regional Council, Sunshine Coast Council, Caloundra City Council and Brisbane Airport Corporation.

Hari Boppudi has been promoted to Chief Executive Officer of Flinders Shire Council.

Ged Brennan, Managing Director, GenEng Solutions, is Acting General Manager Infrastructure at South Burnett Regional Council while Aaron Meehan focuses on the Kingaroy Transformation Project. See pages 56-58 for Aaron's introduction to this exciting project.

Seren McKenzie, has moved to North Queensland as Director Infrastructure and Operations, Townsville City Council.

AWARDS & RECOGNITION

Congratulations Neil Scales OBE, IPWEAQ honorary member and Director-General, Department of Transport and Main Roads, for receiving the highly prestigious John Shaw Medal from Roads Australia. This peak body representing roads within Australia's integrated transport system, recognised Neil's leadership and contribution to the sector. In addition to leading 9,000 staff and presiding over an annual budget of $10 billion, Neil sits on five national transport boards, was involved in the 2018 Commonwealth Games transport planning, and has responded to Queensland's frequent natural disasters.

DRAFT AUSTRALIAN STANDARD FOR FLUSHABLE PRODUCTS

For the past couple of years, ***qldwater*** has participated in a Standards Australia Working Group led by the Water Services Association of Australia to draft a standard for flushable products.

The group includes experts from the water and flushable products industries. A draft standard (AS/NZS 5328:2021, Flushable Products) has been released for public review and comment, closing 1 November. You can comment on the draft documents through the Public Commenting Management System (PCMS). A Standards Australia profile is needed to access PCMS.

REMEMBERING GEOFF WILMOTH

As you would be aware, each year at the Annual Conference, we present the Geoff Wilmoth Best Paper award, voted as the best by delegates.

This award is in memory of IPWEAQ founding member, Geoff Wilmoth and we are thankful to the Wilmoth family for providing us with a copy of Mr Wilmoth's memoir for our members.

A Life Remembered is now available for download in the IPWEAQ Knowledge Centre.

It chronicles his early life and studies in Victoria, working life in Central Queensland and his service during World War II. Returning to Australia in 1946, the memoir recounts his public works engineering roles in Bundaberg, Mackay and Toowoomba, before his passing in 1973 at the age of 59.

SPECIAL WEBINAR ON COVID-19 SEWAGE SURVEILLANCE

Save the date: 28 September, 1:30-2:30pm for an essentials webinar on how sewer monitoring is used to trace COVID-19 outbreaks and how the information and samples you provide is being used.

The webinar will include updated presentations on the successful national ColoSSoS Project (Collaboration on Sewage Surveillance of SARS-CoV-2) by Dr Dan Deere, Water Quality Scientist, Water Futures, and the Queensland Health state-wide monitoring program by Professor Jochen Mueller, Queensland Alliance for Environmental Health Sciences at The University of Queensland.

Registration details coming soon.

VALE

We are saddened to announce the passing of IPWEAQ Fellow and RPEQ, Daryl Davis.

Daryl was a civil engineer from 1966 until ill health forced his early retirement in 2018.

From Daryl, "I have enjoyed the engineering work I was able to deliver in 50+ years years and hope that the focus of engineers now and in the future can be on providing the best engineering solutions, the best quality project outcomes, and sharing of knowledge and experience with other engineers to benefit the profession and the sector, rather than a profit based approach to engineering design."

His experience included 26 years with Sinclair Knight Merz (now Jacobs) where he worked on a range of multi-disciplinary projects. His legacy includes the following projects:

- Bruce Highway Cooroy to Curra project – Section C.
- Business case for the Pumicestone Road Interchange Project
- Bruce Highway Cabbage Tree Creek and Back Creek Range
- Multi-Modal Transport Corridor from Creekside to Maroochy Boulevard, Sunshine Coast
- Design and management, Brisbane Airport construction, Ansett Hanger civil works and pavements, the Logan Motorway, the Bruce Highway and the Cairns Southern Access Road
- The Hay Point Coal Terminal - civil works for coal bunds, drainage, roadworks, water supply, and coordination of structural, civil, mechanical and electrical disciplines, and extensive shore protection
- The Gateway Bridge approaches, toll plaza and local roads - geometric design, drainage design, and construction supervision
- The Gateway Motorway - Old Cleveland Road to Mt Gravatt-Capalaba Road, including design and documentation of roadworks, drainage, resumptions, and TMR contract documentation
- Urban design projects - numerous urban design projects such as Ormiston Waters, and Ormiston Clearwater, and Settlement Road development.

Vale Daryl Davis, FIPWEAQ, RPEQ.

Livingstone Shire Council, 2020 Best Queensland Water award winners.

BEST QUEENSLAND WATER TASTE TEST

Nominations are now closed for the 2021 Best Water competition.

Some of our members take the Best Queensland Water competition more seriously than others, hosting their own taste test event to select the best sample.

Since its inception in 2011, the competition now crosses borders with the Water Industry Operators Association taking the challenge to NSW with the Water of Origin Taste Test. Victoria, South Australia and Tasmania followed with the first National Ixom Australia Best of the Best Tasting Tap Water competition held in 2015.

Last year's winner, Livingstone Shire Council, are looking to repeat last year's success.

Good luck to all entrants!

KYM MURPHY'S CHARITY FUN RUN

On 3 July, I ran 5.7km in the Gold Coast Marathon for R U OK? But I did it with a difference. I ran it at the Highfields parkrun in the fog and drizzle in typical Toowoomba winter weather.

It was heaps of fun thanks to the parkrun family and support crew who ran the last 700m with me (pictured), cheering to make it feel like I was running down the finish chute at the Gold Coast. They even arranged a medal and finisher shirt for me!

I completed the run in 38:03, which I'm very happy with considering all the hills on the circuit. Raising $384.50 for R U OK? was the icing on top.

A big thanks to friends, family, donors and cheer squad near and far – you kept me motivated which makes all the difference.

KNOWLEDGE CENTRE - MOST VIEWED ARTICLES

(June-August)

Our globally recognised Knowledge Centre is an essential resource for anyone involved in public works in Queensland. Join IPWEAQ to access member-only content including all branch conference proceedings.

Contact Director, Information and Resources, Mark Lamont should you have any queries.

June 2021

Title	Views
RS-065 Pathways Concrete Pathways Construction Detail (1/1717)	434
RS-080 Kerb and Channel Profiles and Dimensions including Edge Restraints, Median & Channel (1/2309)	320
Roles and Responsibilities: Environmental and Waste Management Issues for Local Government (Hausler, Sarah) (1/6947)	268
RS-051 Heavy Duty Vehicle Crossing (1/1712)	238
Capestone Lake, Moreton Bay Regional Council (Cronin, Justin et al) (1/6969)	224
Asset decision making – the key to financial sustainability, LGFP (Shave, Michael) (1/6969)	174
Engineering a remote future – McMurtrie Consulting Engineers (Pearson, Elise) (1/6921)	164
2021 Asset Management Symposium Program (1/6983)	154
Complete Streets: Guidelines for Urban Street Design (IPWEAQ) (1/2946)	132
Asset Performance, Moreton Bay Regional Council (Frost, Jackie) (1/6966)	132

July 2021

Title	Views
Barron Falls Walking Trail: Treading lightly to blaze a trail through the world's oldest rainforest (Kirk, Glenda) (1/7038)	132
RS-080 Kerb and Channel Profiles and Dimensions including Edge Restraints, Median & Channel (1/2309)	122
RS-065 Pathways Concrete Pathways Construction Detail (1/1717)	114
RS-051 Heavy Duty Vehicle Crossing (1/1712)	114
Queensland Urban Drainage Manual (IPWEAQ) (1/2946)	78
Complete Streets: Guidelines for Urban Street Design (IPWEAQ) (1/2946)	78
Capestone Lake, Moreton Bay Regional Council (Cronin, Justin et al) (1/6969)	76
Strategic Plan (IPWEAQ) (1/5157)	74
NQ Branch Conference Townsville 2021 – Presentations Album 3 (1/7061)	72
DS-050 Drainage Pits Field Inlet Type 1 and Type 2 (1/2357)	72

August 2021

Title	Views
RS-080 Kerb and Channel Profiles and Dimensions including Edge Restraints, Median & Channel (1/2309)	120
RS-065 Pathways Concrete Pathways Construction Detail (1/1717)	104
RS-051 Heavy Duty Vehicle Crossing (1/1712)	90
Exploring driver behaviour to shape better road-user experiences (Rankin, David) (1/6243)	86
RS-140 Subsoil Drains Details and Location RS-140 (1/1730)	82
Railway Good Sheds – Toowoomba Regional Council (1/7100)	78
Rockhampton Museum of Art (Rockhampton Regional Council (1/7101)	74
DS-050 Drainage Pits Field Inlet Type 1 and Type 2 (1/2357)	68
Noosa Park Road Boardwalk (Noosa Shire Council) (1/7104)	66
Standard Drawings (publications): Road Set (IPWEAQ) (1/2931)	60

ENGINEERS ARE COLLABORATIVE

Mackay Regional Council
& Whitsunday Regional Council
Mirani Water Recycling Facility /
Bowen Sewerage Treatment Plant

Professional Development

Earn up to 1.5 hours at our Wastewater Mini Conferences

Wastewater (109 minutes)

Topic	Speaker	Dur.
Townsville's water supply and sewerage demand by land use	Darron Irwin	26 mins
Mareeba Wastewater Treatment Plant Upgrade: Striking the balance between environmental and financial sustainability	Glenda Kirk	30 mins
Yeppoon Sewage Treatment Plant Augmentation Project	Jessica O'Hare and Eemonn Flynn	24 mins
Geopolymer Concrete - The Future of Wastewater Infrastructure?	Michael Kemp	29 mins

Develop water industry skills with ***qldwater*** courses.

Video

Rob Fearon from Queensland Water Directorate discusses Wastewater Management

Knowledge Centre

New content in the new Sewerage & Recycling Facilities collection

Type	Video
Year	2021
Title	Innovation & Sustainability in Water award Highlights

Type	Audio Visual Recording
Year	2021
Title	Sewage Treatment Plant Augmentation Project, Downer Group

Type	Audio Visual Recording
Year	2021
Title	Mareeba Wastewater Treatment Plant Upgrade: Striking the balance between environmental and financial sustainability

Type	Audio Visual Recording
Year	2021
Title	Townsville's water supply and sewerage demand by land use

Type	Audio Visual Recording
Year	2021
Title	Roles and Responsibilities: Environmental and Waste Management Issues for Local Government

Type	Journal
Year	2021
Title	Issue #21 Engineering for Public Works, March 2021

JULY 2021

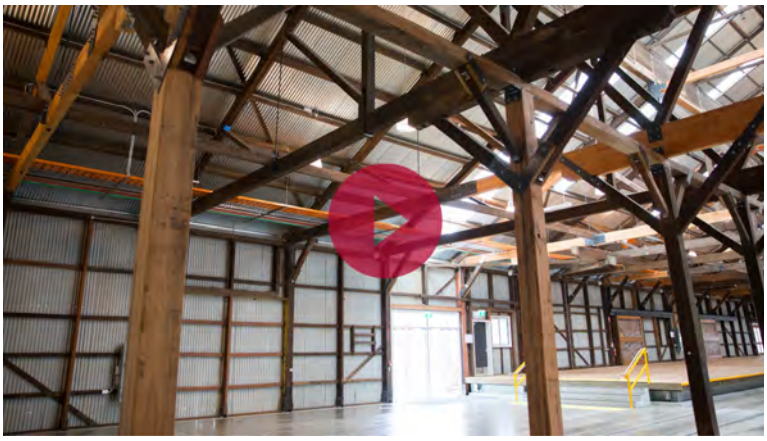
Heritage Preservation

ENGINEERS PRESERVE OUR HERITAGE

Toowoomba Regional Council
Railway Goods Shed Restoration

Video

Learn about the Railway Goods Shed Restoration Project in Toowoomba. Complex engineering design and construction challenges were encountered restoring this 1880's railway goods shed requiring the application of innovative solutions. The outcome is this unique re-purposed 4,000 m^2 events venue in the centre of a thriving historical Railway Parklands



PW-TV

Nicholas Delany

This month, Nicholas Delany, Principal Project Manager at Toowoomba Regional Council discussed the Railway Goods Shed project - A 120-year old heritage-listed site that has been transformed into a first-class, flexible space, available for commercial and community activities and events.

Knowledge Centre

New content in the Heritage Preservation collection

Type	Audio Visual Recording
Year	2021
Title	Rockhampton Museum of Art

ENGINEERS ENGAGE AND PROTECT

Noosa Council
Noosa Park Road Boardwalk

Award winner: Project of the Year (2019) sponsored by Pragmatic Thinking

Professional Development

Earn up to 1.5 hours at our Protecting our Environment Mini Conference

Protecting Our Environment (87 minutes)

Topic	Speaker	Dur.
Barron Falls Walking Trail: Treading lightly to blaze a trail through the world's oldest rainforest	Glenda Kirk, Mareeba Shire Council	33 Mins
Waterways as social assets: filling the gap in waterway design guidelines	Katie Fletcher, ARUP	25 Mins
On ground implementation of the Biosecurity Act 2014	Angela Whitehall, Toowoomba Regional Council	29 Mins

PW-TV

Nate Bultitude

This August, Nate Bultitude, Senior Development Infrastructure Officer at City of Gold Coast discussed the Arundel Wetlands project - a collaboration between landscape architecture, local government and the developer.

Knowledge Centre

New content in the new Stakeholder Engagement collection

Type	Audio Visual Recording
Year	2021
Title	Noosa Boardwalk Project

Graeme Haussmann

Graeme Haussmann was the fourth President of IPWEAQ (1978-1980), now with a training room named in his honour at the IPWEAQ new facilities in Eagle Farm.

Born in Maryborough in December 1927, his father was a District Maintenance Engineer who transferred his family to Roma in 1930. Graeme started his education in Roma in 1932, gaining a state scholarship in 1940. Another family move down south to Brisbane in 1941, saw Graeme attend Churchie until he finished in 1944 to commence training at Queensland Rail.

A great deal of Graeme's work at Queensland Rail revolved around the 'permanent way' with trackwork, timber and steel bridges and station yards. The Burdekin Bridge foundations in 1948 were a highlight, as were the quadruplication and duplication of the Brisbane rail network from 1950 to 1953. During this time Graeme earned his Diploma of Civil Engineering, Queensland Railway Examination for Civil Engineer, and the Queensland Local Government Engineers Examination. While he was up north completing the Biloela to Callide coalfield rail link in 1953, Graeme decided to remain in the region, joining Townsville City Council from 1954 to 1955 where he worked on the design of the western suburb's sewerage, West End steel reservoir, and preliminary work on the Paluma Dam.

In 1955, Graeme headed even further north, becoming the Deputy Engineer at Cairns, where he worked as Deputy and City Engineer for 33 years from 1955

Northern Engineering Conference Townsville 1958.

Northern Engineering Conference Cairns 1959.

to 1988. The post-war period was a pivotal time in the city's development. A great deal of damage to the 25km of sealed streets happened in 1942 from army movements. The city was still struggling to find funds for rehabilitation and to maintain the wartime anti-malarial drains commenced by the U.S. and Australian armies, but never completed. As war operations moved north, the ageing City Engineer Frank Morris returned to duty, but was overwhelmed by the demands of Council and residents for relief from flooding during the wet season and dust in the dry season.

Graeme became initially responsible for all field works of construction and maintenance and for the rapid provision of 120km of cement-stabilised sealed road network for the city, which was mostly originally under mean sea level. Trunk main augmentation of both the Behana Creek and Freshwater Creek water supplies followed. With Cairns rapidly becoming a tourist city, Graeme assumed control of all building and town planning matters.

Further major infrastructure followed with some of Graeme's achievements including implementation of the Cairns Master Drainage Scheme; reclamation of the 3km long Esplanade; reclamation of nearly 4km^2 of land development for industry; installation of a citywide underground sewer network,

pumping stations and treatment plants; and construction of Copperlode Falls Dam and associated reservoirs and water-main infrastructure, together with consultants as required. It's not difficult to see why some weeks Graeme worked 60 hours.

Recognising his abilities, in 1975, Graeme was sent to Canberra for 10 weeks' training in Local Government Management at the Canberra College of Advanced Education, now University of Canberra. With the help of Professor John Power and the local member, Graeme and the other students were able to see the heart of the government at work. Whitlam's dismissal being a function of Australian Government that Graeme had not been expecting to witness. The generosity of the Whitlam Government in funding Cairns' drainage in 1974 to 1975, employing 1,200 staff, where anything that was asked for was granted, saw good things come to an end. By 1974, inflation cost of Council works hit 35%.

In the 1960s, the (1933) *Edge Hill Bridge* over Saltwater Creek was widened and strengthened, enabling it to last for a further 50 years. Due to the increased population and subsequent need to accommodate more traffic, the bridge had to be rebuilt. The new $3.8 million road and pedestrian bridge opened in April 2017, and in recognition of his contribution to city development was named *Graeme Haussmann Bridge*. Graeme joked that he thought you had to be dead to get things named after you, but he is happy he's around to see it.

Graeme's love of all things railway continued after his formal working life had ended. In 2006, he initiated and compiled the application and background report to install a national engineering landmark at Kuranda Railway Station located on a previously erected plinth. Queensland Rail provided a train to bring invited guests and the public to the ceremony.

Engineering cadet recalls construction of Burdekin bridge

Historical account of work site

By JEANETTE GARVEY

CADET engineer during the construction of the Burdekin Bridge, Graeme Haussmann, was one of the special guest speakers at a ceremony in Home Hill recently to recognise the bridge's engineering heritage.

Mr Haussmann delivered his own personal account to invited guests and dignitaries, including Her Excellency the Governor of Queensland, Ms Penelope Wensley AO —

The following is his story:

"I arrived here in Home Hill from Townsville Railway Office in August, 1948, reporting to resident engineer, Mr H.A. Lowe for four months experience.

The site office and huts for single and married accommodation were some distance south from the river bank, tucked in between the future centre line and the existing railway.

I presume Lowe had planned the whole construction site from scratch. It was very well organised.

Possibly he had help from others during the early days in 1947, like Main Roads Commission (MRC) bridge engineer, David Garland, whom I met later.

The only other distinguished visitor I met was D.A. Crawford, the Main Roads Commissioner himself.

A gravel road led down the bank onto the river bed.

The central equipment was an MRC constructed batch plant with two one-cubic-yard mixers fed by weighted aggregate.

Above were the feed bins for course and fine aggregate and cement, the aggregate bins being stocked by elevator from below.

Store buildings for steel reinforcement were nearby and for timber and steel formwork. Crushed aggregate arrived on rail wagons on a specially constructed siding. There was a quarry and crusher somewhere.

During concrete pours of about 100 cubic yards for each five-foot lift, trucks would have the one cubic yard buckets filled from under the mixers, transport it to pier sites and buckets discharged to caissons by electric cranes.

All concrete piles for the approach piers were cast on site, there being 11 piers on each bank.

Pile driving was in progress constantly, with some 40 piles for each and more for the abutment. Pier casting on top of piles was all part of the work — no contractor to bend the steel, as is done these days.

There were probably some 80 men on site in 1948, but labour was hard to find and work could have proceeded faster had there been more available.

The year 1948 was a very dry one. By August, No. 1 caisson was struck at more than half way, being delayed awaiting kentledge ballast loading. No. 2 was full depth. No. 3 was in the last stages, with numbers four, five and six under construction.

By the time I left in late December, these three were substantially finished and I had pegged out the location and offsets for numbers seven and eight. Nine, being in the low river flow area near the north bank, was not pegged.

If there were no wet season, all the pier foundations would have been completed by mid-1949, but it was not to be, of course, with Cooktown and associated areas recording the first cyclone of the season and flooding throughout the north in January.

The record shows that little work was done in the river bed that year, and that only six caissons had been sunk and plugged by 1950, whereas we had, I think, sunk six and plugged two by the end of 1948.

As a 20-year-old already in my fourth year of six years engineering cadetship with QR, field work for me meant survey instrument work and when Harry Lowe learnt this and there was no surveyor on site, I got most of the setting-out jobs.

In addition, when caissons were being dredged and sunk round the clock each 25 feet, I got the 10pm to 8am shift on the theodolite, monitoring the vital sinking for line, position and level.

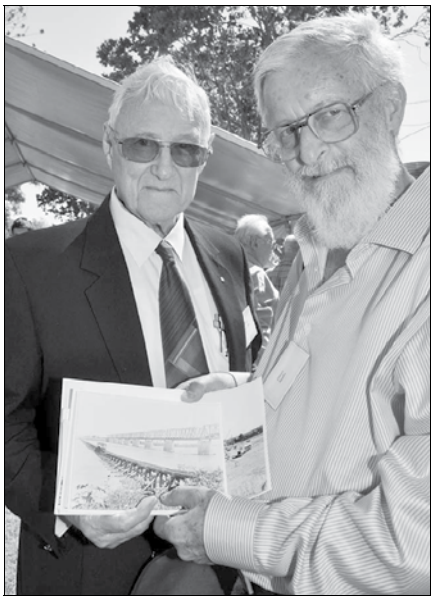
The crane operators would dredge the position at the bottom of the cells, which was most likely to keep the caisson to its optimum from the data supplied to them each time there was a drop.

Sinking was not gradual but intermittent from six inches drop in the early stages at 20 feet down to a quarter inch at 100 feet.

When this was under the supervision of either Vere (Harding) or Noel (Ullman) during the day, my job was the concrete mix design and control of the varied material delivered to the batching plant, allied with making and crushing of test cylinders for recording the confirmation of concrete strengths.

It is a privilege to be able to briefly relate a few of the items of interest that occurred during my time at the site:

At the mess, where all the single men had meals, there was this guy at the mess, who came from an eastern European culture. These were the days of the influx of displaced persons after the war mixing with the traditional Aussie of British background. He sat by himself (at a 10-seater table), eating garlic in quantity. Remember, this is the tropics and it is hot and sweaty — no airconditioning. Today, I suppose nearly everyone eats garlic and no one would notice or object.



Burdekin bridge worker, Graeme Haussmann (left) shows some of his old photographs to Chair of Engineering Heritage Australia, Owen Peake.

Harry Lowe was a serious guy — no nonsense. It was 'Mr Lowe', of course, in those days. One rarely saw him smile, as if he was constantly under pressure. It was a great day therefore for cameras, when the boss, in a jocular mood, launched the soccer ball into the hopper and down the nine-inch tube through 100 feet of water to be immediately followed by the one cubic yard of tremie concrete to commence the first seven feet thick plug.

'Tremie' is the name for concrete poured under water.

I was horribly embarrassed one morning at 8am when the caisson position I had managed all night had not been updated by me since 7am. Harry Lowe arrived and wanted its position now for telephoning to Brisbane. He grabbed the theodolite and with me as assistant got the info quicker than I could myself. I was very impressed with his speed and ability. Needless to say, the data was ready for him from then on.

Second in command at the site, Vere Harding was a gentleman's engineer. He was courteous to and respected by all. He was not married, but lived with his mother in married quarters on the job. Mrs Harding invited Noel and me for dinner one evening and afterwards entertained us to a musical interlude, where Vere played a violin sonata to her piano accompaniment. A very gracious lady.

The third engineer, Noel Ullman was a suitor in waiting. As a prior University Blue for athletics for four years in a row, he and I were in adjacent single quarters and after short sessions with me for solace in his loneliness, he wrote every night to Rhonda (Kelly) who was on a world tour as part of her Miss Australia prize. I'll never forget the afternoon, when he received a letter back (after a month or more), he was over the moon.

One morning, the diver George (Odgers) said that I could go down in one of the caisson cells if I wished to gain the experience of what he had almost daily. I agreed but it all came unstuck when I was going down in the suit. He was a big guy and the suit seemed to be made for two metre tall divers. After being instructed how to balance air pressure in the ears by pressing on the helmet collar with the nose, I found the collar was higher than eye level and I couldn't seem to pull myself up. Blowing with the nose against the suit only made it worse, bloody phlegm being sprayed from a head cold. At 10 metres, I asked through the telephone to come up from the ear pain. He panicked a bit when he unscrewed the helmet and saw the colour of the blood, but I assured him is was only a head cold. End of dive.

I have long treasured the memory of my four months here on this site, the result of a prior arrangement between the Queensland Railways chief engineer Harold Walker and the Main Roads Department and am honoured to have the opportunity of not only being present at this ceremony, but recounting a small segment of the 10-year construction period of this bridge."

Photo courtesy of Ayr Advocate, October 22, 2010.

Ten-years later, a local group of engineers received a request from the Association of Consulting Engineers in Japan to inspect the Cairns-Kuranda railway. The Association recognised the railway as being of great engineering significance, especially with its ongoing use being unrelated to its original purpose. Used as a tourist attraction, the railway had initially been built to transport tin ore from the Herberton area. Given his expertise in railway engineering, Graeme volunteered to liaise with the Japanese visitors via an interpreter. He doesn't think he stopped talking for three hours, which gave the Association sufficient information for a full report for Japan's heritage library.

On a personal note, Graeme married Prue in 1956, and they were blessed with two sons and a daughter. David works at B.C. Ferries in Victoria, Canada; Geoffrey is a radiologist with Queensland X-Ray; and Gillian is a semi-retired project manager. Sadly, Prue passed away in 2018.

After retirement, and between world trips with Prue, Graeme became involved with the raising of funds for a Masonic home for the aged, extensions to the nursing home and a new retirement village to which he moved with his wife in 2013 and is currently President of the Village Committee. The Masonic assets were all purchased by Regis Ltd in 2016 along with others in

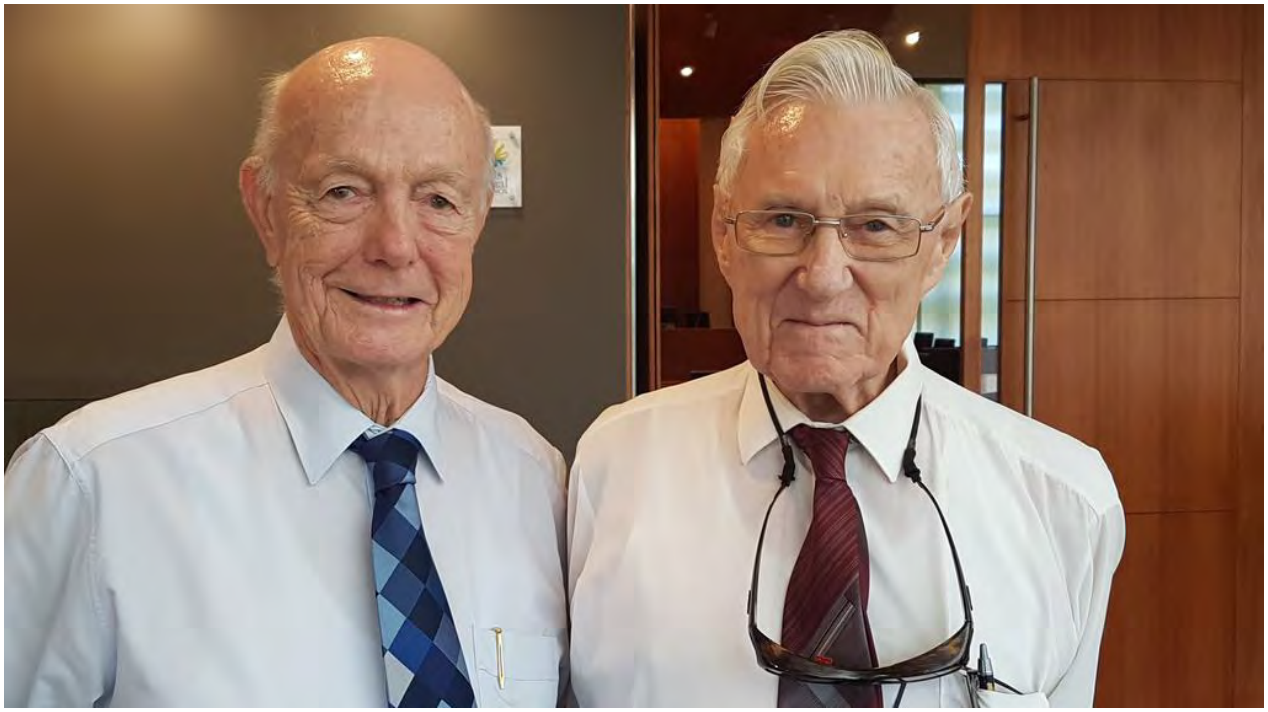


Photo courtesy of Cairns Post, March 26, 2017.

Former Cairns City Council Mayor Ron Davis and former City Engineer of 33 years Graeme Haussmann at the Cairns Regional Council chambers. The Collins Ave bridge in Edge Hill has been renamed in Mr Haussmann's name, to Graeme Haussmann Bridge. PICTURE: CHRIS CALCINO

Brisbane and Townsville. Other interests are the Association of Independent Retirees, Cairns Bridge Club and Australian Decorative and Fine Arts Society.

Graeme has fond memories of week-long IPWEAQ annual conferences and of the learned papers members were able to produce. As President of IPWEAQ from 1978 to 1980, Graeme has a training room named in his honour, to which he has an open invitation for a tour and morning tea.

IPWEAQ thanks Graeme for his years of service to IPWEAQ, and to his decades of dedication to the betterment of his Queensland community.

MEMBERSHIP MILESTONES OCTOBER – DECEMBER 2021

25 YEARS

- **Graham Anderson**

20 YEARS

- **Brian Shephard**
- **Ian Stewart**

15 YEARS

- **Colin Phillips**

10 YEARS

- **Stephen Hegedus**
- **Leslie Hewer**
- **Bishweshwar Pokharel**
- **Stacey Lee**

5 YEARS

- **Matthew Burdett**
- **Craig Bottcher**
- **Weena Lokuge**
- **Mark Bustalinio**
- **Matthew Dennis**
- **Aiyathurai Rameswaran**
- **Keith Metcalfe**
- **Trevor Ensbey**
- **Michael Buxton**
- **Leroy Palmer**
- **Wayne Mills**
- **Sarath Manatunga**
- **Jessica Kahl**
- **Graham Sweetlove**

Queensland

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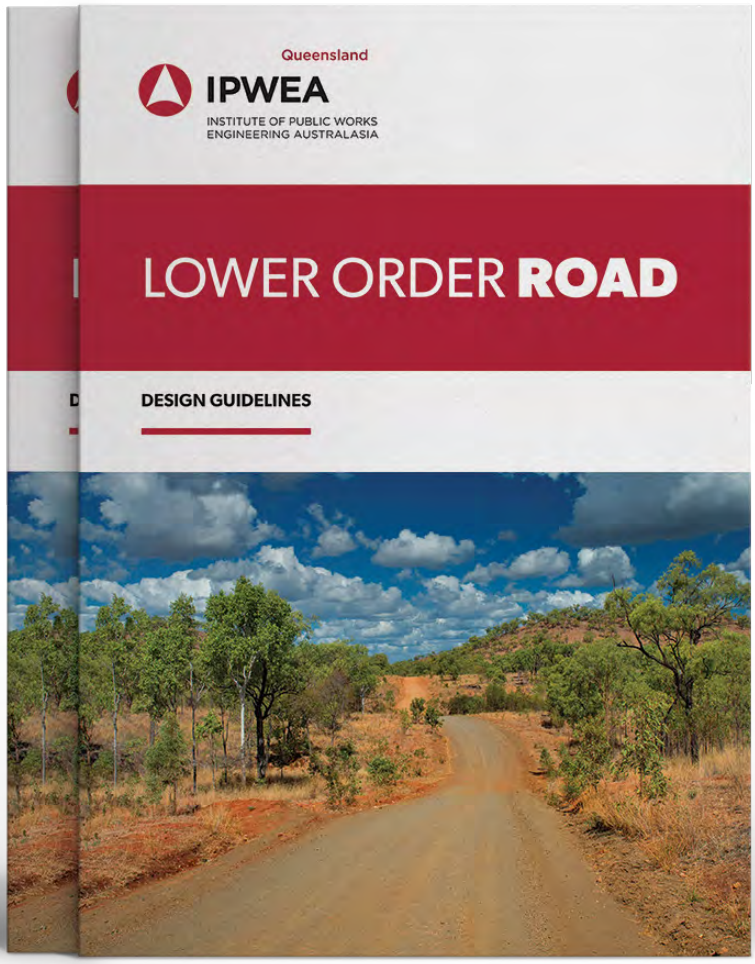

The Lower Order Road Design Guidelines (LORDG) specify minimum standards for the design and construction of lower order road assets and provide practitioners with a risk-based approach to capital improvements. As the lower order road network accounts for over 70% local and state controlled networks throughout Queensland, this approach allows stakeholders to maximise the return on funds invested.

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ENGINEERING QUEENSLAND - FAR AND WIDE

In this new segment, we feature two engineers who share the benefits and challenges of working in rural/regional Queensland; one from the private sector and one from public sector.

Chris Smith and Sean Rice discuss life in the border town of Goondiwindi.

Chris Smith graduated in 2007 and spent the past 14 years in the private and public sectors. Chris is a Registered Professional Engineer of Queensland (RPEQ) with varied experience from stormwater and flood modelling to road construction and rural engineering. Chris has been the District Engineer for Goondiwindi Regional Council since 2015.

Is your experience in the public or private sector or both? What differences, if any, have you noticed between the two when working regionally?

I have been fortunate enough to work in both, six years in the private sector and eight years in the public sector. I have found that working regionally brings the two sectors closer together. Often in rural and regional areas, the public sector does not have endless resources and therefore rely on the services of private consultancies to assist in the provision of quality and cost-efficient outcomes for projects. I have also found that working regionally, the focus of both the private and public sectors is not so much money driven but is more community focused by trying to develop engineering solutions and designs that are both sustainable and of great community benefit.

How long have you lived and worked where you are now?

I have lived and worked in Goondiwindi since 2015.

Have you always worked regionally, or have you also worked in metropolitan areas? If so, what are the more prominent differences between the two experiences?

I have worked in both regional

and metropolitan areas. I started my career in Brisbane working for a large global consultancy and after five years moved to Central Western Queensland, which was the start of my regional journey. The main difference is that in the metropolitan setting, you often work in one particular area, whereas working regionally you get to work as a multiskilled engineer across numerous areas. Working regionally has also allowed me to get out on site and gain more hands-on experience.

What first attracted you to working regionally?

I grew up on a farm, went to boarding school in Brisbane and then onto university, however, have always been keen to return to the bush. I enjoy the wide-open spaces, the people, the affordable lifestyle, the work life balance, and the benefit it has for raising children.

Are your experiences similar or different to what you anticipated?

I would say similar - I always envisaged working regionally would allow me to develop skills across a broad spectrum of areas whilst utilising my invaluable experience gained whilst working in Brisbane. Working regionally has given me more hands on, site-based experience whilst also allowing a good work life balance.

What has been the impact of working regionally on your engineering skills and knowledge?

Making the change from the city to the country has had a significantly positive impact on my career. I have been able to broaden my skills and knowledge across many different areas whilst also collaborating with and learning from highly skilled, respected engineers from a wide range of specialities and backgrounds.

What can working regionally give you that working in a metropolitan area cannot?

Working regionally gives you a huge variety of engineering experiences which require excellent problem-solving skills, creativity, and adaptation to challenges such as extreme temperatures. Additionally, you often have multiple projects on the go at once, all requiring different knowledge and skills, so you are never bored! Working regionally is also a lot more autonomous and travelling large distances to different projects is something I am accustomed to on a weekly basis.

What are some of the most enjoyable aspects of working in a regional area?

The community spirit, wide-open spaces, affordable living, no traffic, and the great work life balance are just a few of the benefits of living and working in Goondiwindi.

What are some of the challenges of working in a regional area? What do you do to try to overcome these challenges?

Working regionally has some challenges - you don't have all the resources at your fingertips and sometimes have to make do with what you have. Good problem solving, thinking outside the box, excellent communication, creativity and the provision of innovative ideas and solutions become vital when working regionally. Distances are greater, temperatures more extreme, people resources are less and supplies often take longer to arrive.

What are you hopeful is the future of public works engineering in regional areas? What opportunities could be created with the right insight and investment?

I'm hopeful that public works engineering in regional areas will remain regional and doesn't get outsourced to metropolitan consultancies. There's a lot of benefit having dedicated, local knowledge and experience on the ground for projects to allow for optimum client and community satisfaction.

Ricey is the Managing Director of Proterra Group, a civil engineering consultancy based in Toowoomba. He is a qualified civil engineer with over 20 years local government experience. A country boy at heart, Ricey is passionate about rural and regional Australia with a vested interest in growing the number of engineers and technical professionals supporting communities and fostering collaboration between councils. Proterra Group has worked with over 45 councils across NSW and QLD and are committed to providing practical, cost-effective infrastructure solutions for regional communities.

Ricey has held full-time and seconded roles with several councils including Director of Engineering Services, Works Engineer and CEO. Although based in Goondiwindi, Ricey travels widely and is in regular contact with many councils. He also provides business coaching and mentoring and loves giving back to the communities which support his business.

Is your experience in the public or private sector or both? What differences, if any, have you noticed between the two when working regionally?

Most of my experience is in local government although half my career has been as a consultant to the public sector with Proterra Group. I still consider myself a council engineer even though I run a business. I also worked for two years as the general manager of an irrigation and AgChem business and two years as a project manager for a civil construction company, Sudholz when I first moved to Goondiwindi. Not many council engineers get to work with scrapers and laser buckets but they are amazing. Get on it.

In my experience there's a lot more expected of you when you work in the private sector when it comes to hours, working weekends, and overall responsibility for budgets and profitability when compared to the local government works. The nature of the work is generally the same though, and I can say first-hand that most of the engineers I've worked with in local government also put in the big hours and work hard for their communities. I don't tolerate those who insult council workers.

A key learning is the knowledge difference when it comes to contracts. When I was in local government, I thought I knew contracts but it wasn't until I moved to private sector that I really understood a contract and I'm confident you wouldn't cause me any surprises when it comes to a contractual issue. It's one of the reasons I now love supplying services to local government.

How long have you lived and worked where you are now?

I have been in Goondiwindi just over 15 years and love everything about it … except it's in Qld; I'm from Back O'Bourke in NSW.

Have you always worked regionally, or have you also worked in metropolitan areas? If so, what are the more prominent differences between the two experiences?

I have always worked regionally and don't do cities. I am glad we have city folk for the nice restaurants and weekend getaways but I could never live there. Too many traffic lights, fast walkers and people who don't wave to me when I drive past.

What first attracted you to working regionally?

I was born and bred in Bourke, NSW which had a population then of about 3,000. I love the bush and I can't see myself leaving. And when you're working you don't specialise in anything, you have to become a generalist engineer, jack of all trades. You have to get it done and don't have the liberty of calling on the multitude of consultants or contractors that you'd find in the cities. I love it and wouldn't have it any other way.

Are your experiences similar or different to what you anticipated?

I think they are exactly what I expected and at the end of the day, work is what you make it. I love what I do and don't know what I would do if I ever leave or sell Proterra. I travel, I advise, and I build stuff. What more could you want? In the early parts of my career though I struggled with spending weeks or months writing reports for councillors and having them make a different recommendation. "No, we won't buy that grader because a mate of mine had one and it kept doing turbos. Let's get this other one." Then one of my bosses said, "Ricey, our job is to research and advise. It's their job to make the call." I've never lost sleep since.

What has been the impact of working regionally on your engineering skills and knowledge?

I think it's given me the most amazing opportunities to advance my career, advance my salary and ultimately start my own






business. If I had taken one of those jobs straight out of uni for a city consultancy or a big firm, I'd still be doing basic project engineering sitting in a small office somewhere in the city. I'd hate it and I'd have nothing like the life I'm living now.

What can working regionally give you that working in a metropolitan area cannot?

Flexibility, amazingly diverse experience, more opportunity to get out in nature, zero commute and no traffic lights.

What are some of the most enjoyable aspects of working in a regional area?

Diversity, the bush, nature and the amazing flora and fauna, the friendly will do anything for you people, the challenges through lack of resources, the opportunity to learn, grow and progress, weekend sports and the smell of gidgee trees when it's raining.

What are some of the challenges of working in a regional area? What do you do to try to overcome these challenges?

Lack of resources, lack of formal training opportunities, long distances to travel between projects, high costs in getting resources where they are needed, lack of mentors for our younger engineers, kangaroos!!

What are the sometimes overlooked opportunities about working regionally?

- Above market salaries and conditions ie often includes housing, vehicles, remote area allowances
- Widely varied experience in different areas of engineering. You can't just specialise in one space you need to get across everything
- Accelerated promotion through your business/council due to difficulty in attracting resources
- Opportunity to travel across regional Australia and see our country
- Fun and welcoming local communities that you don't get in the cities
- Little to no commute time
- People say g'day and wave to you

What are you hopeful is the future of public works engineering in regional areas? What opportunities could be created with the right insight and investment?

Our regions are flourishing at the moment. Although many populations are in decline in rural areas there has been increases in GDP coming from these areas, so they are as busy as ever. The government is throwing buckets of money at infrastructure renewal projects and resources to deliver these projects which are already exhausted. Should some of our engineering colleagues choose to move to a regional area, the opportunities are endless, not just for them and their careers but also the lifestyle that their families will get to enjoy. There's nothing like growing up in the bush and you get to see the real Australia, not just a concrete jungle with purpose-built parks to make you feel like you connect with nature. We have it all in the regions and I wouldn't give it up.

Cody Granger

I am an Infrastructure Planning Engineer at South Burnett Regional Council (SBRC) having started with SBRC in January 2020 as a Graduate Engineer in Assets.

Prior to South Burnett Regional Council, I worked for Gympie Regional Council for two years. I undertook compulsory work experience (while studying) in a volunteer capacity, and eventually obtained a contract as an Assistant Project Manager in the Water & Sewerage Business Unit.

I graduated from the University of Sunshine Coast with a Bachelor of Engineering (Civil) (Honours) in September 2020.

My hobbies include training horses and competing at Team Roping throughout Australia, in which I won a National Rodeo Association Championship in 2018.

What have been your career highlights?

My current involvement in the Kingaroy Transformation Project as a Project Engineer has given me an understanding of major projects within a CBD. This project involves replacement and upgrade of all underground infrastructure from shopfront-to-shopfront within four streets in the Kingaroy CBD. This infrastructure includes conduiting for future upgrades for fibre to premise for multiple suppliers, renewal of water mains and services, stormwater upgrades, conduiting for LV & HV power to be brought underground, wider DDA compliant concrete footpaths, and new full depth EME2 pavement and asphalt surfacing.

Cody asphalting KTP.

A major part of my involvement includes the development of shared/community areas within the CBD. I have presented design reports to Council and undertaken community consultation to further refine the areas to reflect the community's vision. Moving forward into construction will further enhance my construction skills involved with delivering major CBD transformations.

Do you have a particular mentor who has made a big impact on you and your career?

Both Aaron Meehan (General Manager Infrastructure) & James D'Arcy (Manager Infrastructure Planning) at South Burnett Regional Council have been amazing mentors who have given me opportunities to learn and grow my career in Local Government. South Burnett has an awesome Graduate Program which encourages and promotes graduates to get involved beyond their everyday roles.

Another huge mentor from my early career is Dan O'Brien (Senior Project Manager – Airservices Australia) whom I worked with when undertaking unpaid work experience. Dan introduced me to engineering and project management and continues to mentor my professional development.

What has been the most valuable advice you've received?

To make sure you celebrate the wins, especially more than you dwell on the downfalls.

And, to report every problem with at least three solutions. Managers dislike being given only problems with no solutions on how to move forward.

What has been your biggest challenge so far?

Learning to balance and prioritise major construction involved with the Kingaroy Transformation Project, while managing the 'business as usual' in my Planning Engineer role.

Also being more involved with the political side of local government by working firsthand with the Mayor and Councillors has been an eye-opening experience. I believe these skills will be essential for promotion within local government.

What common mistakes do new graduates tend to make when starting out in the industry?

I think graduates assume that they need to know everything about everything as soon as they finish university.

I believe university introduces you to the tools/mechanisms

Cody KTP asphalting with Councillor and ED officer.

Cody Gympie careers expo - including Steve Baxter.

required to be an engineer, but the skills required to be a successful engineer are learnt through mentoring and years of real-world experiences.

What is a common misconception others have about what you do when engineering solutions for communities?

I think people outside of local government overlook how every resident is a key stakeholder on everyday decisions.

It's amazing how something that may seem as small as a lower kerb, or location of a pram ramp can really affect how people go about simple daily activities.

What do you enjoy most about your job and the location in which you work?

I love living and working in regional/country Queensland. I come from a country background and even when studying at the Sunshine Coast was always wanting to get back to the farm.

My weekends usually involve working on the farm or with our horses, and it's not far to get to the coast or Brisbane for a weekend away.

I believe there are a lot of opportunities in regional Australia that get overlooked because people haven't experienced the towns outside of SEQ. Smaller regional councils can provide a more direct working relationship with higher managerial levels than big councils which I see as invaluable in the early stages of an engineering career.

Where do you see yourself five years from now?

In five years I see myself as an RPEQ engineer with the experience to allow me to pursue higher level job opportunities within local government.

What inspired you to join IPWEAQ and what services are of most value to you?

I started using the 'Ask your mates' forum when I joined with South Burnett as I was new in the Asset Management space. My first course as a member was "Assessing Heavy Vehicle Access to Bridges" and I attended the SWQ Branch Conference in Chinchilla this year.

Attending these events does not only offer industry expertise but connections throughout local government and contractors which has been very helpful at this stage of my career. I look forward to continuing my attendance and hopefully one day presenting at a future conference.

WOMAN IN ENGINEERING

With the 2021 IPWEAQ excellence awards just a few weeks away, this issue we highlight past winners of the Woman in Engineering award: Angela Fry (2016), Glenda Kirk (2017), Natasha Murray (2018), Kym Murphy (2019) and Tiffany Parker (2020).

Angela Fry | 2016

The highlight of winning this award in 2016 was the realisation that I was a role model for other younger females trying to navigate a path in this heavily male-dominated industry. I'm proud of the progress we've made over the past five years, particularly through my ongoing involvement with IPWEAQ. We are seeing greater numbers of females studying engineering, starting their career, and staying in the industry long term.

After more than 20 years, I can genuinely say I still love my job and the work that I do. I loved being onsite in construction for the first phase of my career. Then when I had my kids, I was able to transition into more flexible part-time work. My return to full-time was exciting, interesting and challenging but always achievable.

My boys are now in high school, and even though they are unlikely to follow in my footsteps as engineers, I am always actively and strongly encouraging all young people, males and females, to become engineers. We get to be creative and curious. We get to collaborate and connect. And best of all, we get to build and grow our communities to make them a better place to live.

Glenda Kirk | 2017

I commenced my career as a project manager in the private sector, first in Cairns and later in Western Australia. I moved into local government in 2010 as a project engineer with Cassowary Coast Regional Council delivering major projects, before moving into the role of civil works engineer where I was responsible for a broad range of functions including NDRRA, transport infrastructure and asset management.

Born and bred in Mareeba, I returned home to be closer to family in 2016 when an opportunity arose at Mareeba Shire Council to deliver several major projects before taking on my current role as Director Infrastructure Services in 2017.

Your current role and general responsibilities

As Director Infrastructure Services at Mareeba Shire Council, I am responsible for leading my team in planning, construction, maintenance, and strategic management of Council's portfolio of transport, drainage, water, wastewater waste and recreational infrastructure.

I am part of the executive management team, using my engineering expertise to ensure that Council's corporate vision and objectives can be achieved through provision of quality infrastructure and services.

Some major projects that I have completed at Mareeba Shire Council include the Mareeba Wastewater Treatment Plant upgrade in 2017 to achieve environmental compliance and to cater for the growing population, and the Mareeba Airport upgrade in 2019 to provide the infrastructure needed to expand flight training, attract aircraft maintenance businesses, and establish Mareeba as a hub for the general aviation industry.

More recently, I have led a strategy to improve water security throughout the Shire, which includes a two-stage project in Chillagoe for construction of a new clearwater reservoir and development of a new bore and pipeline to supply raw water to the treatment plant, which is expected to break a five-year period of Level 3 water restrictions for the town by early 2022. My team is also developing a Parks and Open Spaces strategy, underpinned by an asset management plan to enhance Council's portfolio of recreational infrastructure and improve liveability while ensuring long-term financial sustainability.

The impact of the Award on your career

Receiving the IPWEAQ's Woman in Engineering award in 2017 was quite a surprise for me and it was humbling to be recognised by my peers for my contributions as an engineer. It provided me with awareness of other female leaders in the sector and I believe the professional relationships I have gained with these amazing women are largely a result of the confidence and recognition gained through the award.

The award has inspired and motivated me to promote and encourage the next generation of females in the public works engineering sector to become involved in IPWEAQ and recognise the important contributions they make.

Any advice for upcoming young female engineers in the industry?

The biggest piece of advice I can give is to not underestimate the value you can add to your organisation as a female engineer. Engineering is a broad career and there are so many opportunities to make a real difference. Soft skills including communication, collaboration and leadership are equally as important as the technical knowledge you can bring to the table, and a female's perspective is essential in all that we do. After all, half of the population is made up of women and we can only truly address the needs of our community by giving consideration to all gender and demographic groups.

I also believe that in engineering, women especially need to push their own boundaries, and the boundaries of their peers, stepping up to face challenges and overcome obstacles. Responding to setbacks forces us to learn, question, discover, experiment, and improve, presenting a valuable (albeit uncomfortable) opportunity to grow, both professionally and personally.

Reasons why organisations should nominate a female engineer for this Award

The Woman in Engineering award provides the opportunity for organisations to recognise and celebrate the talented women within their workforce and promote the contributions those women make in providing positive outcomes for the community. It provides a platform for organisations to showcase the achievements of both their people and the whole organisation, while encouraging excellence through the identification and promotion of the exceptional female engineers in their team. It also helps raise the profile of the organisation in terms of gender balance by demonstrating they value the outstanding women in their workplace.

How would you pitch public works engineering as a career to young girls and women?

A career in public works engineering provides the opportunity to improve the community's quality of life and protect the natural environment through providing leadership and technical advice in the delivery of quality infrastructure and services. Engineers use their specialist skills and knowledge within cross-disciplinary teams to make a real impact in the world by developing solutions that underpin the sustainability and prosperity of a community.

By living and working in their communities, public works engineers develop a greater understanding of how to overcome challenges and harness opportunities, with no two days ever the same. The reward comes when engineers are able to experience first-hand how their work helps shape the world they live in, whether it be through the roads they drive on, the water they drink or the recreational spaces they enjoy with their families.

Natasha Murray | 2018

I have worked in public works engineering for 20 years following the completion of my Bachelor of Engineering (Civil) at Monash University, Victoria, in 2001.

Describing my career, I would say it has been exciting, rewarding, and diverse. I started my career working in a large capital city, followed by a dynamic fast-growing town and now a regional area with great beauty and diversity. All have come with very different engineering challenges.

My first local government position was at the City of Melbourne where I was employed for six years. During this time, I had the opportunity to be involved as Council's representative for a 12-month period in the traffic and transport planning and delivery of the Commonwealth Games held in Melbourne in 2006.

In 2007 I made the move to the most beautiful part of Australia - Far North Queensland, where I worked with the Cairns Regional Council for a 13-year period prior to becoming part of the team at Douglas Shire Council.

Your current role and general responsibilities

I have been working at the Douglas Shire Council for 12 months as Manager, Infrastructure. My role is responsible for the management and development of all matters related to Council's Civil, Open Spaces and Building infrastructure from capital works to maintenance. In this position I manage a dedicated team working together to deliver a high level of service to our community.

The impact of the Award on your career

Winning the Women in Engineering award was a great honour, especially considering the many other female engineers in the community who are just as deserving. The recognition motivated me to grow further in my chosen career, giving me the confidence to put myself out there and try new things with the attitude to always strive for excellence.

Any advice for upcoming young female engineers in the industry?

Take every opportunity to learn from your peers whether engineers or not, especially those colleagues with several years of experience. They are the ones that know their area better than anyone else. Those learnings will be invaluable.

As a female engineer, embrace the courage to challenge the stereotype of engineers being a career for males. There is no doubt that males and females have different experiences throughout life. Look at this as your strength using your learnings to complement your analytical and technical abilities.

Most importantly recognise that good communication is the key to achieving success in any career path!

Reasons why organisations should nominate a female engineer for this Award

It is always nice to feel that your efforts are recognised in your workplace. A nomination for an award demonstrates this to the staff member. It shows that their contribution is valued by the organisation. This leads to a positive workplace culture where staff will strive for excellence with the knowledge that their efforts are recognised and appreciated.

How would you pitch public works engineering as a career to young girls and women?

Times are changing. The stereotype of an engineer being a male in overalls, a hard hat and boots working on a construction site is not accurate. Public works engineering opens up a world of opportunity. It provides the opportunity to make a difference and improve the quality of life for a community through the provision of essential infrastructure and services, that many cannot live without. Public works engineers have the opportunity to make history! Imagine in years to come driving past something you were involved in making happen. Whether it be a building you project managed, a road you designed, a reservoir you supervised construction of … the list is endless. It is an exciting and rewarding career that will never be boring.

Kym Murphy | 2019

In 1993, I commenced work as a graduate Civil Engineer in Roma at the Department of Transport and Main Roads (Queensland Transport back then), as the first most western female engineer. When starting out in Roma, I worked in both the Transport Planning team and as an Area Engineer in the Infrastructure Delivery team, working closely with several local governments; Taroom Shire, Murilla Shire, and Warroo Shire councils. I had much ground to cover but I loved getting out and meeting the crews and supervisors in person. Back then "The Pink Book" had just been published by TMR and we were all learning the specifications together. In those early days I learnt a great deal about bitumen sealing, getting the 'windows' just right for the aggregate spread, and being a traffic controller.

In 1996, still with TMR, I joined RoadTek as a project manager where I had some amazing experiences living in construction camps including: learning about blacksoil as a subgrade; sourcing local pavement materials; stabilising pavement and insitu material; building along a new alignment across blade-ploughed country; learning the difference between compacted density and 'ground' density during a massive cut/fill operation with scrapers; driving piles that wouldn't pull up and some that refused (all in the same pier); and much more. Working with the crews was one of my favourite aspects of the job. These crews were often sheep farmers or wheat harvesters by their rural background, some with minimal schooling, but all with gems of information and experience to soak up and learn from if you took the time to listen.

I often say that I "grew up in RoadTek". RoadTek witnessed me getting married to a local grazier; stepping over rills onsite seven-months pregnant with twins; developing as a manager and leader (the crews were very patient as I practiced and grew many of my people skills on them); and as a young woman working full time while managing a 300-head grazing business and raising my three sons. This was a terrific grounding with unconditional encouragement for both my career and my personal development. It took close to 15 years for me to move from the RoadTek branch and take up a new role in 2011 as Regional Director (South West).

In 2014 I moved my family to Toowoomba where I was appointed as Regional Director (Downs South West) in early 2015I was thrilled that I would still be leading "my old South West team" in this role, and I still do

today. With Wide Bay Burnett joining with Darling Downs and the South West in February 2020, my region has now grown to be the Southern Queensland Region. The breadth of opportunity and experiences, and culture of inclusivity and diversity in TMR, along with being able to make a real difference in the everyday lives of our community, has been key to my working with the department for my entire career to date.

Your current role and general responsibilities

As the Regional Director, I am accountable for the strategic planning and forward program development for transport infrastructure in Southern Queensland. I also lead and provide governance over the delivery of the transport infrastructure program, along with the management and operation of the state road network. As Regional Director (Southern Queensland), I particularly call on my values-based leadership and strength in engaging with people and our community and driving a strong performance culture in pursuit of results. I also join my peers throughout the state providing leadership and stewardship of the statewide business of Program Delivery and Operations branch, TMR.

The Southern Queensland Region encompasses the Darling Downs, South West and Wide Bay Burnett districts, with approximately 300 people spread across offices in Toowoomba, Warwick, Roma, Charleville, Bundaberg and Gympie. The Southern Queensland Region covers just under 450,000km^2 of geographical area, with a total road network of 11,500km and a transport infrastructure program consisting of $745 million for 2021/22.

Bruce Highway's $1 billion Cooroy to Curra Section D project, locally known as the Gympie Bypass, is in Southern Queensland's current delivery program, along with Saltwater Creek and Tiaro Flood Immunity projects, both over $100 million in budget. Our Southern Queensland regional delivery program also includes several road safety programs and stimulus packages, along with a large maintenance and preservation program and a planning program that informs the development of an investment pipeline for the region. The much-celebrated Toowoomba Bypass project was in one of my recent portfolios; being a key contributor to its successful delivery is something I'm very proud of. The diversity of project deliverables and program outcomes in the Southern Queensland regional delivery program provides many terrific opportunities for developing our people, whilse contributing to providing a single integrated transport system accessible to everyone.

The impact of the Award on your career

I was incredibly humbled to receive the 2019 Women in Engineering Award. Like many of us, I love what I do and feel that I'm 'just doing my job', so hearing publicly how my contribution to our profession and my work with Transport and Main Roads is appreciated and valued has caused me to pause and reflect on my achievements and how I have made a difference in everyday lives, being the best I can be and leading with heart and integrity.

The recognition has afforded me a platform upon which I can talk about why I'm a proud engineer, a proud woman, a proud Mum, a respected leader, a loving friend, a member of a church... an immensely proud conglomeration of all that and more to make me who I am; and how we can use our unique qualities to make a positive impact in the world, set people on their own paths to success, and encourage more of our young folk to give our fabulous profession a go.

Recently I had the absolute pleasure to talk with local Year 6 girls as part of their school's Bella Girl program, a program that seeks to challenge, inspire and equip girls with healthy life principles, including valuing yourself so that you are able to value others. Speaking opportunities like these 'fill me up', by being provided the privilege to help shape these beautiful inquisitive minds and play a part in helping develop their future selves.

I have also been asked to reflect on my experiences and insights as a woman engineer on webinars, panel sessions, at STEM student events and in newsletter articles, each presenting an opportunity for me to talk publicly about what I'm passionate about: values-based leadership; using our engineering and innovative problem-solving capability for achieving humanistic and best-for-community outcomes; fostering a culture of care in our workplace; and the importance of mental well-being.

Any advice for upcoming young female engineers in the industry?

My advice is to stay true to yourself. Your job doesn't define you. This advice however, is for anyone and everyone, wherever they are in their career.

For young female engineers, keep remembering why you wanted to be an engineer and focus on being the best you can be. Define and embrace your point of difference as an engineer - don't be distracted about whether you're the only female in your team or cohort, just get on with being a valued professional.

While you are young, and often with less personal commitments, consider all the opportunities offered to you. Don't let a lack of self-confidence stop you from taking up a challenge and having a go; making mistakes is your rite of passage as a young person as they teach resilience and accountability, so embrace them, and learn and grow from them.

I strongly suggest finding yourself a mentor, or several – who you admire, who aligns with your values or who you aspire to be like. Mentors are terrific sounding boards for testing thoughts and aspirations, can provide networking connections, and can also reflect on their own experiences, successes, and mistakes, sharing their learnings – it's the safe space for often vulnerable but powerful conversations. We as mentors often learn from, and value, the time together just as much as the mentees; we love encouraging people to shine.

Reasons why organisations should nominate a female engineer for this Award

Just being nominated for the Women in Engineering award is a real boost; to know you are valued by your organisation and the people who you work with and hearing why. It can inspire you to strive even further for excellence in all that you do. I believe any organisation with 'people' at their centre, is proud of their achievements and enjoys celebrating and recognising their successes, should nominate their female employees for such a prestigious award. It is a "no-brainer".

How would you 'pitch' public works engineering as a career to young girls and women?

Public works engineering is a fabulous opportunity to make a difference in the lives of your community. We get to live, work, and play in the community in which we serve.

Every day, everyone in our community has a touch point with some aspect of public works and infrastructure. Our impact is far reaching on the social vibrancy, connectivity, and wellbeing of our communities, and on peoples' lives. As engineers, we have the opportunity to make a genuine difference in the world, and in our communities, as we apply our logical brains and problem-solving capabilities to real life and everyday challenges. We draw on our life experiences, at work and in the boardroom.

As women, we can bring a different perspective and creativity, often centred around our values, to leadership, problem-solving and decision making. As young girls and women, we need to *embrace* femininity, *not* conceal it. I am living breathing evidence that you can be an engineer *and* keep your femininity. For young girls who love logic and problem solving, particularly those who have strong humanistic values, public works engineering is certainly a profession well worth considering.

Tiffany Parker | 2020

'Shall I study engineering or pursue my love of classical piano at the Conservatorium?' That was my original conundrum, fast forward 20 plus years and yes, sorry Beethoven I did not choose you.

I am a structural engineer with more than 20 years' experience with both government and private organisations. I studied Civil Engineering at The University of Southern Queensland where it became clear to me that I had a proclivity towards all thing related to structures.

My first engineering roles were focused on steel structures. I have a strong design and construction background in commercial and industrial steel buildings, heavy industrial steel structures including silos, overhead bins, conveyors, and towers.

I moved to London and worked on London's 3G telecommunications network roll out, which took me to the rooftops of its most iconic places, including Victoria Station and Piccadilly Circus. Along the way, I became a Chartered Professional Engineer and obtained my RPEQ back in 2001.

On joining City of Gold Coast Design office in 2010 I focused on planning, design, and construction of civil infrastructure. This included roads, stormwater drainage systems, concrete structures, bridges and retaining walls. I attracted structural design projects such as community services infrastructure including community centres (Coomera Hub Community Centre) and numerous public amenity structures.

In 2016 I moved into City of Gold Coast City Assets Branch and became part of a fledgling team to work on a small capital program for bridges and lead the engineering component of the project delivery. This team eventually became Transport Structures Asset Team (Bridge Team) consisting of 15 strong professionals.

My current role has allowed me to develop skills in managing a portfolio of bridge and major culvert assets. These skills include programming, developing capital budgets, understanding risk management, and applying engineering judgment to plan and prioritise projects in a sustainable and cost-effective manner.

By the way, my career mentor once told me engineering was the correct career choice for me, mind you he has not heard me play the piano.

Current role and general responsibilities

Senior Structural Engineer, Bridge Team, City of Gold Coast,

Transport and Infrastructure.

- Subject matter expert on all bridges and major culvert planning works for the City's network of existing structures
- Lead Engineer for the Bridges and Major Culvert capital works program
- Specialist in technical specifications for planning, design, and construction contracts
- Asset Custodian representative duties for contributed assets, heavy vehicle access decisions and asset management guidance and development of four and 10-year capital programs

Notable recent projects of which I have been Lead Engineer include:

- Sarawak Avenue Steel Footbridge Renewal (IPWEAQ 2017 Overall Project Winner and National Finalist)
- Kirra Boardwalk Renewal (IPWEAQ 2020 Project nominee Projects $2-$5 million)
- Coplick Footbridge Replacement (IPWEAQ 2020 Highly Commended projects $1 -$2 million)
- Numerous bridge and major culvert rehabilitation projects across the City of Gold Coast

The impact of the Award on your career

The award prompted me to reflect upon my achievements and re-evaluate my path going into the future. I intend to stay in local government, knowing I have much more to contribute.

It has inspired me to give back to the profession and get involved in working groups and organisations where I feel others can benefit from my experiences and knowledge.

I am very proud to say I have secured a Chair position for a Gold Coast Regional Committee of an industry recognised technical organisation.

From a personal perspective I was most proud of my two teenagers' reactions on finding out I won. Their response was, 'That's awesome Mum, you rock!' It certainly went a long way towards counteracting my working mother's guilt. Incidentally, my daughter intends to study engineering next year at university, suffice to say it seems to have had a ripple effect.

Any advice for upcoming young female engineers in the industry?

Never has there been more opportunities to specialise across engineering disciplines, find the area which is the most satisfying and aim to be the best engineer you can.

Seek out like-minded professionals and foster those relationships. They will get you through the challenging times and celebrate the good times with you.

Know that you will be a minority in the workplace, learn how to collaborate, celebrate diverse thinking, and promote equality.

How would you pitch public works engineering as a career to young girls and women?

Public works engineering not only deserves the best and brightest minds on the job but also the unique perspectives women have to offer. Yes, aesthetics and sustainability are important to engineers!

You can take your pick in disciplines whether it be transportation, water and waste, beaches, and foreshores and so much more.

Planning and delivering infrastructure can be challenging and rewarding at the same time. There are so many people who benefit from skilled engineers working for our communities.

You will meet and work with the most diverse and skilled teams of people where there are opportunities to learn how to manage, build and operate our built and natural community. I challenge you to take these skills to any city in the world.

PAVING THE WAY FORWARD – INDUSTRY LEADING PRACTICE FOR SPECIFICATION OF SMALL-FORMAT CONCRETE SEGMENTAL PAVEMENTS

In Australia, small-format concrete segmental pavements have been utilised in roads, carparks, commercial facilities, and industrial environments for decades. Over the years they have been favoured for their functionality and aesthetic appeal. More recently however, they have been recognised for their ability to exhibit the flexibility of asphaltic materials and the durability of concrete. Permeable segmental pavements, often referred to as permeable interlocking concrete pavements (PICPs) are similar in design to their non-permeable counterparts; however, they showcase the ability to control, detain and treat urban runoff. Despite the extensive use of segmental pavements internationally and within Australia, a lack of information and technical guidance produced in Australia has made it difficult for local and state governments to correctly design, construct and maintain concrete segmental pavements. This article from the Concrete Masonry Association of Australia (CMAA) provides an overarching discussion on the key aspects that differentiate small-format concrete segmental pavements from other pavement systems, centring on industry leading practice for their specification and construction in local government projects.

The Potential of Small-Format Concrete Segmental Pavements

Small-format concrete segmental pavements are a flexible pavement system comprised of modular paving units with an individual unit face area of less than 0.08 m^2. Flexible systems such as these can deform under loading, allowing loading forces to be dispersed laterally. These segmental pavements are widely used for pedestrian focused public places and are commonplace in urban design. In fact, it is more than likely that you have seen these pavement systems throughout your local area, whether that be a residential driveway, pedestrian footpath or even a sprawling carpark.

However, the implementation of concrete segmental pavements extends far beyond these low traffic purposes.

Segmental pavements are incredibly durable, and due to the interlocking nature of the individual paver units, their modular surface progressively stiffens over time. Through this unique characteristic, you can successfully design concrete segmental pavements for heavy traffic loads, ranging from small scale industrial yards to port facilities. In fact, the flexible nature of the pavement surface allows a typical 80 mm thick concrete paver to be used in applications extending from lightly trafficked roads to heavy industrial facilities. The key to unlocking the potential of these pavement systems is highly dependent on the correct specification of materials for your design situation and implementing leading construction practice.

Design and Construction of Concrete Segmental Pavements

Like all modern pavement systems, concrete segmental pavements are designed in layers, with each individual layer serving a specific purpose for the structural performance of the final pavement system, as shown in Figure 1. It is important to understand the roles of these layers to ensure your pavement is designed and constructed for its intended purpose.

As a flexible system, the

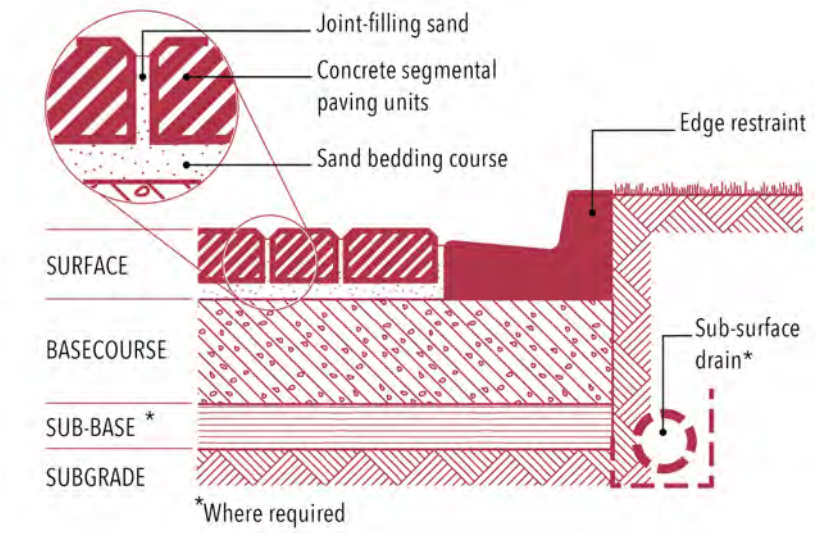

Figure 1 Typical cross section of a small-format concrete segmental pavement.

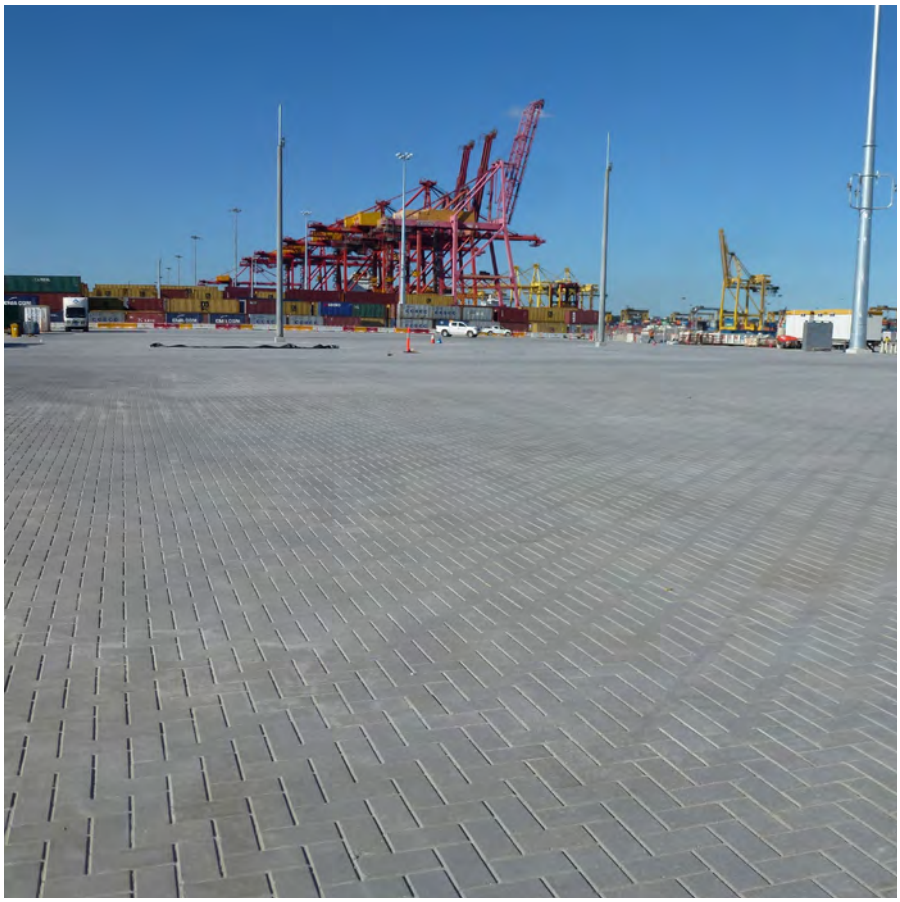

Figure 2 A 69,000 m² concrete segmental pavement was specified for a container facility at Port Botany in Sydney. The herringbone laying pattern provides additional strength to the pavement.

preparation and construction of subgrade, subbase and base layers for a segmental pavement remains identical to the procedures employed in asphalt over granular material pavements. The leading practice for the preparation of subgrade and basecourse/subbase would therefore be equivalent to those referenced in Austroads technical documents and Queensland Transport for Main Roads literature.

The main differentiating characteristic between concrete segmental pavements and other flexible pavement systems is the unique properties of the modular surface. The surface of a segmental pavement system is formed in two distinct layers; a bedding course, as well as the paving units and jointing sand. As modular pavements are "pre-cracked", fatigue failure is not modelled in their design and rutting at the subgrade interface becomes the primary mode of failure for thickness design. Whilst the substructure preparation and construction are identical, it is important to note that the thickness design of segmental systems is not the same and one should consult CMAA literature for guidance when specifying these systems. The construction considerations for the surfacing layer are discussed below.

Bedding Course and Surface Materials

The bedding course often consists of clean graded crushed quarry fines and quality concrete sands. The purpose of the bedding sand is to give the pavers a uniform surface to be laid upon, expediting construction, and reducing the likelihood of differential settlement in the pavement. A secondary benefit of bedding sand is that it assists in filling in the underside of the pavement joints that may not have been filled during jointing operations, facilitating interlock. Industry leading practice suggests that a compacted thickness of 20 – 25 mm shall be achieved for the bedding course layer. Compacted bedding courses thicker than 30 mm are not recommended as they not only add unnecessary material costs but are likely to result in differential compaction. Avoid using bedding sand to fill any depressions appearing in the basecourse layer, as this will create soft spots in the pavement leading to an increased risk of differential settlement.
It is important to note that bedding material should remain uncompacted, and compaction should be undertaken after the paving units are laid and the joints between have been filled as detailed below.

In Australia, all small-format paving units are manufactured and shall be used in applications aligning with the requirements outlined in AS 4455.2 - Masonry units, pavers, flags and segmental retaining wall units, Part 2: Pavers and flags. When specifying a concrete segmental pavement, some key factors to consider include paver thickness and laying pattern. The laying pattern can contribute to the overall stiffness of the pavement surface, with the CMAA recommending the use of a herringbone pattern where possible to minimise the effect of traffic direction on pavement performance. An example of this pattern is shown in Figure 2, where a 69,000 m^2 concrete segmental pavement was constructed for Patrick Wharf in Port Botany. For roads that are subject to vehicular traffic, ensure that the paving unit chosen is specified for the respective loads. Figure 3 highlights the CMAA recommended minimum paver thickness and characteristic breaking load requirements for a range of traffic loading scenarios, based off the requirements stipulated in AS4455.2. Compare these values with product technical statements to determine the suitability of specific units for pavement.

After the pavers have been laid over the bedding material, the joints between each unit must be filled with a jointing sand. This material is graded more finely than bedding material, and because of this, the two materials cannot be used interchangeably. This is because the finer sand can fill the joints in a more effective manner and reduce the surface permeability whilst simultaneously applying greater friction to the adjacent pavers. This allows for greater interlocking action to occur across the whole pavement surface improving load carrying capabilities with every traffic pass across the pavement surface. Figure 4 shows the CMAA recommended grading requirements for bedding and jointing sand.

Pavement applications		Minimum paver thickness (mm)	Minimum characteristic breaking load (kn)
Residential	Pedestrian only	40	2
	Pedestrian and light vehicles only	40	3
	Pedestrian and commercial vehicles	60	5
Public space	Pedestrian only	40	2
	Pedestrian and light vehicles only	50	3
	Pedestrian and commercial vehicles	60	5
Trafficked	Minor and residential	60	6
	Local access	60	6
	Collector	76	6
Industrial	All	80	10

Figure 3 Minimum thickness and characteristic breaking load requirements for small-format pavers (Standards Australia & Standards New Zealand 2010).

	% Passing	
Sieve size	Bedding Sand	Jointing Sand
9.52mm	100	
4.75mm	95 – 100	
2.36mm	80 – 100	100
1.18mm	50 – 85	90 – 100
600 µm	25 – 60	60 – 90
300 µm	10 – 30	30 – 60
150 µm	5 – 15	15 – 30
75 µm	0 – 10	5 – 10

Figure 4 Grading envelopes for bedding and joint-filling material (Concrete Masonry Association of Australia 2014).

Once the jointing sand has been spread across the surface and brushed into joints, compact the pavement to kick start the interlocking process and provide initial stiffness. The compacted bedding sand will ensure the pavement maintains a uniform surface, whilst the compacted jointing sand will fill the gaps between pavers, allowing for interlocking action to occur over time. The advantage of small-format concrete pavements is that unlike other systems, they get stiffer over time, which increases their performance.

Specification for PICPs

Similar to impermeable concrete segmental pavements, PICPs are designed in layers that each serve a specific function on a structural and hydrological level. The key difference is that PICPs are designed to

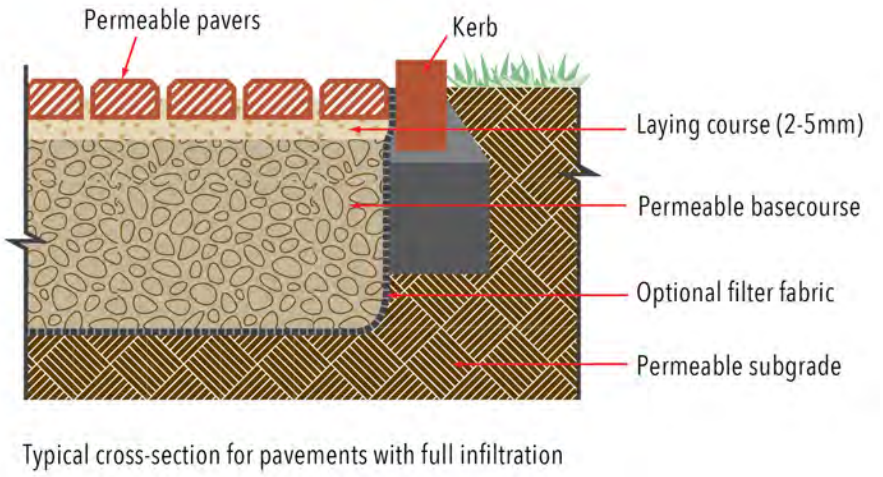

Figure 5 Typical cross section of a permeable concrete interlocking pavement allowing for full infiltration into the subgrade.

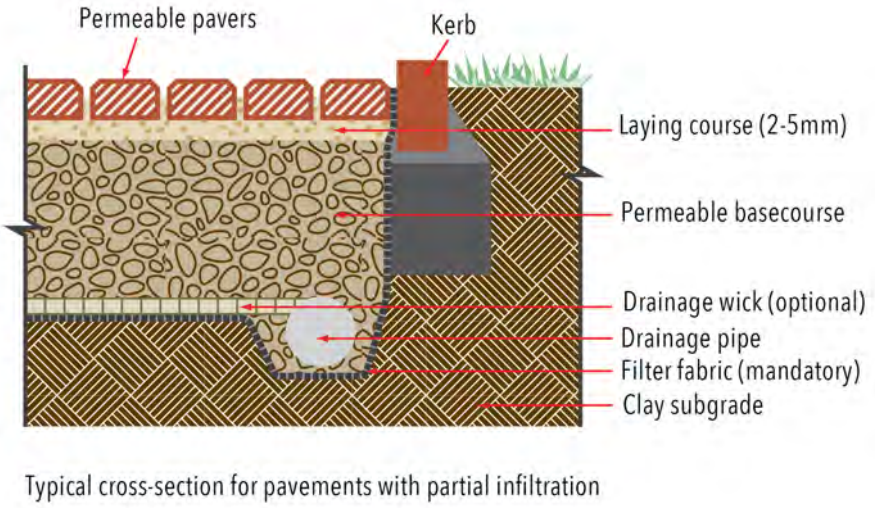

Figure 6 Typical cross section of a permeable concrete interlocking pavement allowing for partial infiltration into the subgrade

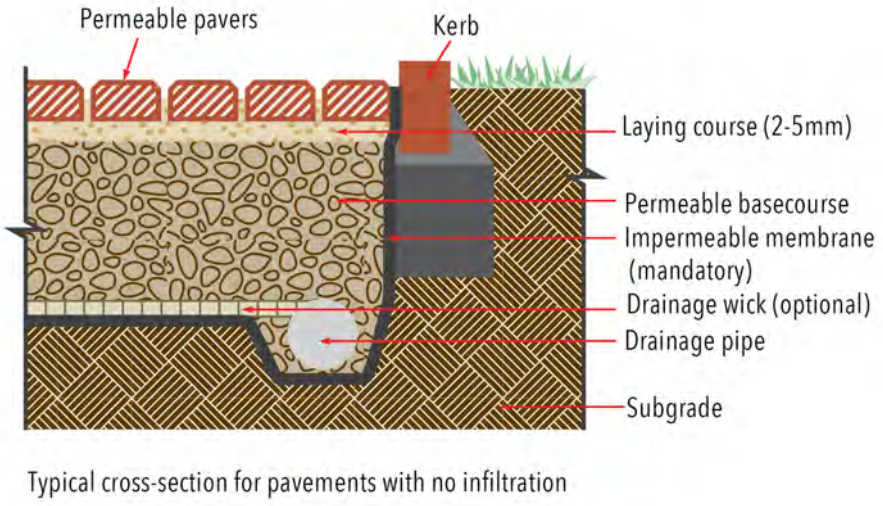

Figure 7 Typical cross section of a permeable concrete interlocking pavement prohibiting infiltration into the subgrade

allow for the infiltration of precipitation. This means that hydrological functions including runoff control, water quality improvement and water storage can be considered during design. As a result, pavement materials and layer thicknesses must be specified to account for the required traffic loading as well as the desired hydrological functions.

Subgrade and Basecourse Specification for PICPs

The design and construction principles for PICPs are similar to their impermeable counterparts discussed earlier. However, their permeable nature means that it is important to specify alternative materials to allow for the infiltration and potential storage of stormwater runoff.

PICPs can be constructed over all types of subgrades, however, specify the correct system for the existing environment. There are three infiltration systems that can be selected, shown in Figures 5 through to 7, representing full, partial and no infiltration into the subgrade, respectively. Figure 8 highlights the subgrade characteristics to consider when specifying the correct infiltration system for the PICP. If the site's subgrade is reactive, polluted or has low permeability, then a no infiltration system is recommended. If the pavement is subject to vehicular loads, then compact the subgrade. Experience suggests a 92 - 96% Standard Maximum Dry Density (MDD) is adequate. Note that the compaction of subgrade will reduce subgrade permeability and consultation with a geotechnical engineer is recommended to determine the extent of this impact.

Unlike impermeable pavement systems, the basecourse material of PICPs must be carefully specified to allow for rainfall and runoff infiltration. Single size uniform granular materials and graded permeable road bases are often used for the basecourse of PICPs. Figure 9 shows the CMAA grading recommendations for

		Full infiltration PICP system	Partial infiltration PICP system	No infiltration PICP system
Permeability of subgrade, defined by coefficient of permeability k (m/s)	10^{-6} to 10^{-3}	✓	✓	✓
	10^{-8} to 10^{-6}	✗	✓	✓
	10^{-10} to 10^{-8}	✗	✗	✓
Highest recorded water table within 1000 mm of formation level		✗	✗	✓
Pollutants present in subgrade		✗	✗	✓

Figure 8 Subgrade considerations for the correct specification of different PICP infiltration systems. (British Standards 2009).

	% Passing	
Sieve size (mm)	Open graded granular base	Uniform granular base
40	-	100
31.5	-	98 – 100
26.5	100	-
19	95 – 100	85 – 99
13.2	70 – 93	-
10	-	20 – 70
9.5	55 – 85	-
4.75	20 – 75	0 – 15
2.36	10 – 50	0 – 5
1.18	0 – 25	-
0.6	0 – 12	-
0.425	-	-
0.3	0 – 8	-
0.15	0 – 6	-
0.075	0 – 5	-

Figure 9 Grading recommendations for open graded and uniform granular PICP basecourse materials (Concrete Masonry Association of Australia 2010).

open graded and uniformly graded granular bases. These materials should be compacted to a 98% MDD for pavements subject to vehicular loading. In full infiltration systems, the inclusion of a geotextile (or geofabric) material between the basecourse and subgrade layer can be considered, which can prevent the migration of colloidal particles into the base or sub-base material. In partial infiltration systems, this geotextile material is required and should be brought up the sides of the pavement as shown in Figure 4.

Bedding Course and Surface Material Considerations for PICPs

The bedding and surface layers of a PICP must also allow for the interception of water. Sand should never be used in permeable pavement systems due to its low permeability. Industry leading practice recommends that a clean 2-5mm uniformly graded aggregate material should be used for the bedding course. This should be laid to a depth of 30mm after compaction.

Permeable pavers perform identically to their impermeable counterparts from a structural standpoint and are only differentiated through the inclusion of a water infiltration function. Typically, these pavers are either shaped with widened joints and openings or manufactured with no-

Figure 10 A completed PICP system on Phillip Island in Victoria, which allows for rainfall and runoff infiltration through small openings between individual paving units.

fines concrete. An example of a completed PICP is shown in Figure 10, comprised of individual pavers with small openings, allowing for runoff infiltration into the basecourse below. As with non-permeable pavements, these individual pavers should be laid with small 2-5mm gaps between each unit.

After laying the permeable pavers the joints should be filled through sweeping action. Choose to use the same material specified for the bedding course, however, a finer aggregate of 1-3mm may also be specified. Once filled, the pavers and bedding course should be compacted so the pavers become held in place for the same reasons this is done for traditional segmental systems.

Pavement Design Software

The CMAA has collaborated with the University of South Australia to develop DesignPave & PermPave; a leading-edge software that allows engineers to design impermeable and permeable concrete segmental pavements with ease. Made specifically for Australian conditions, the software incorporates both Austroads design principles and Australian Rainfall and Runoff 2016 data to streamline the design procedure, allowing for greater design efficiency and accuracy no matter what project being worked on.

The CMAA and its member companies have made the software complimentary and available to the public for the benefit of all. The CMAA recommends the use of these software tools when designing any concrete segmental pavement. Register for DesignPave now by using the QR code attached.

Register for DesignPave today using the QR code.

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ABOUT THE AUTHOR

The CMAA is the peak industry body representing concrete brick, block, and paver manufacturers. We offer all of our technical resources and expertise on a complimentary basis. We also offer continuing professional development (CPD) courses and programs for engineers and tradespeople focusing on the correct design and installation of our members' products. Visit our website to access these resources and to learn more. Additionally, should you have any questions about these pavements or the DesignPave software, do not hesitate to get in contact with our team via email on info@cmaa.com.au. or call us on (02) 8448 5500.

NEXT GENERATION PLANNING & URBAN GROWTH MODELLING – IT'S A PUG'S LIFE

Andrew Saad
Coordinator Planning & Analytics, Strategic Infrastructure
City of Gold Coast

Preparation of a new Local Government Infrastructure Plan (LGIP) or major amendment to an LGIP usually requires Council to develop a new set of planning assumptions and development projections. These projections provide scenarios for future urban growth in the City, based on the time horizon and the current population projections to indicate how this growth will be distributed across the City over time. As required by the *Minister's Guidelines and Rules* (MGR), the predictions for future urban growth for LGIP purposes are prepared based on the MGR requirements (using Queensland Government Statisticians Office (QGSO) and other appropriate resources and considering the development trends for different areas within the City).

The City of Gold Coast's (the City) LGIP Steering Committee supported the development of a new model using a robust framework and repeatable methodology for preparation of updated development projections for the City. The Planning and Urban Growth model (PUG) was subsequently developed by the Economy, Planning and Environment (EP&E) directorate as a transparent, repeatable and fit for purpose LGIP planning assumptions modelling tool. The model is an example of best practice urban growth modelling with a transparent framework to provide a reliable foundation for residential and non-residential development projections. This modelling supports and informs future land use and policy decisions across the local government area (LGA). The PUG will enable the City to better plan, fund and deliver trunk infrastructure plans which underpin future growth and development. It's a PUG's life!

SEQ Context

The context for PUG modelling includes the following and is shown in (Figure 1) below:

- *SEQ regional plan 2041 benchmarks for The City's dwellings and employment* – Testing the realism of benchmarks and the quantum of interventions required to meet the benchmarks.
- *QGSO Population Projections* – Modelling of current projection series and informing future allocation scenarios developed by QGSO to ensure they are as realistic as possible
- *City Plan Amendments* – Testing policy changes to understand potential differences in supply and capacity.
- *LGIP Updates* – Development Projection scenarios developed based on the above to derive infrastructure projects required to support the future growth of the City

Link to strategic and business plan

The PUG provides strategic direction to planners, networks, stakeholders and political decision makers on the anticipated sequence and scale of future residential and non-residential development. The model is a tool for the City to support the timely and coordinated delivery of trunk infrastructure, in a financially sustainable manner.

Key benefits

Integrity of planning information.

The PUG provides the following benefits around integrity of planning information:

- More accurate, reliable and up-to-date predicted residential and non-residential development growth information to support decisions regarding the City's infrastructure planning
- Substantiated land use and infrastructure planning policy decisions, including the ability to inform decisions regarding distribution of future growth
- The ability to demonstrate assumptions on the sequence and scale of future greenfield and brownfield development distribution

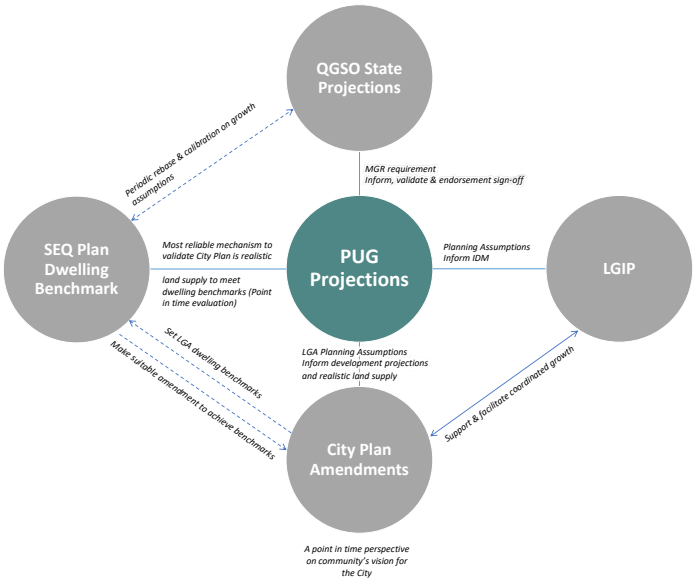


Figure 1 PUG's SEQ contextual diagram.

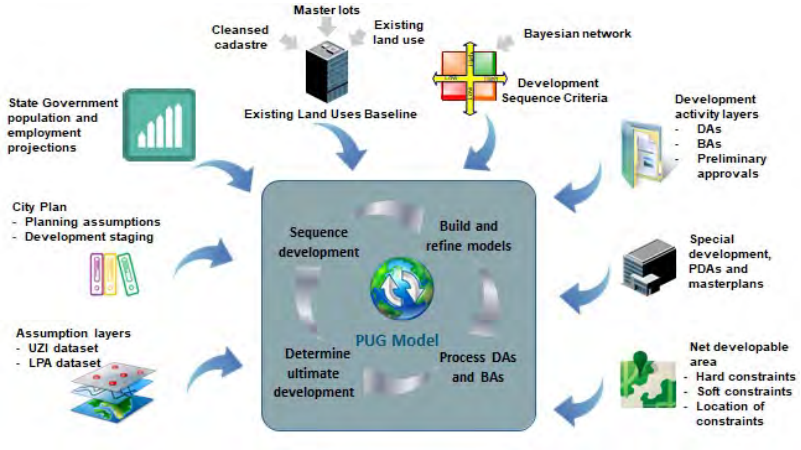


Figure 2 Overview of PUG components including inputs and processing.

Figure 3 Sample of Master lots (existing land use) geometry.

- The ability to quantify and validate a more timely and coordinated delivery of trunk infrastructure
- Incorporation of Queensland Government Statistician's Office (QGSO) population projections - it is also intended that the model will be used to help inform the QGSO on the next series of population projections in order to ensure they reflect the current land supply in the city
- Incorporation of the Department of Transport and Main Roads (TMR) Employment projections based on QGSO with National Institute of Economic and Industry Research (NIEIR) small area allocation employment projections
- Incorporation of updated population projections, employment projections and updated versions of City Plan into future versions of the PUG
- The ability to perform more in-depth assessments of planning criteria as part of future scenario testing (e.g. the inclusion of property development factors and transport accessibility factors to ensure the maximisation of future urban development along public transport nodes and corridors).

Improvements/enhancements to infrastructure planning methods

The PUG also provides the following improvements:

- Enhanced infrastructure planning methodology and tools that provide increased capability and confidence in infrastructure planning outcomes
- A prescribed method for growth projection modelling, which can be consistently followed for infrastructure planning practices
- More accurate estimates of the cost of future trunk infrastructure to assist Council with its long-term financial planning

- Support for more accurate estimates of likely trunk infrastructure cost recovery through expected infrastructure charges
- The ability to validate land use policies regarding infrastructure capacity, land capacity and market demand
- Repeatability of PUG allows for the LGIP process to be more responsive to City Plan changes over time through the ability to undertake more regular LGIP reviews and scenario testing.

Further refinements to PUG

During the internal consultation phase, the PUG was further refined in response to stakeholder feedback and ongoing quality assurance analysis. The LGIP2 scenario was developed as the first version of the PUG with continuous improvement planned to ensure that future versions are further refined.

Items identified for future improvements to the PUG include refinement to lot level non-residential allocation of land uses using Artificial Neural Networks (ANN) analysis and more detailed determination of tourist residential land uses and growth over time.

Methodology overview

Planning assumptions are defined as an assumption about the type, scale, location, and timing of future growth in the local government area. For an LGIP, the planning assumptions must identify a summary of the existing and future projected urban residential and non-residential development by development type for a projection area (development projections) in terms of:

- dwellings
- population
- non-residential gross floor area
- employment.

The MGR requires development projections to be prepared from a recent base date and for a projection period of at least 15 years, up to 30 years and must not exceed the capacity for the projection area identified for ultimate development. They are required to be stated for the following development types, as a minimum:

- detached dwellings
- attached dwellings
- retail
- commercial
- industrial
- community purposes

For the first five to ten-year period, development projections are usually informed by existing development, development approvals (DA) and building approvals (BA). This provides a relatively high level of confidence that forecasts in this period will align with the type, scale, and location of actual development as it occurs. Beyond the first five to ten-year period, projections of development must increasingly rely on population and employment projections, along with planning assumptions built into the model. The assumptions are based on the City Plan and are made in relation to several factors including zone, building height, density, site coverage, development and land use type. One of the key assumptions is the scale (planned density) to which lots are likely to develop to ultimate development. It should be noted that development must be projected out to the QGSO population projections in five-year cohorts out to the projection year.

A review of the PUG's application of residential density was undertaken (based on previous development activity) to ensure the dwellings per hectare rates used to inform ultimate development were realistically applied as per the MGR Part 4, Section 18.2.

Figure 2 is an overview of the PUG components and input layers.

Planning assumptions

Base date

For the purposes of the PUG, a 'base year' level of development is required. The base date and subsequent time horizons are selected to accord with Australian Bureau of Statistics (ABS) census years. The latest census year (2016) provides for existing population and employment figures for the LGA at a base year (i.e. 2016). Future census years have a time horizon of five-years. The base year will be updated for future versions, ideally with the results of the 2021 Census.

The PUG is currently using June 2016 as the base date, as this is the year that had the best available base input data for the model (cleansed and synthesised cadastre, population, dwelling and gross floor area (GFA)). A synthesised existing land use layer (Master Lots) was created (as shown in Figure 3) specifically for the purpose of PUG, as the existing land uses and related attributes as at June 2016.

Projection period

The MGR requires that development projections must be prepared from a recent base date (2016) for the LGIP and for a projection period of at least 15 years, up to 30 years. The current LGIP has a planning horizon of 15 years (2016-2031). It also includes figures for ultimate development.

It is generally considered that the longer the planning horizon, the greater reliance there is on assumptions. Despite using modelling techniques that use a logical methodology for predicting future demand, there are always factors that are less certain, including future market and economic factors, increased desirability of certain locations over time and a random propensity for particular sites to develop.

The PUG has a planning projection period of 25 years (2016-2041) and ultimate development. This generally aligns with City Plan (2016-2036), Shaping SEQ, the QGSO population projections period and the requirements of the MGR.

City Plan version

The PUG model uses Version 6 of Gold Coast's City Plan for determining planning assumptions. City Plan Version 6 commenced in September 2018 and was the current version at the time that the PUG LGIP2 scenario was developed and for the period that the main inputs were being developed between October 2018 and June 2019.

Population and employment growth

As an MGR requirement, the top down population projections and occupancy rates are based on QGSO 2018 edition (medium series). A slight adjustment was made to the occupancy rates for three Statistical Areas (SA2), where it was found that there were population overcounts at the base year due to the presence of several unoccupied dwellings in these areas. These three SA2 areas were Pimpama, Upper Coomera-Willowvale and Coomera. These areas are predominantly greenfield/ expansion areas, with new dwellings that were built but not occupied by people and therefore were not accounted for in the 2016 population derived from the census (which constitutes the QGSO 2016 base numbers) but correctly appear as dwellings.

The employment forecasts used by PUG for the LGIP2 scenario are based on TMR's 2015 edition (QGSO with NIEIR small area allocation) adjusted by way of economic consultancy advice. The employment forecasts provide the model's non-residential growth by way of employment type. Employment workspace ratios were developed as part of *Workspace ratios for the LGIP2 Growth Assumptions report* and *Ratios*. This enables employment to GFA conversion for specific land uses. Other relationships that are non-GFA based are also factored into the model by way of non-residential assumptions and informed by *RPS Employment ratios for non-floor space land use and activities and Ratios*.

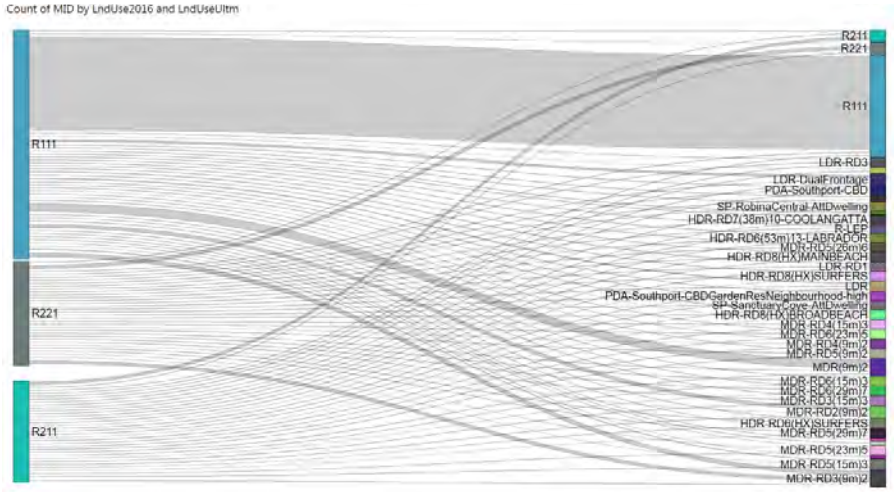


Figure 4 Land use Sankey example to visualise changes from 2016 -2041.

Employment concordance is required to align employment at small area level by employment type to land use categories. This concordance at SA2 to PUG's level 1 Land Use is based on *CDM Smith – Gold Coast PUG – Employment to land use Categories Assessment*.

This concordance aligns employment categories to land use categories including the treatment of home based and mobile workers which are counted at SA2 level; however, home based and mobile workers are not processed or converted to GFA in the model (as they have no floor space or fixed location).

Development categories, types, zones and land uses

The PUG model expresses and relates existing and future land uses (example shown in Figure 4) based on Queensland Planning Provisions V4.0 at four levels of detail (L1 to L4) designed specifically for modelling purposes to be able to cascade in detail and concorded to LGIP development types as required to be published.

Unique zone identifiers

The adopted City Plan development parameters for zones are incorporated into PUG's assumptions to determine planned densities as required by MGR Part 4, Section 18.6. The version of City Plan at the time the planning assumptions were formulated (Version 6) was used to apply planned density to developable area to reflect the realistic level of development (ultimate development) as per MGR, Part 4, Section 18.5.

Planning zones were mapped based on a breakdown of City Plan zone, building height and residential density differences for the model. This process includes deriving information such as densities, minimum lot sizes, site coverage, and building height, for example. Overlays or special provisions that affect development densities or constrain development on sites are also identified. These areas are spatially mapped, and the unique attributes assigned to the Unique Zone Identifiers (UZI) used by the PUG.

City Plan was examined for any overlays or special conditions that affect development densities or constrain development. These areas are geospatially mapped, and the attributes assigned to planning zones. Each unique combination of zone, zone precinct, building height and residential density has been extracted out of City Plan and into a GIS dataset.

The City has over 300 unique combinations of zone, height and density provisions or other unique identifiers as shown in (Figure 5). Each UZI has a set of planning assumptions that relate to the unique combination and the future planning intent based on the City Plan provisions at the

time. These unique identifiers are required by PUG to determine realistic planned densities expressed as dwellings per developable hectare as per MGR, Part 4, Section 18.7.

Local planning areas (LPAs)

As an override to the planning assumptions in select areas, the model also uses Local Planning Areas (LPAs) which are applied to areas where the realistic applicable assumptions differ to the underlying zone (as shown in Figure 6). The model includes the ability to override the base zone (UZI) with the planning assumptions in the LPA - this provides flexibility to recognise and reflect assumptions that are different to the zone.

The LPAs contain assumptions relating to Priority Development Areas (PDAs), some Special Purpose zoned Special Development Areas, Conceptual Land Use Mapped (CLUM) areas and Preliminary Approvals. Their interaction with future development within the model uses these assumptions as an override to the Planning Zones. The assumptions include information such as specific land uses, development densities, limitations and other development considerations. The LPA assumptions are used for areas where the assumption applied is required to be more specific than the assumptions from the base zone.

Developable area (application of constraints)

To predict future development, constraints and overlays applicable to development need to be included in the modelling. In the process of determining the developable area for LGIP purposes, feedback was received from stakeholders, advising that some areas are not absolutely constrained despite the overlay maps and planning provisions which apply. Therefore, it is proposed to introduce constraint level factors (defined as a percentage of development potential) to a range of constraints. This approach

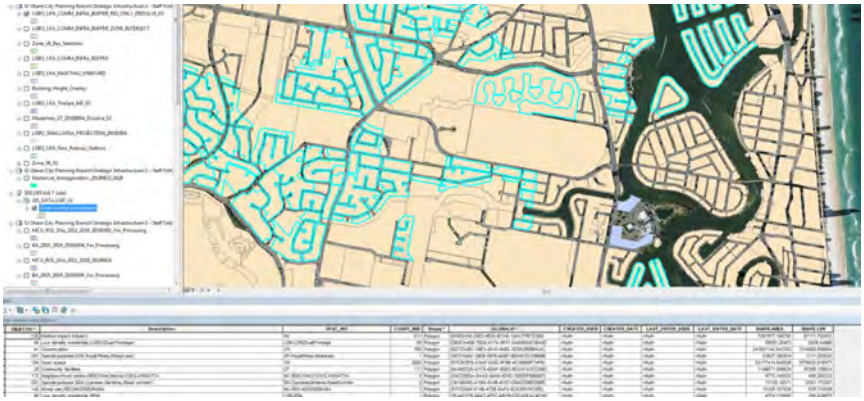


Figure 5 UZI spatial layer selection by zone, height and density.

Figure 6 LPA spatial layer with areas that have different assumptions to the City Plan zone.

enables the calculation of partial constraints, rather than defining only absolute constraints.

The *LGIP 2 Developable Area* method includes the following considerations:

- determination of constraints
- identification of data sources
- determination of constraint levels
- calculation of net developable area
- model selection
- GIS approach to calculate net developable area

Development approvals and building approvals

Approved development is incorporated into the PUG model by way of a time series snapshot of DAs BAs. This provides realistic development sequencing to reflect the approved development pipeline as an evidence-based allocation. DAs included in the PUG model are from 2011 to 2019 and BAs from 2015 to 2019, based on information collected and interpreted by both the Strategic Urban and Regional Planning and Strategic Infrastructure teams from core development tracking systems. Preliminary approvals can also be used by the model to reflect approved development that may happen and is inconsistent with the current City Plan zone.

Resident and tourist population

The model forecasts both resident population and tourist population (non-resident).

For residential development, the total population is determined from the occupancy rates for attached and detached dwellings at the projection year as defined in the 2018 QGSO population projections for each SA2.

The model provides a non-resident ratio that can be applied to land uses and dwellings developed by an UZI/Zone. This ratio specifies the percentage of the dwellings that will be treated as a tourist dwelling with the remaining allocated as a resident dwelling. Occupancy rates are applied to these dwelling allocations to determine the total

population and portions assigned to tourist population and resident population.

The model further provides for the tourist dwellings to have a different occupancy rate applied to determine tourist population. The tourist population is then added to the resident population to give the total population generated for a Master Lot. For UZI/LPAs that have a non-resident ratio specified, the tourist dwellings are allocated utilising that ratio. An occupancy rate of 2.6 persons per dwelling is applied to those tourist dwellings. The PUG model reports on total and resident population however the resident population is used for the comparisons to the QGSO population projection targets.

PUG V1.0 outcomes

The PUG is processing the interaction of residential and non-residential development assumptions, existing land use and future predicted employment and population. To achieve alignment with both employment forecasts and population projections (top down - as per MGR requirements) from a dwelling and land use base (bottom-up), the modelling ingredients required refinement and tuning over multiple model runs.

The Strategic Infrastructure team used analytical tools such as Microsoft PowerBI (Figure 7) and GIS queries /analysis to view the modelling outcomes in various ways and at different scales. By cross analysing the model dataset's information fields, the team was able to determine which settings to tune in order to achieve the most reliable result for LGIP network planning purposes. The refinements to the PUG inputs and assumptions resulted in alignment with both population and employment projections at 2016 to 2041 to within a tolerance of 0.5%.

The results of PUG v1.0 modelling are currently being used by the City's infrastructure networks to determine the future demand on

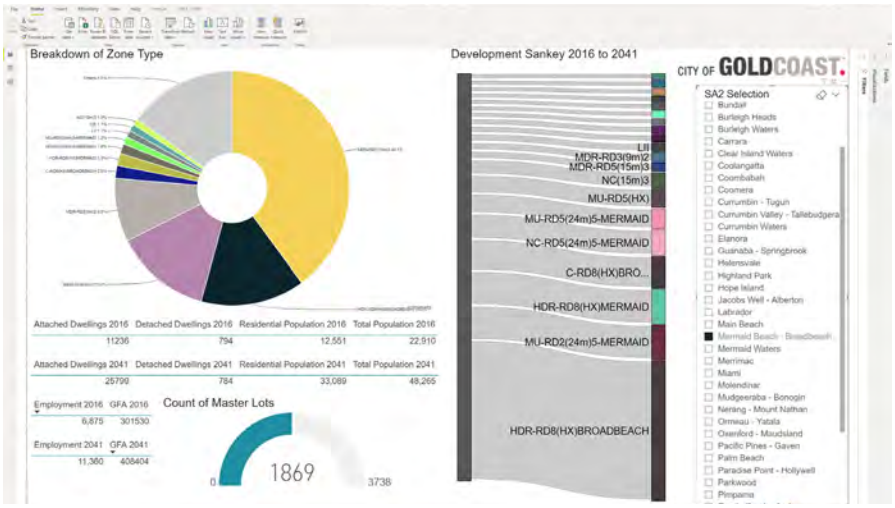


Figure 7 Power BI report with key stats by SA2 area and the ability to cross-analyse by zone type.

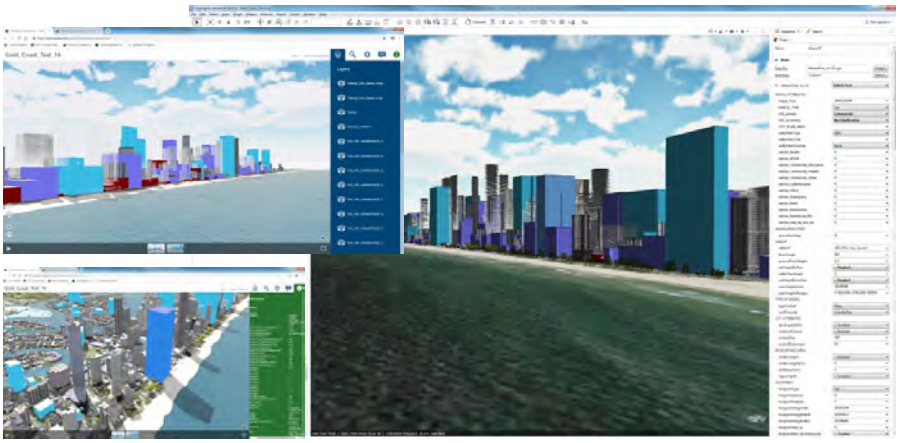
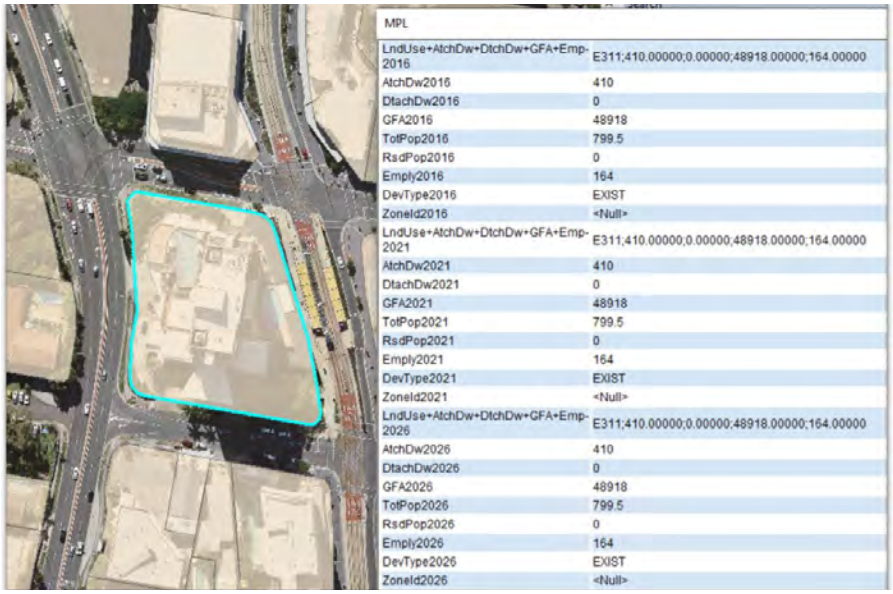


Figure 8 3D Visualisation of modelling in ESRI City Engine.



MPL	
LndUse+AtchDw+DtchDw+GFA+Emp-2016	E311;410.00000;0.00000;48918.00000;164.00000
AtchDw2016	410
DtachDw2016	0
GFA2016	48918
TotPop2016	799.5
RsdPop2016	0
Emply2016	164
DevType2016	EXIST
ZoneId2016	<Null>
LndUse+AtchDw+DtchDw+GFA+Emp-2021	E311;410.00000;0.00000;48918.00000;164.00000
AtchDw2021	410
DtachDw2021	0
GFA2021	48918
TotPop2021	799.5
RsdPop2021	0
Emply2021	164
DevType2021	EXIST
ZoneId2021	<Null>
LndUse+AtchDw+DtchDw+GFA+Emp-2026	E311;410.00000;0.00000;48918.00000;164.00000
AtchDw2026	410
DtachDw2026	0
GFA2026	48918
TotPop2026	799.5
RsdPop2026	0
Emply2026	164
DevType2026	EXIST
ZoneId2026	<Null>

Figure 9 Example of PUG output at Master Lot level with attributes (sample).

each network. The PUG model outputs are converted to the demand unit required by each network; for example, transport requires a conversion of dwellings and GFA to trips. With the PUG loaded with information for each Master Lot (as shown in Figure 9), the demand units can be converted and aggregated to transport zone or higher statistical areas or catchments

depending on requirements and 3D visualised (Figure 8). For stormwater demand purposes, PUG is converted by land use to impervious area by way of an automated tool developed by the team.

The PUG results were also analysed by QGSO as a retrospective analysis to test the allocation that was predicted as part of the 2018 edition population projections (and assumed dwelling mix). The outcomes of the PUG modelling will also inform future versions of the Land Supply Development Monitoring report (LSDM) produced by Queensland Treasury. Future versions of PUG will include any updates to City Plan, updated population and employment projections and further refinements to assumptions and growth allocation factors.

Abbreviations and acronyms

The table below includes a list of PUG model specific abbreviations and acronyms used in this document.

Abbreviations and Acronyms	Description
ANN	Artificial neural networks
BA	Building Approval
BN	Bayesian Network
City	City of Gold Coast
DA	Development Approval
DSS	Desired standard(s) of service
EP	Equivalent persons
GFA	Gross floor area
GIS	Geographical Information Systems
LGA	Local Government Area
LGIP	Local Government Infrastructure Plan
LPA	Local Planning Area
MGR	Minister's Guidelines and Rules July 2017
NDA	Net developable area
NIEIR	National Institute of Economic and Industry Research
PDA	Priority Development Area
PFTI	Plans for trunk infrastructure
PIA	Priority infrastructure area
PUG	Planning and Urban Growth model
QGSO	Queensland Government Statistician's Office
SDA	Special Development Area
SEQ	South East Queensland
TMR	The Department of Transport and Main Roads
UZI	Unique zone identifier

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ABOUT THE AUTHOR

Andrew Saad has over 15 years Local Government and private sector experience in the development of models and tools to support infrastructure and land use planning. As an architecture graduate and 3D modelling specialist, Andrew was heavily involved in award winning projects such as Brisbane City Council's - Virtual Brisbane 3D model. As an advocate for evidence-based planning, Andrew has worked to ensure the use of best practice models and tools in support of Local Government land use and infrastructure planning.

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AMR V GARDNER UPDATE

Kylie Mercer,
Registrar, Board of Professional Engineers of Queensland

The interstate recognition of reciprocal equivalent occupations changed on 1 July 2021 with the passing of the *Mutual Recognition Amendment Bill 2021* (*AMR*), through the Commonwealth Senate.

AMR proposes to facilitate the unencumbered transition of occupations and professions across jurisdictional boundaries (namely interstate) thereby allowing people to engage in those occupations and professions without the need to re-register in the jurisdiction in which the 'activity' will be delivered. Put simply, if you are registered in an occupational / professional scheme in your home state (following the introduction of AMR), it is not necessary to register in another state – where there is in that state a registration framework for the same occupation / profession as is being performed in your home state. By way of analogy a builder registered in another state (being the home state) does not need to re-register in the second state (being the jurisdiction in which the building work will be undertaken) – a process referred to as 'deemed registration'.

However, one of the exceptions to deemed registration is '... any public protection requirements required by the law of the second State before carrying on the activity...'.[1] Notably, Queensland has been a national leader in the regulation of the engineering profession – having instituted a scheme of registration obligating those practising engineering in Queensland to be registered and thereby entitling a registrant to use the postnominals RPEQ – registered professional engineer of Queensland. Queensland's strident framework of registration was recently the subject of judicial consideration by the Federal Court in the matter of *Board of Professional Engineers of Queensland v Gardner* [2021] FCA 564 (Gardner decision) – being a successful appeal brought by the Board of Professional Engineers of Queensland (*BPEQ*) challenging a decision of the Administrative Appeals Tribunal (*AAT*) permitting the registration of Mr Gardner as a RPEQ – Fire Safety (with conditions).

The Impact – Gardner

The Gardner decision reaffirms the foundation for the existence of BPEQ and moreover the framework of registration for those seeking to perform professional engineering services in the State of Queensland. The decision of the Honourable Justice Logan in Gardner is significant and potentially renders nugatory current and future applications for registration (pursuant to the *Professional Engineers Act 2002* (Qld) (*PE Act*)) when such applications are made pursuant to the *Mutual Recognition Act 1992* (Cth) (*MR Act*). As a starting point the principle enunciated from Gardner is referenced at paragraph [40] of the decision. The salient two questions for ultimate enquiry and determination are:[2]

1. Is there a scheme of registration for the same profession / occupation (c/f s. 4 MR Act); in the first state as that of the second state? and if so;

2. Are the activities authorised in the first state – to be conducted as part of that registration the same as the activities authorised in the second state?

As a starting point, where there is no scheme for registration in the home state, purported claims to practise in the second state (where a scheme of registration exists) will fail – in that those seeking to practise in the second state will need to progress through the normal registration application process in the second state.

Impact – Deemed Registration

However, if you are registered as a professional engineer in another jurisdiction this does not mean that you are automatically entitled to 'deemed registration'. The Gardner decision (referencing the High Court decision of *Victorian Building Authority v Andriotis* [2019] HCA 22) (*Andriotis* decision) references the entitlement to registration in respect of an 'equivalent occupation'.[3] Critical to the entitlement for registration is the claim for equivalency. Inherent within the assessment of equivalency is consideration of the approved activities in the home state (within the home state's registration framework). AMR does not automatically displace the requirements of s. 17 of the MR Act – this being the section considered by the High Court in the Andriotis decision. Critically, the question that must be answered in the affirmative is whether the two occupations (namely the one in the home state versus the one in the second state) are equivalent.

The Equivalency Test

On the question of equivalency, the Gardner decision tells us that we must consider the '... activities authorised in the first State – to be conducted as part of that registration – the same as the activities in the second State?...' (c/f paragraph 40). This of course applies on applications for registration however AMR (through the process of deemed registration) purports to 'deem' registered the practitioner already

the subject of registration in the home state, treating that registrant as authorised pursuant to the respective statutory framework to carry out the authorised 'activities' in the second state. Gardner outlines with clarity the preconditions required for application of the MR Act.

As was the case with Gardner, applications for registration pursuant to the PE Act with reliance upon the registration scheme of another jurisdiction will almost certainly be unsuccessful, save for those activities that accord with the PE Act. Regulators are obligated to consider the applicable tests of s. 29 of the MR Act and therein make a decision on the question of equivalency of occupation / profession.

As was detailed by his Honour in Gardner, in circumstances where there are no applicable registration scheme/s for the profession of engineering any assertion for equivalence requires an assessment of the first state's authorised activities, unless that review determines the 'application of engineering principles and data to a design, or to a construction, production, operation or maintenance activity, relating to engineering' is indeed authorised the jurisdiction of MR Act cannot apply because those activities are not regulated (c/f paragraph [40] of Gardner – cited above).

Gardner is arguably authority for the contention that even when it appears two jurisdictions have legislation regulating the same profession in order for the MR Act to apply the test required pursuant to s. 29 of the MR Act must be applied substantively and moreover there must be an interpretation and correlation of each of the activities authorised under each legislative scheme – therein permitting consideration of the other relevant considerations pursuant to s. 29 namely, whether a condition/s could or ought to be applied to achieve equivalency.

It should be noted that no change has occurred to sub-section 29(1) of the MR Act. The tests applicable to that sub-section remain current. Inherent within this conclusion is the fundamental requirement for the BPEQ to maintain a framework of registration for every practitioner registered pursuant to the PE Act. The continuance of sub-section (1) in its current form places the obligation on the BPEQ to continue to pursue the objects of the PE Act through the maintenance and provision of the registration framework of all persons purporting to practice a professional engineering service in Queensland.[4]

Reminder – s. 115 *Professional Engineers Act 2002*

The decision of Gardner takes on particular significance around the discussion on the objects of the PE Act. Notably, and critically, it is a criminal offence to practice professional engineering services in Queensland and not have registration. Section 115 of the PE Act states:

115 Who may carry out professional engineering services

1. A person who is not a practising professional engineer must not carry out professional engineering service

Maximum penalty – 1000 penalty units.

Division 2 of the PE Act – s. 3 references the mains object of the PE Act, they are:

3 Main objects of Act

The main objects of this Act are –

1. To protect the public by ensuring professional engineering services are provided by a registered professional engineer in a professional and competent way; and
2. o maintain public confidence in the standard of services provided by registered professional engineers; and
3. To uphold the standards of practice of registered professional engineers.

Notably, sub-section 3(a) prescribed that the objects of the PE Act are to protect the public. Critical to protecting the public is providing for a scheme of registration for practitioners of professional engineering services. His Honour, in Gardner (c/f paragraph 33) references, inter alia, the fundamental purpose of the PE Act as follows:

> *33. One purpose of the Engineers Act is to ensure that only an individual who is a 'practising professional engineer' and registered as such may carry out 'professional engineering services': s 115(1). Another is to ensure that an individual who is a practising professional engineer carries out professional engineering services only in an 'area of engineering' for which the individual is registered under the Engineers Act: s 115(3). These purposes are achieved by a compulsory registration system. Each of the terms highlighted is defined in the Engineers Act...*

We strongly advocate purported registrants from other jurisdictions obtaining legal advice to ensure they receive appropriate instruction on their obligations when delivering a professional engineering service in Queensland.

1 Mutual Recognition Amendment Bill 2021, s. 42D(4)(f).

2 Board of Professional Engineers of Queensland v Gardner [2021] FCA 564 at [40]

3 Ibid at [15].

4 Mutual Recognition Amendment Bill 2021, s. 67

ABOUT THE AUTHOR

Kylie Mercer has served as BPEQ's Registrar since 2015.

BPEQ is Queensland's engineering regulator. BPEQ is an independent statutory body and has administered the PE Act and the RPEQ system since 1930.

PLANES, TRAINS, AUTOMOBILES AND BEYOND: LEADING BY CONNECTING COMMUNITIES

Emma Thomas, CEO
Sunshine Coast Council

From aeronautical engineering to community inclusion and advocacy, Sunshine Coast Council CEO Emma Thomas's diverse roles have always allowed her to focus on what may be the most important issue of our time, connecting people. This was the catalyst for Emma embracing the incredible opportunity of joining Sunshine Coast Council, with Council's vision to be Australia's most sustainable region: Healthy, Smart and Creative.

Through her myriad of experiences across Australia, from Perth to Sydney, the Northern Territory to Adelaide, Canberra and now back in Queensland, Emma continues to be passionate about finding ways to provide great service to communities.

"How we care for our community is important. We need to work together to develop solutions, because when we all come together and do good for everyone, it makes everyone's lives better," Emma said.

"I've been fortunate to take part in a wide range of projects and teams that have shaped me and given me the skills to stand in the position I am in today.

"Leading the fifth largest local government organisation in Queensland that is strategically and successfully coordinating a number of important public works and infrastructure projects to benefit the community, is an absolute honour.

"I'm proud to stand at the helm, share and guide from my experience and continue to learn from, and connect with, the Sunshine Coast community and beyond."

With an early fascination for space and air travel, curiosity and a love for math and physics, Emma began her professional life as a qualified aeronautical engineer with the Australian Air Force.

Her first posting was at Tindal, south of Katherine in the Northern Territory, where she worked on the then very new F18 hornets. She loved every moment.

Keen to be part of the small local community, the former WA state gymnast updated her coaching accreditations and spent many hours coaching young girls at the YMCA.

It was during her post in Tindal that Emma spent time in the real heartland of Australia, travelling to its remote communities. She became aware of Indigenous culture, resilience, and sustainable approach to land management.

However, she has found their history and truth-telling of what has happened and the generational sorrow heartbreaking.

"I need to listen to more of that conversation and visit what has happened in our country.

"We should all be incredibly proud of the 65,000 years of culture and it is my business to learn as much as I can. All the stories are there and there is only benefit in learning about them."

Continuing with her aeronautical aspirations, Emma moved to Boeing where she worked for over 10 years and progressed to Vice President roles in Australia and Europe.

Switching gears to roads and rail, Emma took on senior leadership roles with Queensland's Department of Transport and Main Roads, South Australia's Department for Infrastructure and Transport, and then with the ACT Government, where she helped deliver light rail to Canberra, connecting the City Centre with the northern suburb of Gungahlin.

When Emma made the move to PwC consultancy as a partner within the Infrastructure and

Urban Renewal team, she had the opportunity to really pull all her transport and community inclusion experiences together.

"Transport is so important to how our civilisation functions; the ability for us to connect for work and play is critical," Emma said.

"As our cities and regions grow, it is important for us to consider how we move around and create land use and transport in synchronicity.

"I wanted everyone in the infrastructure and placemaking community to consider that some people cannot access ways of life that many of us take for granted and I could see that increased diversity in teams was improving the way we designed solutions."

Now on the Sunshine Coast, Emma is driven by community togetherness and cooperation. High on her to-do list is ensuring accessibility and social inclusion for everyone living on, and visiting, this beautiful region.

"Our creativity and our incredible liveability are supercharged when everyone can access the public places that we deliver.

"The question is how do we design our cities to make them universally accessible?"

"I was pleased to see that thousands of submissions were shared through the recent community consultation for the Sunshine Coast Mass Transit Project.

"We expect around 200,000 more people will choose to live here in the next 20 years, so it is critical that we establish more sustainable transport options to maintain our lifestyle and efficiently connect people to jobs, recreation, tourism, services and education."

Following her appointment in September 2020 and commencement as CEO of Sunshine Coast Council a few months later, Emma hit the ground running and has quickly become involved with many of the coast's major projects.

"With so many important projects already on the go and in the pipeline, my early work at council has been based around listening to and valuing our staff and community's feedback," she said.

"By joining in on community engagement information sessions for, and participating in, community activities and initiatives like the Vinnies CEO Sleepout in June this year, I had the opportunity to engage and connect with residents, neighbours, colleagues and make new friends.

"It's been exciting to see so many projects nearing completion or well underway, and we continue to look for ways to serve our community better, for our residents and visitors of today and also for our future generations.

"The Coastal Hazard Adaptation Strategy is all about proactive action and building our community's resilience to climate change. Council endorsed this strategy in May which provides a blueprint for preparing and protecting our coastal areas and communities from coastal hazards into the future.

"In Mooloolaba, the foreshore revitalisation project is well underway, and as part of the Placemaking Mooloolaba Master Plan, it will be an incredible community asset that will enhance access, improve amenity and stimulate the local economy.

"I'm proud that each of these assets and projects, and many, many more have the goal of connecting our community in an inclusive, accessible and sustainable way."

Emma is impressed by and enthusiastic about council's three regional strategies – the Environment and Liveability Strategy, Regional Economic Development Strategy, and the Sunshine Coast Community Strategy – and how they take bold steps and set important framework for ensuring a safe, prosperous, sustainable, and inclusive society.

"Ensuring our region has initiatives and infrastructure that allow for sustainability, accessibility and social inclusion means that not only will our community be happier and healthier, our region's economic development will also continue on the right track," Emma said.

"Sunshine Coast Council's vision is to be Australia's most sustainable region: healthy, smart and creative.

"I fully believe these pillars and vision, along with efforts to create and maintain a connected community, are the keys to the success of any community, and, with an enthusiastic and professional team, we're on the right track on the Sunshine Coast."

KINGAROY TRANSFORMATION PROJECT

Aaron Meehan
General Manager Infrastructure, South Burnett Regional Council.

Thank you to IPWEAQ for inviting us to showcase the "Kingaroy Transformation Project – Community Activation and Economic Regeneration". Over the coming series we will feature the key elements of the project and hear from our industry leading project design and delivery team, many of which you will have come across within our IPWEAQ community.

KTP groundbreaking ceremony.

The project is commonly referred to as the "KTP" and with a budget of $15.5M is more than your average streetscape. Delivered in partnership between Council, the Australian Government and the Department of Transport and Main Roads, the project involves the complete redevelopment of the Kingaroy town centre into a modern "Smart Country" precinct like no other.

It's no secret that the Kingaroy town centre is tired and dated, with the last upgrades of this area completed in 1989. In 2017, our design team led by James D'Arcy lit the candle to propose the now KTP and the project was approved for construction under last year's BBRF Program with groundbreaking on Monday 18 January 2021.

The project involves the upgrade of all infrastructure within the KTP footprint including featured landscaping, LED fire lighting, inclusivity targeted design with PWD and green zone carparking, widened footpaths, class A irrigation, "Smart Country" capability with almost 50 km of conduits, EME2 pavements, arts and culture spaces, and the KTP's flagship community zone.

Each instalment we will feature the key elements of the KTP design, each with specific objectives to support community activation and economic regeneration for today and for the future. This instalment gives a taste of the features of design which include:

Liveability and Inclusive Community Design

- Widened footpaths for pedestrian focus and footpath dining both day and night
- Installation of legacy and features trees, low maintenance landscaping with automated Class A irrigation
- Feature build out areas for alfresco and outdoor bar space
- Interactive LED fire lighting and signature lanterns featuring the identities of the South Burnett
- Designated PWD and Green Zone elderly/pram parks within 50 m of every shop
- Arts, culture, indigenous, tourism and community spaces for activation and special events

Smart Country and Data Innovation

- National leading enabling infrastructure for dark fibre, fibre to the premises and CBD wi-fi
- Communication conduit to almost all fixed electrical infrastructure for future technology enablement such as cell-fi, autonomous vehicles, data, and tourism applications
- Interactive and programable

KTP team.

Kingaroy Transformation Project footprint.

lighting for community activation

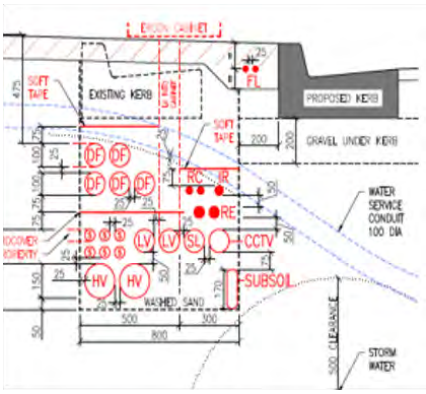
- Lower energy consumption, power offsets and simple maintenance through master planned systems and solar infrastructure
- Safe community infrastructure through CCTV, crime prevention design and controllable street lights
- Electric car charging stations and infrastructure for further expansion

Asset Sustainability

- New road geometry to improve vehicle pedestrian safety, along with upgraded pavements including EME2 asphalt
- Upgrade of all footpaths and pedestrian accesses to achieve compliant access and mobility throughout the CBD for all people

KTP design.

Conduit construction.



Standard telco profile.

- Replacement of asbestos water infrastructure, stormwater systems and communication pits
- Upgrade of traffic signals, energy efficient street lighting and communication infrastructure
- Recycled construction materials for sustainable re-use across community and other projects

Next Edition

With construction well underway, we look forward to inviting interested people to tour the project in the near future. Our next instalment will feature the first of our civil design civil specialists and landscape architect, GreenEdge Design.

KTP design.

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Street Design Manual for Practitioners

Up to 8 CPD hours

Streets and pathways are the building blocks of every residential neighbourhood. Along with our built environment, well-planned streets and neighbourhoods influence how people move and interact, access parks and open space, walk and cycle for leisure, recreation, exercise and transport.

IPWEAQ's Street Design Manual: Walkable Neighbourhoods (the Manual) is a contemporary guide for the design and development of Queensland's residential neighbourhoods. Developed for industry by industry, the Manual recognises streets as an essential connector to multi-purpose social spaces in our neighbourhoods. It offers access options for active transport delivering safer neighbourhoods and a sense of community.

This program will provide a detailed understanding of all aspects of quality contemporary residential land development that promotes healthy and safe communities, and provide a more coordinated approach to neighbourhood planning and design for councils, developers and the community.

Outcomes

Participants will gain a sound understanding of the intent and application of the Street Design Manual to assist in planning and design applications that complement current regulatory requirements.

Who should attend

This program has been designed for Industry Practitioners working in the Planning and Design of contemporary residential neighbourhoods, including those working in both private and government organisations. Typical attendees include:

Planners, Designers, Engineers, Development Managers, Technicians

Learning Strategies

Lectures, Case studies, Group Discussions, Practical Activities

Topics

Introducing the Street Design Manual: Walkable neighbourhoods,

An overview of the need, intent and strategies that led to the development of the SDM.

Part 1

- ✓ Element 1: Community Design
- ✓ Element 2: Movement Network – Concept Design
- ✓ Element 3: Neighbourhood Open Space Network
- ✓ Element 4: Lot Design
- ✓ Element 5: Activity Centres

Part 2

- ✓ Element 1: Introduction
- ✓ Element 2: Active Transport
- ✓ Element 3: Public Transport
- ✓ Element 4: Motor Vehicles
- ✓ Element 5: The Residential Street
- ✓ Element 6: Design Detail – Related Infrastructure

Part 3

- ✓ Practice notes

Facilitators

The program will be facilitated by Planning and Design professionals.

Attendees will be provided with a complementary hard copy of the Manual

3752

Contact Professional Development Manager
Tammi.Petre@ipweaq.com 07 3632 6807

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COUNCIL'S RESEAL PROGRAM RESURFACES MORE THAN 850,000M² OF LOCAL ROAD

Western Downs roads are now safer thanks to the completion of Western Downs Regional Council's annual reseal program.

Council has recently completed resealing of over 850,000m2 of road this financial year, which equates to 1.83 million litres of bitumen and 9,600 tonnes of aggregate.

Western Downs Regional Council Spokesperson for Works and Technical Services Councillor George Moore said the program ensured Council provided a safe and sustainable road network by performing timely renewal of sealed surfaces.

"The Western Downs has the second largest road network in the country, covering more than 7,500 kilometres – which is roughly the same distance as driving from Dalby to Perth and back," Cr Moore said.

"Our Reseal Program is a significant program for our region, with just over $3 million invested into the program in 2020-21."

Cr Moore said the Reseal Program also delivered environmentally friendly outcomes with recycled rubber used as part of the bitumen.

"Our works have an added environmental benefit, with around 274,500 kilograms of recycled rubber used as part of the bitumen mixture. That's the equivalent of around 34,300 passenger car tyres.

"This recycled rubber – which is sourced from old tyres and blended locally – is not only environmentally friendly, but also provides a stronger, sturdier road surface.

Residents are reminded to report any road damage to local roads by using the Snap, Send, Solve App for mobile or contact the Department of Transport and Main Roads to report damage on state-owned roads.

For more information contact Council on 1300 COUNCIL (286 624).

TECHNICAL COMMENTARY

Sam Fitzgerald
Works Manager – Maintenance, Western Downs Regional Council

Delivery of the 2021 reseal included prior works and sprayed sealing of 93 sites across the entire Western Downs. These sites were selected by shortlisting based on asset condition and seal age data, and then inspected to prioritise the site and determine the scope of prior works required.

Council maintains a rolling three-year Reseal Program to allow effective prioritisation of

sites, forecasting of costs, and identification of opportunities for efficiency during delivery. Council also delivers all reseals for recent construction projects as part of this program. This yields costs savings for these construction projects, as well as improved quality outcomes when compared to Council's historic practice of two-coat seals on construction projects.

S15RF/S45R was the chosen binder due to improved resilience to cracking, aggregate retention, and relatively low cost. With expansive subgrades throughout much of the region, cracking is a common mechanism of seal failure. Considering most of Council's pavements are constructed of marginal materials, S15RF/S45R provides good value in ensuring the seal continues to provide adequate waterproofing to the pavement throughout its functional life. S15RF/S45R is also a generally more robust binder providing improved confidence on a seal network subject to significant fluctuations in traffic volume and composition based on seasonal demands of primary industry and coal seam gas development in the region.

Council has also invested in delivering a high standard of prior works, spending an equivalent of 25% of the reseal budget in repairs prior to resealing. This program aims to repair defects at a much lower severity than Council's typical maintenance, restoring the pavement to a sound condition and giving confidence that underlying pavement defects won't compromise the target seal life. This strategy is allowing Council to delay reconstruction of sites, extending the life at a relatively low cost, and providing great value for Council in the ongoing management of its sealed assets.

DELIVERING ON WATER QUALITY IN THE CASSOWARY COAST – THE CCRC JOURNEY TO ELIMINATE BOIL WATER EVENTS

Geoffrey Smart

Cassowary Coast Regional Council (CCRC) has four water supply schemes that supply water to a total population of about 26,500 located in the towns and communities stretching from Innisfail to Cardwell and including the town and surrounds of Tully and Mission Beach. Only the Innisfail supply scheme has full treatment. The Innisfail Water Treatment Plant (WTP) draws its water from the Johnstone River which is classified as a category 3 water source with substantial upstream agricultural uses and human settlement. The three other water supply schemes south of Innisfail all draw their water from small creek systems with intakes within World Heritage listed National Parks and have no treatment other than course filtration and chlorination. These three run off creek water supply schemes supply water to a connected population of about 13,000.

In 2013, CCRC received approval from the Water Regulator of its first Drinking Water Quality Management Plan (DWQMP). The plan included improvement plan initiatives that were directed at improving the monitoring and operations of its three run of the creek systems including upgrading SCADA, turbidity monitoring and chlorination systems. These improvements were undertaken between 2012 and 2014 and Council quickly discovered that many of the summer storms and weather events were creating turbidity spikes in the creek systems and chlorination was possibly ineffective and hence boiled water alerts needed to be initiated. Up until this time and the associated implementation of full SCADA and monitoring systems, boil water alerts had been rare. Some of these communities had been living with these conditions for many decades and there was substantial community confusion and dismay that Council was now insisting on the boiling of their drinking water.

Within the space of a couple of years, communities which may have been subjected to maybe one or two boil water alerts a year were getting far more. In 2017, Council issued 18 boil water alerts. Some of the impacted regions were tourist towns such as Mission Beach and communicating boil water alerts into these areas was particularly challenging. The local Woolworths at Mission

Nyleta Creek Intake – Course screening.

Beach was known to run out of bottled water on occasion and they became one of the stakeholders we communicated with when a boil water alert was triggered. Boil water events have major implications for all sorts of businesses and service industries. The impacts to cafes, restaurants, nursing homes, schools, hospitals, childcare centres and people with dialysis machines can be significant.

Communicating the introduction of boil water events became a logistical headache but one that Council became quite practiced at. Council utilised digital message boards in key locations, as well as the radio, Council's web site, emails, and direct phone calls to key high-risk stakeholders such as the hospital and nursing homes. Rain events do not just happen in normal working hours and staff were needing to deal with situations seven-days a week and potentially at any time day or night.

The following sequences of actions and events were typical of boil water alerts:

- Initial two-hour high turbidity alarm at the intake to operator (Turbidity > 5NTU)
- Four-hour turbidity alarm >5 NTU
- Boil Water Alert (BWA) triggered. Immediately contact Water Regulator (24-hour contact)
- Plumbing staff directed to isolate parts of the network to isolate some of the communities with separate water storage in reservoirs. Minimise the spread of the dirty water into the network
- Initiate communications of the BWA
- Slight increase to chlorination dosing levels
- Monitor turbidity at intakes. Commence network testing (E.coli, chlorine residual, and turbidity) after water at intake falls below 5NTU and likely to remain so
- Flushing of network
- After multiple days of all clear with no evidence of E.coli and good levels of chlorine and low turbidity (internal testing of two days followed and confirmed by external laboratory over two consecutive days), after agreement from Qld Health and the Water Regulator the BWA could be lifted and communications amended accordingly

On some occasions we were off a BWA for approximately a week and then another rain event triggered another BWA.

Water quality improvements quickly became a major strategic priority of the organisation but fixing the problems with three supply schemes needed substantial planning, design, and capital investment. Council's DWQMP Improvement Plan was the strategic document that detailed proposals to improve the water quality to each scheme. The timelines in the plan were largely supported by Council through its annual budget considerations.

Water Quality Improvements to Nyleta Water Supply Scheme

In 2016, Council focussed on delivery of infrastructure to improve the water quality of the Nyleta supply scheme. The primary supply source for the Nyleta scheme was Nyleta Creek which is a pristine creek deep in the rainforest. Unfortunately, this creek had a relatively small catchment and during the dry season it was often necessary to introduce water restriction (typically to level 3). Council successfully received an extraction licence from another creek (South Liverpool Creek) which had a catchment 10 times larger than Nyleta Creek. Council also successfully negotiated the acquisition of a parcel of land just outside the National Park with a hill of suitable elevation to allow the construction of a 3.3 ML reservoir. The site had constraints including a limited platform area on the ridge for the reservoir, slope stability issues and very steep access. However, by the end of 2017 Council had successfully completed the construction of a new 3.3 ML reservoir with a concrete access road (for the 20% approach grades), extensive soil nailed embankments and a chlorination facility. Concurrently Council also constructed a new sub bed filtered intake on the South Liverpool Creek that allowed the extraction of water from below the bed of the creek. The filtered intake was connected by a manifold system to twin inclined borehole pumps that were mounted on the bank of the creek. These borehole pumps then pumped the water to the new reservoir.

The South Liverpool Creek sub bed filtered intake allows water to be extracted in periods of low flow and it also allows water to be extracted from the creek with turbidity up to 40 NTU. Even at such high turbidity, the sand filters ensure the pumped water is below 5 NTU and is safe for drinking after chlorination.

A system of turbidity monitors linked to automated valves (all integrated to SCADA) were also installed. This system ensures that when the water supply from the gravity Nyleta Creek system exceeds its quality threshold (set at 4 NTU), the intake is automatically isolated without operator intervention. The new reservoir then supplies clean water to the connected communities which include the northern area of Mission Beach and the towns of Silkwood, El Arish and Kurramine.

If the reservoir drops below a defined level, the pumps at the South Liverpool Creek will be automatically started and if the water through the system is below 5 NTU it will resupply the reservoir.

The Nyleta scheme water quality improvements have been a major success and there have been no boil water alerts issued since these works were completed in late 2017. Council

also interconnected the Tully and Nyleta schemes at Mission Beach which allowed the diversion of more clean water into Mission Beach from this source and keeping more of Mission Beach off boil water when the Tully supply scheme was affected.

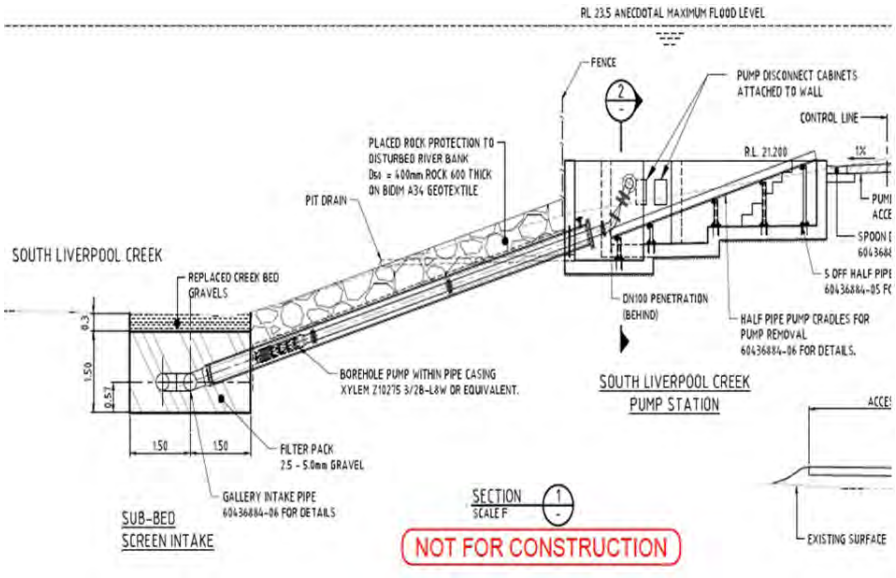
There have been some lessons learned in relation to the works. Council did have problems with the operation of the bore pumps. The relatively shallow filters did not provide adequate submergence to the bore pumps, and it was necessary to set up a vacuum within the bore pump casings to improve pump output. The sand bed filters can clog over time, but Council has found that by using the Nyleta Creek pressure and backfeeding through the intake manifold it can flush the sand bedding. Council also installed 50 micron pressure screens before the reservoir but the benefit of these filters is minimal although they do keep out some of the sand material that passes the 250 micron screens at each intake.

Costs associated with the Nyleta scheme water quality improvements are:

- Design and preparatory works for the new reservoir including bulk earthworks, slope stabilisation works, concrete access road, and approach water mains $2.3M
- 3.3 ML concrete reservoir with aluminium roof $1.9M
- Ergon Connection $155K
- Chlorination building and dosing facility $258k
- Sub bed filtered intake and pumping system and associated electrical and civil works $0.95M
- 50 micron pressure filters and enclosure $145k.

Council recognises the assistance of the State Government which provided funds of $3.7M through DILGP grants to assist with these costs.

In 2017/18 Council started the planning for improvements to the Tully and Cardwell supply schemes.



South Liverpool Creek Intake - Sectional Elevation – Inclined bore pumps.

South Liverpool Creek Intake - Manifold pump housing.

Water Quality Improvements to Cardwell Water Supply Scheme

Meunga Creek is the water source for the Cardwell Water supply scheme area. The intake for this scheme is located well inside the National Park and a 300 mm pipe delivers the water some 18.2 km to reservoir storages in Cardwell. Council had initiated the drilling of two bore sites outside the National Park area in the hope that the water from these sources could be used to supplement or replace the Meunga Creek supply when it was affected by turbidity or low flows in drought conditions. The water quality from one of the bores was unacceptable for consumption but the other bore proved to be reasonable. The only issue was a marginally low pH but all other parameters were excellent. Council then progressed the development of the bore including sizing and installation of the pump, disinfection system, pH correction and a control building. In addition to developing the bore, Council also installed turbidity analysis monitoring equipment near the Meunga Creek intake as well as auto isolation valves, all connected to SCADA. When Meunga Creek was impacted by turbidity greater than 5 NTU, the pipeline from the intake would be automatically shut and the bore started. A valve

South Liverpool Creek Intake filter – S/S intake screen is 300mm dia 22m long. Bedded in sand surround 2.5 - 5mm grading.

3.3 ML Nyleta Hill reservoir under construction.

Nyleta Hill Reservoir – Completed.

was also opened on a scour line off the main so that the turbidity analysis would be continuous and allow the intake to be reopened when the intake water was clean enough. Solar power was used to power these systems. This system was fully operational by December 2018 and Cardwell has not been impacted by a boil water alert since. Council currently does not have a permanent back-up generator at the bore site but ensures a trailer mounted generator is deployed ahead of any predictions of severe weather. The bore does not provide for peak demands but with the available storage at Cardwell the output is adequate and reservoir storage with some overnight recharge ensures the system has a minimum of two-weeks of reservoir storage or continuous bore use.

The costs to upgrade the bore and to construct chlorine dosing facilities, monitoring and auto-isolation for the Cardwell scheme was approximately $450k.

Water Quality Improvements to Tully Water Supply Scheme

The Tully supply scheme has two creek sources (Boulder Creek and Bulgun Creek). Both sites are located within the Tully Gorge National Park. After investigating options, Council settled on the construction of a new 4.5ML reservoir at a suitable site near the Bulgun Creek intake. The concept allowed both supply sources to be isolated automatically if turbidity exceeded thresholds and clean water for the entire supply area supplied from the proposed new intake reservoir, supplemented with storage from other existing reservoirs. Securing the site for the reservoir required extensive environmental and cultural heritage investigations and then applications to State and Federal Authorities and the Wet Tropics Management Authority. These applications took approximately 18 months before a lease could be secured, notwithstanding the extensive “political” door knocking to facilitate a faster outcome.

Kennedy Bore and Chlorine Dosing Building/Switchboard Enclosure.

Council progressed with documentation of a glass coated steel plated tank at this site as it would be approximately 25% less cost than a similar sized reinforced concrete reservoir. The reservoir site was planned with sufficient grassed surrounds to limit the risk of falling vegetation or the unlikely event of a bush fire. A contract was developed for the supply and delivery of the reservoir so that this could be started before the lease was secured. Council was agreeable to this risk. The contractor for this component used a Permastore tank designed and manufactured in the UK. Council did have some frustrations with their design matching to Australian codes. After a 6-month period, the first shipment of wall components arrived in Tully just before Christmas 2019. Council called a separate contract for the civil works, chlorine dosing facility and erection of the tank with a nominated subcontractor for the erection being the same company that supplied the tank. The approval from the authorities for the lease was granted at the end of 2019 and civil works were able to commence in January 2020.

Although site works identified the presence of granite boulders in the earthworks, the scale and size of the boulders was a challenge. It seemed an ancient creek ran across the site, and it was full of large boulders. The management of boulders in the earthworks was a provisional item so the Contractor was covered for the cost risk of this issue, but the contract did not allow for any blasting within the National Park. The largest boulder was the size of a small house. The Contractor drilled and used expanding grouts to attempt to split the rock but finally it was necessary to use a special low energy blast product after approval from Wet Tropics.

Turbidity monitoring at Meunga Creek Intake.

Finally in December 2020, Council was able to commission the reservoir. The reservoir included for the dosing of chlorine through the inlet pipe that was configured with a nozzle arrangement that promoted circulation of the water and chlorine within the reservoir.

In addition to the reservoir works, the contract also included a turbidity monitor at the intake and an automated valve that allowed the intake to be isolated automatically without operator intervention. A scour line with auto-valving would open when the primary intake main was closed so that turbidity could be monitored continuously, and the intake reopened when turbidity fell below the 5 NTU threshold. Power to controls and dosing equipment is from a solar system mounted on the reservoir roof with a backup diesel generator.

During 2019, Council also constructed a new 4.6ML concrete reservoir at Wheatleys Hill near South Mission Beach. This reservoir in combination with the new Bulgun Intake reservoir as well as other existing reservoirs in the network have allowed

4.6 ML Wheatleys Hill Reservoir – Slab pour.

Bank stabilisation works adjacent to existing reservoir.

Completed Wheatleys Hill Reservoir.

Council to avoid all boil water alerts in the Tully Scheme since the completion of the Bulgun Creek intake reservoir in 2020.

During any typical rain event affecting Tully, either the Boulder Creek or Bulgun Creek or both creek sources could be impacted by turbidity. The final system allows each system to be isolated individually and automatically as needed and then each individually reopened when the source water clears. Clear water storage is still constrained so there does need to be some careful consideration of the conditions and the reopening of systems does require some judgement when storage is low. The Bulgun Creek reservoir has been as low as 20% but to date no boil water alerts have been required.

Some lessons have been learned on the journey with the Bulgun Creek intake reservoir. Whilst a glass coated steel tank can be provided with a theoretical life of 80 years, a conventional reinforced concrete reservoir is a better investment if funds are available. Using a reservoir designed in the UK has some risk and very careful review of the design plans is needed before accepting manufacture. In particular, focus on the roof detailing and access hatches.

Costs associated with the Tully Supply Scheme Water Quality Improvements are outlined below:

- Wheatleys Hill 4.6 ML reinforced concrete reservoir and associated civil works and pipework $5.02M
- Design, supply and delivery of a 4.5ML glass coated steel tank $0.71M
- Project management, survey and civil design costs for the Bulgun reservoir works $207k
- Civil works, erection of the tank, construction of the chlorine dosing building, monitoring systems and SCADA $2.55M

CCRC recognises the funding contributions of $1.86M from the

Federal funding scheme Building Our Regions for the Wheatleys Hill reservoir project.

CCCRC also received $1.9M from the State Government which provided funds through LGGSP grants to assist with the Bulgun Creek intake reservoir project.

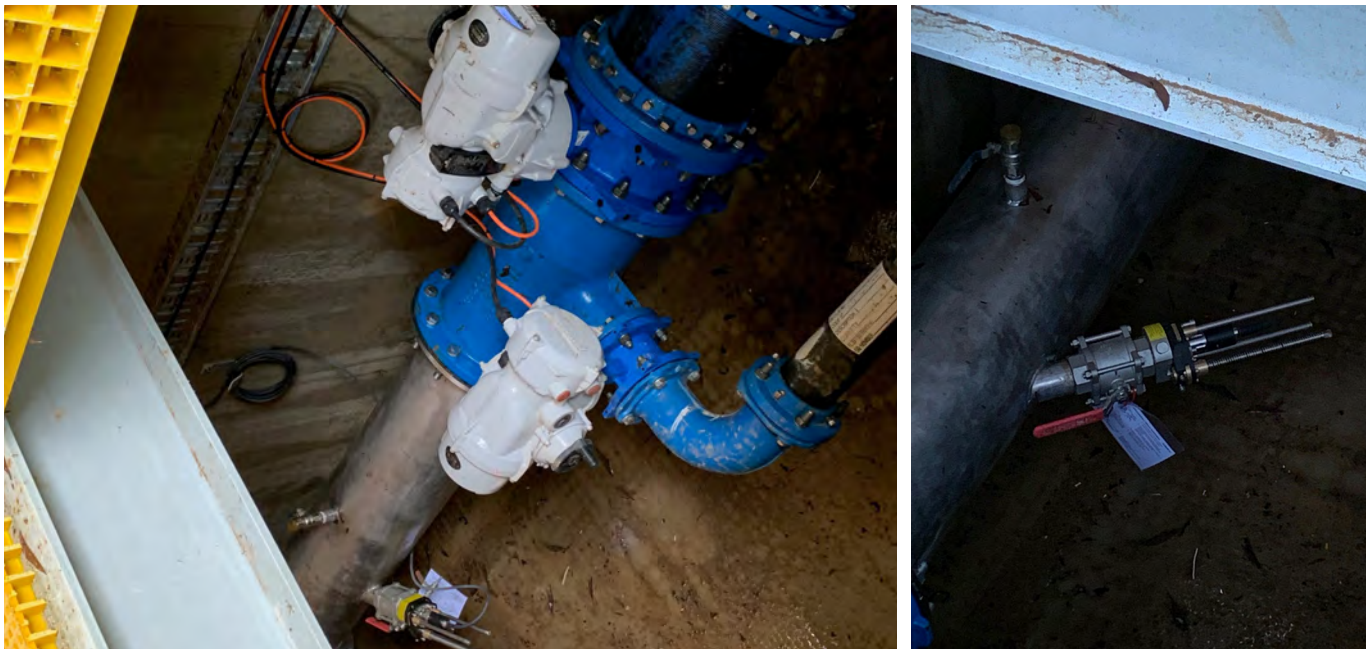
CCRC would also like to acknowledge the assistance of State National Parks and staff of the Wet Tropics Management Authority who recognised the community value of these schemes and guided Council through the processes to gain the necessary approvals.

By closing the water quality gap between the Innisfail scheme and the southern schemes, and since the completion of these water quality works Council has moved to standardise its water consumption charge to all schemes so that all consumers are now paying the same water charges. This has been possible with minimal backlash from the community who recognise the effort and cost undertaken to improve the quality of water to all the region.

Summary

The CCRC has been on a journey over many years with significant capital investment to deliver water quality improvements that have successfully eliminated boil water alerts in the three water supply scheme areas of Nyleta, Tully and Cardwell. None of these water supply schemes have any water treatment other than course filtration and disinfection but by the smart application of turbidity monitoring equipment, automated valving, SCADA, intake reservoirs or bores, Council is now supplying a clean and reliable water supply to approximately 13,000 water

Photo montage of the construction of the 4.5ML glass coated steel reservoir at Bulgun Creek.



Bulgun Creek Intake Isolation Valve and Scour line and Turbidity Probe.

consumers irrespective of the conditions of its intake sources. Overall, the cost of these capital improvements has been approximately $14.7M. Council's Drinking Water Quality Management Plan (Improvement Plan) provided the strategic direction for these works and was a significant factor in the success of our many grant applications.

Acknowledgements

The author would like to acknowledge the support of Manu Gravatt (Water Engineer) and Andrew Musumeci (Technical Officer Water Planning) who assisted with the delivery of some of these projects.

Shane Bandiera (Coordinator Treatment) and his operators deserve recognition for their dedication and professionalism in dealing with our boiled water situations.

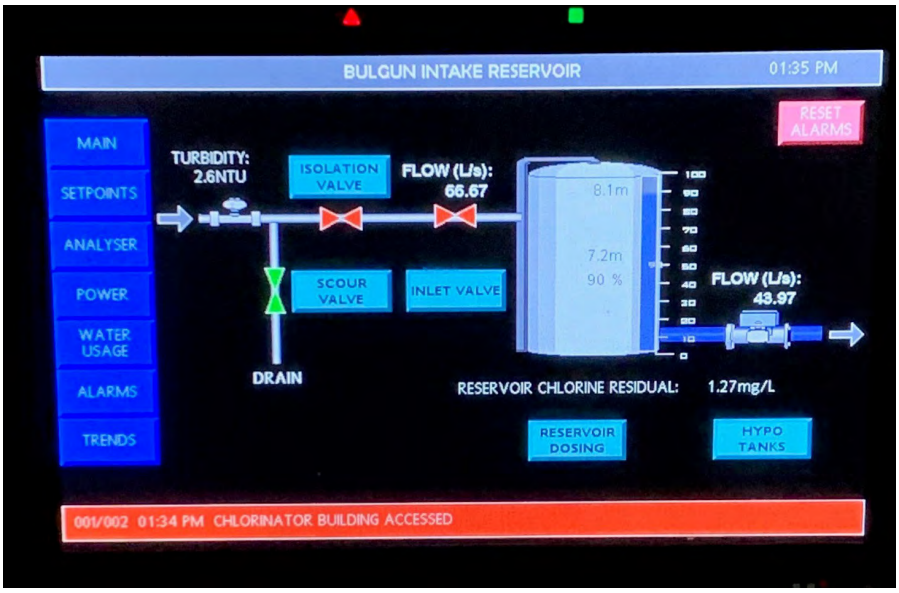
Councillors and Executives of Cassowary Coast Regional Council for supporting the vision.

ABOUT THE AUTHOR

Geoffrey Smart has been the Manager Water at Cassowary Coast Regional Council for the past eight years. Geoff is a civil engineer with extensive local government experience planning, designing, and constructing major infrastructure. Living in the beautiful region of the Cassowary Coast and making a real difference to standards of service in the community has been a privilege and is a highlight of his working life.

Completed Bulgun Creek Intake Reservoir.

Bulgun - Chlorine dosing board and pump units.



SCADA screen of Bulgun reservoir, control valves and flowmeter.

COVID-19 WASTEWATER TESTING IN THE NT. HOW IT WORKS AND WHY IT'S IMPORTANT

By Lauren Roberts
Posted Sunday 15 Aug 2021 at 4:50pm

When Tony Boland collects samples of wastewater for coronavirus testing in Darwin's northern suburbs, he needs to keep one eye peeled for crocodiles.

Mr Boland, managing director of Trop Water, said the sewage ponds in Leanyer was home to at least one saltie.

To minimise risk, Mr Boland said two people visited the site together so one can be the "spotter".

"There's always crocodiles here," he said.

"You basically need to show respect for an apex predator in its natural environment."

But mosquitos and the waste itself were more dangerous than a well-fed crocodile, Mr Boland said.

"Crocodiles, while they're front and centre of people's minds, they're not the highest risks in these types of environments," Mr Boland said.

"The biggest risk we face here is actually the wastewater itself, nothing holds human borne pathogens better than humans."

The sewage ponds are known to be home to at least one saltwater crocodile *(ABC News: Lauren Roberts)*

Mr Boland says the crocs in the Leanyer ponds are well-fed and rarely bother his team *(ABC News: Hamish Harty)*

The NT's wastewater program

The NT started testing its wastewater for traces of SARS-CoV-2 (the virus which causes COVID-19 disease) in May this year.

It was the last jurisdiction in Australia to launch its own COVID-19 wastewater testing program.

NT Deputy Chief Health Officer Charles Pain said experts were trialling the system for months before the launch.

"Because we didn't have community spread in the Territory, we didn't have to rush into it," he said.

"We were able to take our time."

According to NT Health, there are now 10 catchment sites in the Greater Darwin area and four in Alice Springs.

The Howard Springs site

NT Health says Leanyer is one of 10 catchment sites in Greater Darwin *(ABC News: Hamish Harty)*

exclusively receives wastewater from the quarantine facility.

How exactly does it work?

Mr Boland and his team test the raw sewage that comes into the ponds.

Positive results act as an early warning system, telling health authorities someone may have been in the community with COVID-19.

To test the wastewater, Mr Boland's crew put a 3D printed "shuttle" into the debris.

Inside the shuttle, Mr Boland explains, is a negatively charged membrane that attracts coronavirus RNA.

The shuttle usually collects information for between three and four days.

During COVID-19 outbreaks (such as the recent Tanami cluster), it collected data over just 24 hours, allowing more frequent testing.

When the time's up, Mr Boland's team pulls up the shuttle, bags it and refrigerates it before sending

The shuttle used to test wastewater for coronavirus in the NT is 3D printed *(ABC News: Lauren Roberts)*

the sample off to South Australia for scientific testing.

The SA laboratory looks for certain markers which are unique to SARS-CoV-2 (the virus which causes COVID-19 disease) and reports what they find out to health authorities.

Test results are returned in about 24 hours, Mr Boland explained, although it was quicker during the Tanami outbreak.

Wait, why send it to SA?

Dr Pain said because the testing was very specialist, there wasn't currently a team who could do it locally.

However, through a program called the Collaboration on Sewage Surveillance of SARS-CoV-2 (ColoSSoS Project), Dr Pain said the NT was able to call on interstate scientists.

"It's much better for us to be part

of that partnership than try and do it ourselves," he said.

And Dr Pain said the NT was not looking at doing this laboratory testing locally.

"At the moment, we are very happy with the way things are working," he said.

"Our system has proved to be very reliable and very efficient," he said.

Limitations of testing

Dr Pain said a positive wastewater result could mean someone was currently COVID-19 positive or that they had recovered from virus and was shedding it in their waste.

The test itself didn't show whether someone was still infectious.

"That's why it's so important to follow up on these positive samples when there is one," he said.

"What we are really looking for is the unexplained positive samples."

And for Mr Boland and his team, the work on the ground isn't always glamorous.

"When you're working at sewage treatment plants, poo stinks, there's no secret about that, it's not a surprise to anyone," he said.

But Mr Boland was proud to be part of the COVID-19 response, helping keep the community safe.

"The implications of something like COVID taking hold in the NT is pretty dire," he said.

"As a member of the broader NT community you've got to step up and take responsibility when you can."

This article was originally published on the ABC website on Sunday 15 August 2021 and appears with permission.

The shuttle is attached to a bottle to protect it from wet wipes and other things which should not be flushed *(ABC News: Lauren Roberts)*.

Dr Pain says he is pleased by how the NT's wastewater testing program is running *(ABC News: Lauren Roberts)*.

The NT is part of the national program monitoring waste water for COVID-19 *(ABC News: Hamish Harty)*

ARTIFICIAL REEF STRUCTURES IN THE NT: CREATING SUSTAINABLE FISHING OPPORTUNITIES FOR TERRITORIANS AND TOURISTS

Building Services
Infrastructure Planning and Logistics
Northern Territory Government

Fishing is synonymous with the Northern Territory and has come to be regarded as a destination experience for those travelling to the Top End. According to the Northern Territory Government, the fishing tourism industry's total economic contribution is estimated at $26 million per year, with $22 million of this generated by interstate or international visitors to the Territory.

In 2016 the Northern Territory (NT) Government made a commitment of $50 million over five years to invest in a range of recreational fishing infrastructure projects as a means of expanding, improving and diversifying recreational fishing opportunities to enhance lifestyle activity and tourism. As part of this commitment, the Department of Primary Industry and Resources (DPIR) investigated the potential of artificial reefs and fish attracting devices (FADs) as a part of a 'recreational fishing infrastructure investment plan' to increase the population of vulnerable fish species whilst enhancing sustainable fishing opportunities.

Planning for a new underwater ecosystem

It is widely accepted that artificial reefs and fish attracting devices have the potential to diversify and enhance recreational fishing opportunities. For example, many countries have installed artificial reefs and FADs to enhance artisanal, commercial and recreational fisheries (angling and spearfishing (Baine 2001)).

Artificial reefs and FADs have historically been constructed using materials of opportunity (e.g., car tyres, pipes, abandoned fishing gear and decommissioned ships) while more recently consideration of construction materials and design has resulted in the development of purpose-built devices being deployed (Sherman et al. 2002).

These purpose-built devices have several benefits over those that consist of materials of opportunity, as they can be engineered to address specific aims, objectives, and existing conditions (such as to suit a chosen location in terms of depth, oceanographic conditions, substratum type and habitat preferences of particular species).

As part of their commitment, in 2017 the Northern Territory Department of Primary Industry and Resources engaged Cardno Pty Ltd (Cardno), a research and design consultancy, to undertake a scoping study to investigate the potential of artificial reefs and fish aggregating devices to aid in the recovery of at-risk reef fish. The artificial reef was required to meet five criteria:

1. Maximise diversity of reef and/or pelagic species that are preferred by recreational fishers
2. Minimise attraction from other reefs, and maximise new production
3. Create scalable and long-term network development
4. Siting that maximises enhancement, accessibility and minimises safety, social, economic and ecological risks
5. A design life minimum of 30 years

A survey was conducted in early 2018 to obtain community input to complement the biological and technical information in the scoping study and to identify potential deployment areas. Recommendations were provided on the design, construction and deployment of the new purpose-built artificial reef structures, with the Recreational Fishing Advisory Committee (RFAC) engaged to discuss and endorse the final proposed locations.

Navigating approvals and avoiding risks

As the first of its kind project in the Northern Territory, and the largest bespoke reef in the Southern Hemisphere, the approval processes for the $10 million project was always going to be challenging. With a number of different and competing authorities and stakeholder groups, the Environmental Management Unit was tasked with liaising with the Environmental Protection Agency and the Aboriginal Areas Protection Authority. Other areas of compliance included:

- requirements from the Commonwealth of Australia's Sea Dumping Act
- working outside the restricted areas for trawlers
- the Marine Act and the Lighthouse Act, and
- Darwin Harbour Master approvals which developed throughout the project.

Other influential stakeholders included the Amateur Fishing Association of the Northern Territory (AFANT), Recreational Fishing Advisory Committee (RFAC) and fishing tour operators.

Overlaying these consultations and approvals the project had several risks to consider, which were separated into three key areas:

1. Environmental:
- avoiding areas of complex benthic habitat (existing reef structures, areas of sea grass that provide food for Dugongs and other sea creatures, and conservation estate)
- targeting protected habitat for vulnerable species such as Golden Snapper, Black Jewfish, Coral Trout, Emperors, Mangrove Jack, Blue Tuskfish, Javelin Fish, and Cods
- deployment had to fall within the 2019/2020 financial year with work completed safely around Darwin's dangerous wet season.

2. Social:
- avoiding areas of existing use, known wrecks, war graves, culturally significant sites, mineral or petroleum exploration areas, dreaming sites, archaeological sites, burial sites, and important historical sites.

3. Engineering:
- considerations including substrate type, avoiding rock and corals, the distance from boat ramps, water depth so the modules can remain submerged in all tidal levels and provide clearance for vessels at the lowest astronomical tide, avoid shipping channels, and have enough monolithic presence so they remain stable on the sea floor and can survive a 1/100 storm event.

Jumping hurdles to get across the line

Previous artificial reef structures in the Northern Territory had been largely opportunistic with the deployment of the hull of vessels, mining equipment, or decommissioned plant and machinery, all with little evaluation of the environmental consequences or their effectiveness as a reef. Furthermore, there were no companies in the Northern Territory that had experience in specifically designed reef structures, and only two companies in Australia had adequate design experience with bespoke reef systems. This acted as the first hurdle in the procurement process as the NT Government (NTG) is clear in its support of local development.

After conducting market research, the project team requested verbal permission from the NTG to go through select tender to find a suitable contractor, however due to their firm commitment to local development, this was rejected.

Another condition of the NTG procurement process is for tenderers to have Contractor Accreditation (CAL) in the required field of work. As this is a requirement unique to the NT, the project team again applied for a waiver of the policy, which was also rejected.

The public tender was released and open for eight weeks – two weeks longer than normal to cater for the complexities. Two addendums were released and so a further two weeks were added. The tender closed with five submissions.

All the submissions being considered needed CAL upgrades. They all requested changes to the conditions of the contract, and, in most cases, they were asked to withdraw their change requests. There were 24 assumptions and qualifications to assess – some resulted in a discussion with the tenderer, some required written clarification, and some required a combination of both. There were queries on concrete testing, reinforcement cover, cement additives, set out points, the allowable movement of the structure, and site inspections. It was a complicated and detailed selection process, and the procurement outcome approval that was provided to the delegate was 114 pages long.

Shorecast, a local precast company, came out on top with a tender price of $8,373,539. They partnered with a WA company called Subcon who had the artificial reef experience required to ensure a successful project.

After six variations, the project costing was confirmed at $8,443,304. Those variations included:

- changing the steel to concrete (another effort to support local development)
- provision of a time lapse camera to capture construction and deployment
- the adjustment of location of one of the reefs to remove the need for marking buoys
- provision of a drone for capturing deployment; and
- transporting modules to an event for marketing.

Ecosystem engineering

The local project team overcame complications in supply, design and risk to create a new ecosystem consisting of four engineered reef structures situated across Beagle Gulf which were installed in 2019.

The reef complexes are large concrete structures that are five metres tall and four metres square at the base, weighing about 24 tonnes. They are expected to last up to 100 years and will attract a variety of species to suit a range of fishing techniques and abilities.

Innovation was demonstrated in the concrete mix that was developed for pouring into fully complete module moulds (3.7). A specific mix using nylon fibre reinforcement and additives allowed for a consistent, self-levelling flow through the mould from a single injection point which achieved well over 40 MPA. This mix had not been used in Darwin before this project.

Fisheries' Evan Needham described the specific design of the modules as providing a 'high rise apartment complex for fish'. The upwelling of the current lifts nutrients through the module and attracts foraging fish while allowing habitat protection from predation.

Location. Location. Location.

A key aim of the project was to increase the diversity and abundance of fish whilst minimising the attraction of fish from the closest natural reef. To minimise the potential for attraction, the artificial reefs needed to be placed outside the home ranges of fish on natural reefs. A home range is the distance a fish travels from their reef in search of food.

There were several target species to consider, however, there was no known home range for them. Cardno found the home ranges and habits of demersal reef fish in other countries associated with artificial and natural reefs. A collection of secondary research reports were utilised to identify a suitable separation distance between a natural reef and an artificial reef. For the areas under consideration, Cardno identified the optimal separation was a minimum of 500 m away from the natural reefs.

Testing showed the upwelling of the current lifting nutrients through the module.

Reef Pyramid with and without antenna.

Installation issues and smart solutions

The installation process was another risk that needed to be mitigated. Subcon would typically use an anchor moored barge and crawler crane to install large modules. This process involves a dumb barge being towed to site by a tugboat at a speed of 5 knots. This approach wouldn't work for several reasons:

- the number of reef modules on the project meant that at least six full resupplies would be required, therefore increasing handling and the risk of incidents
- infield vessel to vessel transfers would be required for the crew which are statistically the most dangerous offshore operation
- the installation vessel would be subject to swinging around the anchor
- removing anchors could damage modules

The project team had to design a safe and time-effective installation procedure. After market investigation, a Dynamically Positioned vessel became the ideal option and Guardian Offshore, who had been interested in buying this kind of vessel, purchased one from Montego Bay. To ensure the installation could take place safely, Subcon provided Shorecast with support by:

- developing the novel A-Frame installation technique
- performing the engineering to upgrade the capacity of the existing A-Frame
- providing experienced crew and supervision for the installation

To further ensure safe deployment, Shorecast developed a cradle arrangement to hold the modules still on the

Reef Pyramid construction at Shorecast.

deck, winching them to the stern for deployment via the pivoting crane and hydraulic release claw preventing the need for divers.

Spotlight on local supply

Northern Territory is a close-knit community with a deep focus on buying and supporting local.

Despite the awarded contractor fulfilling the requirement of declaring any resources sourced from outside the Northern Territory, it was discovered they had made a mistake in their submission regarding the information on the supply and fabrication of the steel *Fish Towers* from China, before being assembled in Darwin, was overlooked.

The project team acted immediately, conducting market research to identify a local steel supplier. It was discovered however that local steel fabrication was going to be a costly outcome, so the team pivoted to consider alternate design proposals. A new design consisting of a collection of five *Reef Pyramids* with steel antennae would not only suitably replace a single *Fish Tower* but would increase the overall efficiency of each reef, increasing the total volume from 7600m^3 to 9600m^3. In addition to this, all four reefs would have a central cluster, instead of just two. Shorecast would fabricate 118 concrete *Reef Pyramids* – 96 according to the original design, 20 with steel antennae, and 2 spares. As an added environmental and financial benefit, the concrete *Reef Pyramids* are expected to last three times longer than the steel *Fish Towers*.

A partnership with local disability service and support organisation – Helping People Achieve (HPA) –to source and fabricate the steel antennae further increased the local investment of the project.

The important role of community engagement

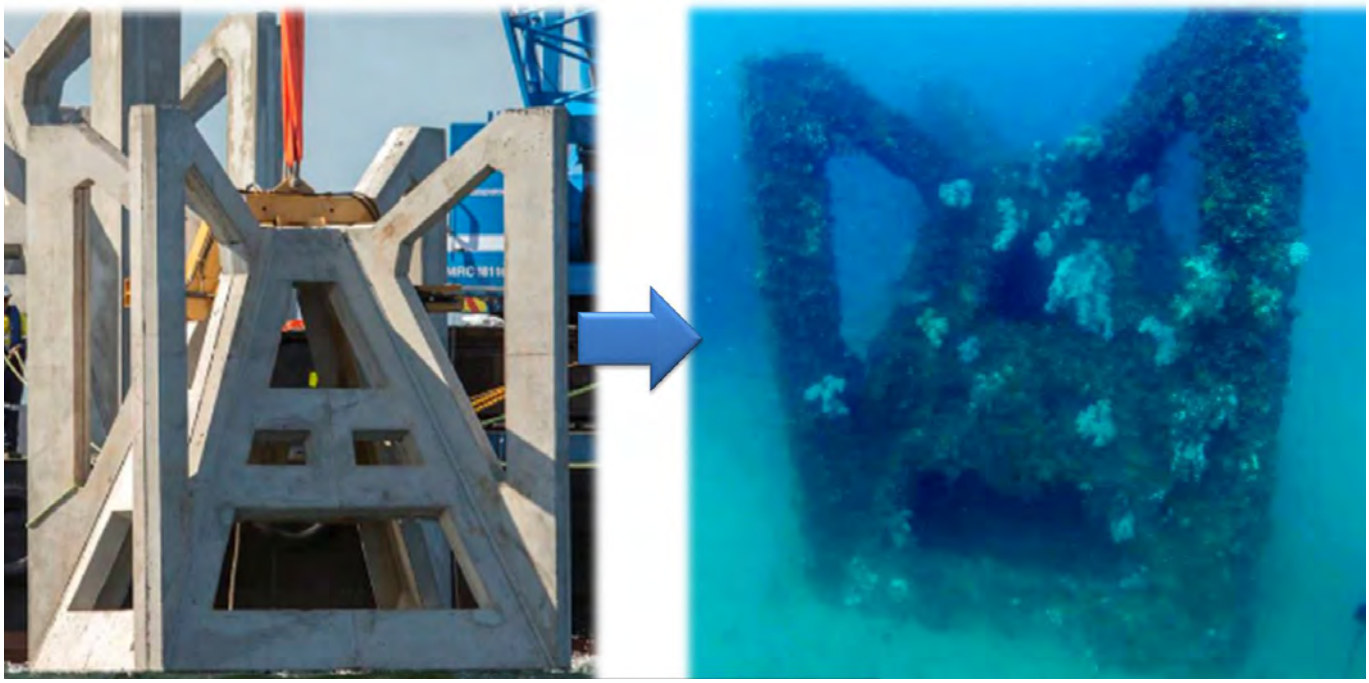
During the project, communication presented some unexpected challenges. There were many individuals identified across the government, fishing organisations, and the general public, all who had interests and a level of involvement.

The importance of a communication strategy that sits alongside the project plan, became apparent during the approval and review process for the new design. A disgruntled lobbyist discovered the winning tender's proposed use of foreign resources and addressed this to the Minister for Primary Industries and Resources at a press conference. Unaware of the alternative solution, the Minister was caught up in a series of negative press surrounding the project, which had the potential to damage the NT Government's reputation and derail the whole project.

To mitigate the negative publicity, the project team quickly announced the update, accepted the mistake, and worked to rectify public opinion. A marketing campaign was rolled out which included regular project updates to the media from the design and research team, a webpage to receive community feedback on the design and deployment areas and the display of a prototype artificial reef module and 3D models at various local events including the V8 Supercars and boating and fishing expos. In addition to the campaign, all media events ensured Ministers were clearly briefed with accurate information.

A win for the environment and the community

The artificial reef project was a success across social, economic and ecological targets.



The reef complexes have maximised marine life diversity and created new fish habitats, while providing new fishing areas for recreational fishing enthusiasts, which in turn have helped reduce pressure on existing natural reefs and fish stocks.

The project was scheduled for completion on 26 December 2019 but was delivered nine days earlier. It came in under budget, saving the Northern Territory Government, and the taxpayer, $1.6 million. The modules were required to last 30 years, but it is estimated they will have longevity for more than three times this, at 100 years. The reefs were required to have a volumetric reef system of 7600m^3 but have achieved 9600m^3. Finally, optimal reef productivity was estimated to take three years, but after six months the reefs were noted as being extremely active.

Coastal Engineering (103 minutes)

Topic	Speaker
Scenic Highway, Statue Bay - Cyclone Marcia Reconstruction Project	• Dan Toon
Flying Fish Point Rock Revetment Upgrade: The Application of 'Green Engineering', Fish Friendly Features and Other Innovative Measures	• Justin Fischer • Anthony Folan
Connecting Communities: Innovative fibre composite solutions for infrastructure - from Swale Bridges to Bulk Carrier Wharves	• Michael Kemp
Public buildings for post disaster function - structural engineering design experience	• Stuart Grallelis

ENGINEERING A REMOTE FUTURE

Elise Pearson
McMurtrie Consulting Engineers

On 23 March 2020, Australia entered the first stage of a nationwide shutdown. This was a time of great disruption leaving many businesses to operate differently and address challenges never presented before.

We are arguably now entering the Post-COVID era. A chapter in history that will be remembered as defining in many ways. Not only in the way people live, but in the way they work, and this is indeed a defining period for the engineering industry.

The engineering industry had never experienced a more significant shift to working conditions than when the world turned to remote working. A study by Engineers Australia (2020) reported "Engineers cited the changes associated with working from home as the biggest immediate impact of COVID-19." Despite unpreparedness, the problem-solvers got to work in setting up the hardware, software, home office, and troubleshooting human error. The forced new working conditions saw many new opportunities and challenges and ultimately gave way to a new style of working.

Remote working is much more than working from home for a day when a delivery or tradesperson is expected. It is, in essence, a completely borderless and freelance friendly workforce. Remote working is defined as a working style that allows professionals to work outside of a traditional office environment. It is based on the concept that work does not need to be done in a specific place to be executed successfully (Author Unknown, 2021).

It is a term interchangeable with working from home, telecommuting and flexible working. Remote working may not be the dream for everybody, but it should be an option for everybody.

The Virtual Shift

In 2020, there was a tidal shift toward remote working. For most this was born out of necessity during the COVID-19 pandemic and was expected to quickly pass. It didn't matter where a business was sitting on the spectrum of 'virtualness'; whether the business already existed in the virtual world or it was completely unaware, it was a shift required by everyone – the Boomers, Gen Xs and of course Millennials.

While the experience faced by engineers in regional Queensland may have been significantly different to those in metropolitan areas, it is likely all would have at least faced the prospect of remote working, if not actually experiencing it. Australians Googling, 'Working from home' increased by 900% in March 2020 compared to February 2020 and every other previous month, beginning in 2004 (Google Trends, 2021). Buzzwords such as 'synergy', 'pivot', 'adapt' and 'you're on mute' were similarly heavily googled and became overused phrases that have formed our COVID-speak.

Although this was a new working style for many, a survey by Employment Hero found that 84% of people enjoy working from home and 92% would continue to work from home regularly if given the opportunity (Author Unknown, 2021).

Benefits to Remote Working

There are some obvious and widely agreed benefits of remote working which include reduced business overheads, flexible working arrangements and less commuting. Anecdotally it is common to hear the phrase "I get much more done whilst working from home when I'm not being interrupted" and in fact, increased productivity is a benefit of flexible working. Stanford University's two-year remote work productivity study whereby 500 employees were divided into two groups - half being a control group who continued to work from their usual office and the other half working from home, found the remote workers had a decrease in employee attrition by 50%; they took shorter breaks, had fewer sick days, and took less time off (Mautz, 2018). Interestingly, during COVID, the ABS also reported a reduction in sick leave being taken and, importantly during this time, less sickness being spread (Tomevska, 2020).

Other benefits realised by many during COVID were that there was more time in the day for personal tasks, less money was being spent on takeaway coffees and lunches and there was less pressure to show up for the sake of it.

Enabling remote working could also help reduce the brain drain faced by many regional towns, allowing skilled professionals to move out of metropolitan areas and settle in smaller towns. It could also open regional

employers up to a wider, arguably unlimited, talent pool being able to hire experts from any location.

Barriers to Remote Engineering

Although there are many positive and enticing benefits to remote working there are clear trade-offs that are prudent to consider. There have historically been many barriers inhibiting true remote engineering work. The nature of site-based work and inspections, expectations of face-to-face meetings and inadequate IT have stifled any real progression to virtual work. When COVID-19 forced many to work from home, the traditional engineering industry, quite simply, was not prepared.

Although industries such as software development, journalism, and many of the creative industries have embraced freelance work for many years, the engineering industry has proved more timid and had never attempted to trial remote working at scale. Whilst there are legitimate site-based obligations that may require a physical presence, there is an increasing use of drones, BIM technology and smart infrastructure which reduce requirements for inspections and may eventually remove this barrier.

There are challenges relevant to all industries, which include managing feelings of isolation. In the above-mentioned Stanford study, when the remote working group was given the opportunity to continue to work from home 100% of the time - they declined, due to feeling too much isolation (Mautz, 2018).

Building relationships with new clients or even maintaining them with co-workers can prove more challenging when working remotely. Research found that workers miss the social aspects about work the most, noting that being easily able to bounce ideas off co-workers as the top response (63%). This was followed by the camaraderie and friendship of colleagues (50%) and ease of communication with a team leader or manager (36%) (Employment Hero, 2021).

Other common negative experiences that employees face is an unclear delineation between work and personal space, switching off from work, and bad internet connections (Buffer, 2019). KPMG warns of remote working being a catalyst for new inequalities, between those who have better workspace and technology at home and those who do not (Mabbott, et al., 2020). Employers must be cognisant of their remote workers' caring responsibilities, desired opportunities, and the possible marginalisation of already disadvantaged groups.

While there are many clear benefits to remote work, the real barriers must be considered and managed appropriately.

Legislative considerations

There is a multitude of legislative considerations that influence remote working scenarios. As usual, legislation is left to play catch up with industry and new markets. Australian laws suit the "business- as-usual" much better than the innovation unicorns. The home and office are now interchangeable as a 'workplace'. Remote working policies are provided by the Australian Fair Work Act which allows employers and employees to make arrangements about working conditions that suit them (Australian Fair Work Act, 2009).

Firstly, the Professional Engineers Act (2002) provides industry-specific governance on how engineers are to conduct their business. Most relevant to remote working, the Act provides that a person carries out professional engineering services under

the direct supervision of an RPEQ only if the RPEQ directs the person in the carrying out of the services and oversees and evaluates the carrying out of the services by the person (Professional Engineers Act (Qld), 2002) This Act makes it very clear that the supervision must be 'direct', however it does not define 'direct'.

The Board of Professional Engineers has provided clarification that 'direct' does not necessarily mean physical co-location. "Direct contact need not be in person, but may be through written correspondence, telephone, or voice or video chat" (BPEQ, 2019).

This distinction was made in 2019 before the Zoom boom. In 2021 we have access to much more than just telephone, voice, or video chat. We have online collaboration spaces, screen sharing, instant messages, results trackers, AI to-do lists, virtual reality and all the other technology that we may not know about yet that has been conceived out of COVID.

In addition to the Professional Engineers Act, there is Industrial Relations and WHS legislation outlining the duty of care as required of employers. Regardless of a centralised office space or remote working scenario, the requirement for a safe workplace "as far as is reasonably practical" remains unchanged. While it may be straightforward to manage home office trip hazards, screen height adjustments and lighting; managing risks such as isolation, mental health and domestic violence is much more nuanced.

There has been a landmark case of workers' compensation awarded where there was a direct connection between a violent act and work, when undertaking work from home (Workers' Compensation Nominal Insurer v Hill, 2020). This case demonstrates employers need to implement a holistic approach in providing a safe home working environment as required by law. This includes the threat of domestic violence (Wittig, 2020)

Other legislation to note are tax and/or employment laws if working remotely or hiring abroad, and Fair Work amongst others. Although the legislation regarding remote working is still incipient, companies can be proactive and develop remote work policies and can access best practice guidelines and support information from Fair Work, Safe Work Australia, and other organisations.

Engineering a Remote Future

Remote working is much more than a popular trend. It is the modern workplace presenting itself and it is here to stay (Buffer, 2019). Traditional office spaces are being repurposed and replaced with co-working spaces, home offices and work-from-anywhere attitudes.

While it may be easier to adopt an 'all or nothing' approach, the best results will be found by enabling employees to strike a balance between a traditional office and remote working options. This has been referred to as a 'blended workforce', where employees can choose either to work remotely, from a centralised office, or both. While problems are still emerging, if these are met with the same level of design thinking and innovation as the initial remote working shift solutions will be created.

This can seem like a big change for some, however, not everyone necessarily needs to change their working conditions. The request is that people will be open and facilitate the diverse working conditions of others. This is a once in a lifetime opportunity, and the remote working framework has been set in motion and the engineering industry can either embrace this new work style or be left behind.

In 50 years, there is no doubt that the working environment will look very different to how it does today. There will be a greater prioritisation of communication and new ways of collaboration will continue to emerge. It is likely the traditional office space might be retired for co-working spaces or work hubs in suburbs, where small groups of employees meet, instead of commuting to centralised offices. Work contracts may evolve into something of a hybrid between a permanent and casual employee where hours can be chosen for each week and employee benefits accessed. The remote future will see a shift in management structure with a focus on managing outcomes rather than inputs and hours (Mabbott, et al., 2020). The time-based payment system might be scrapped altogether and replaced with an outcome-based model where people are valued for more than just the time sitting at their desk.

The future of engineering could emerge into a completely borderless and freelance friendly workforce. This transformation would require a continued uptake in new technologies and work styles to embrace the remote future of engineering.

Acknowledgements

Lachlan McMurtrie & Kenny Festing

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ABOUT THE AUTHOR

Elise is a Civil and Environmental Engineer working in Central Queensland. Her experience has involved project management, design, and construction support for several of Queensland's largest infrastructure projects and experience in the International Development sector. Elise is passionate about community building projects, social inclusion and empowerment of women and girls.

ADAC: DESIGN XML AND BEYOND

Adam Johnston
Bundaberg Regional Council

On 1 September 2017, Bundaberg Regional Council (BRC) adopted the ADAC system for As Constructed XMLs provided by the Development Industry. However, ADAC, as the name implies, is Asset Design As Constructed: So why doesn't our industry provide For Construction (or Design) XML? With this in mind, Bundaberg Regional Council in conjunction with 12d developed a system to create ADAC XML files at the Design or For Construction phase. The next logical question is: if we have ADAC at design and at the as constructed phase where will this process lead? This paper discusses how ADAC can transform from the asset management area to a project management tool.

What is ADAC?

Asset Design As Constructed (ADAC) is essentially a defined format or specification for the supply of vendor independent 3D data in what is called Extensible Markup Language (XML) format. The data is usually prepared by surveyors and is transmitted as part of an As Constructed package.

ADAC was created by IPWEAQ in collaboration with local governments across south-east Queensland and other states more than a decade ago. Membership has expanded to include State Government Departments and water utilities.

The ADAC specification is endorsed by the IPWEA National Asset Management Strategy Committee (NAMS.AU) which provides national leadership and advocacy in the sustainable management of community infrastructure. ADAC is the only data specification referenced in the International Infrastructure Management Manual (IIMM) that is driven out of ISO 55000 Asset Management Standards.

The ADAC specification is defined by the ADAC XML schema and is generally utilised by Councils to transfer asset information into its corporate systems – in Bundaberg's case a Feature Manipulation Engine (FME) which is a Spatial ETL (Extract, Transform and Load) tool is used to read, write, and manipulate ADAC data so that it can be transferred into our GIS package and accounting software automatically. This process used to be done manually and could take weeks for large projects. Now this only takes hours to achieve, arguably with more accuracy than before.

The Data Standard applies to the following infrastructure asset types:

- Transport
- Stormwater
- Open space
- Water
- Sewerage
- Cadastre / surface
- Electrical
- Telecommunication

The capture of the information is usually described in a generic guideline. Bundaberg Regional Council partnered with both Gladstone and Rockhampton Regional Councils to develop a common guideline which has now been in use since 1 September 2017.

ADAC is considered as an asset management tool.

How does this relate to an actual asset?

Looking at an extract from BRC's guidelines and how it applies to a Stormwater Pipe (Figure 1).

The guideline talks about Asset Capture (e.g., simple linear feature that drains downhill), special relationship (point 2 and 3) and data attributes (e.g., diameter, class, length).

This information has also been summarized in a **data dictionary** that lists all data classes in our schema in a single spreadsheet (Figure 2). In this example, the items listed in the stormwater piper schema are shown.

The **schema** for this single object is quite extensive for one piece of infrastructure, let alone a whole project. The same example is presented again as diameter, class, length.

Case Study

Bundaberg Regional Council recently widened a section of Gahans Road, East Bundaberg. The widening included kerb and channel and underground drainage. For example:

- The GIS format after translation through the FME Script – originally developed by Lyons systems (Figure 3, and
- The design drawing featuring 0.5 m of pipe from an RGU 1/D1 to access hole 2/D1 (Figure 4),
- The actual data

Spatial Relationship: May be coincident to StormWater point features.

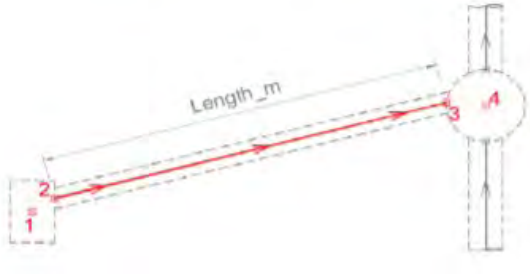


Figure 1.

ients the feature f stormwater	Pipe	Represents a stormwater pipe feature	Dimensions_Invert_Levels_m	Calls in the standard elements for upstream and downstream invert levels
			Dimensions_Surface_Levels_m	Calls in the standard elements for upstream and downstream surface levels
			Pipe Structure	Container for a choice of pipe cross-sectional measures

Figure 2 Data dictionary.

```
<adac:StormWater>
  <adac:Pits>
  <adac:EndStructures>
  <adac:Fittings>
  </adac:Fittings>
  <adac:Pipes>
    <adac:Pipe>
      <adac:ObjectId>37352155</adac:ObjectId>
      <adac:ComponentInfo>
        <adac:InfrastructureCode xsi:nil="true"/>
        <adac:Owner>Council</adac:Owner>
        <adac:Status>Design</adac:Status>
        <adac:Notes>1/D1 to 2/D1</adac:Notes>
        <adac:SupportingFiles xsi:nil="true"/>
      </adac:ComponentInfo>
      <adac:US_InvertLevel_m>14.974577</adac:US_InvertLevel_m>
      <adac:DS_InvertLevel_m>14.9672</adac:DS_InvertLevel_m>
      <adac:US_SurfaceLevel_m>16.107092</adac:US_SurfaceLevel_m>
      <adac:DS_SurfaceLevel_m>16.204393</adac:DS_SurfaceLevel_m>
      <adac:PipeStructure>
        <adac:CircPipe>
          <adac:Diameter_mm>450</adac:Diameter_mm>
          <adac:Material>RCP</adac:Material>
          <adac:Class>3</adac:Class>
          <adac:JointType>FJ</adac:JointType>
        </adac:CircPipe>
      </adac:PipeStructure>
      <adac:Cells>1</adac:Cells>
      <adac:ConcreteCoverType>Standard</adac:ConcreteCoverType>
      <adac:Grade>1.384399</adac:Grade>
      <adac:Length_m>0.532899</adac:Length_m>
      <adac:Geometry>
        <adac:Polyline>
          <adac:Path>
            <adac:PolySegment>
              <adac:Vertex>
                <adac:X>437795.706909</adac:X>
                <adac:Y>7251507.597512</adac:Y>
                <adac:Z>14.974577</adac:Z>
              </adac:Vertex>
              <adac:Vertex>
                <adac:X>437796.234145</adac:X>
                <adac:Y>7251507.520378</adac:Y>
                <adac:Z>14.9672</adac:Z>
              </adac:Vertex>
            </adac:PolySegment>
          </adac:Path>
        </adac:Polyline>
      </adac:Geometry>
    </adac:Pipe>
    <adac:Pipe>
      <adac:ObjectId>37352160</adac:ObjectId>
```

Figure 3.

Extrapolating this object throughout a whole project shows why a program like the FME is so important.

Design Process of Creating an XML

Typically, the process described, applies to works in the ground or As Constructed infrastructure.

But ADAC is asset design as constructed – not only As Constructed.

ADAC no longer needs to be only part of the As Constructed package as BRC in partnership with 12d has developed a system that can produce ADAC XML from 12d design. To my knowledge we are the first organization to apply this process - and it has only taken a decade for it to happen.

The key to obtaining design XML or For Construction ADAC XML created by 12d is the ***pickup*** editor (Figure 5). This editor contains all the attributes mentioned in the BRC data dictionary.

The attributes within the pickup editor - then apply to the asset using various ***snippets*** for each class of infrastructure. For example; pipes, pavement road edge, subsoil drain and pathway.

Next there is another function to bring in polygons – such as the pavement – to move information to the ADAC Model.

Once the ADAC model is finished, create the ADAC For Construction (or Design) XML.

This was a brief overview of the 'For Construction' process, that in BRC's case required a number of hours training and still requires quite a bit of review and customisation.

Next Steps in the application of ADAC

The next step in the acceptance of 'For Construction' XML is to create Power Users within BRC's design team. These users will have ironed out any issues with the 12d software and will have developed a mature User Library for BRC projects.

Figure 4.

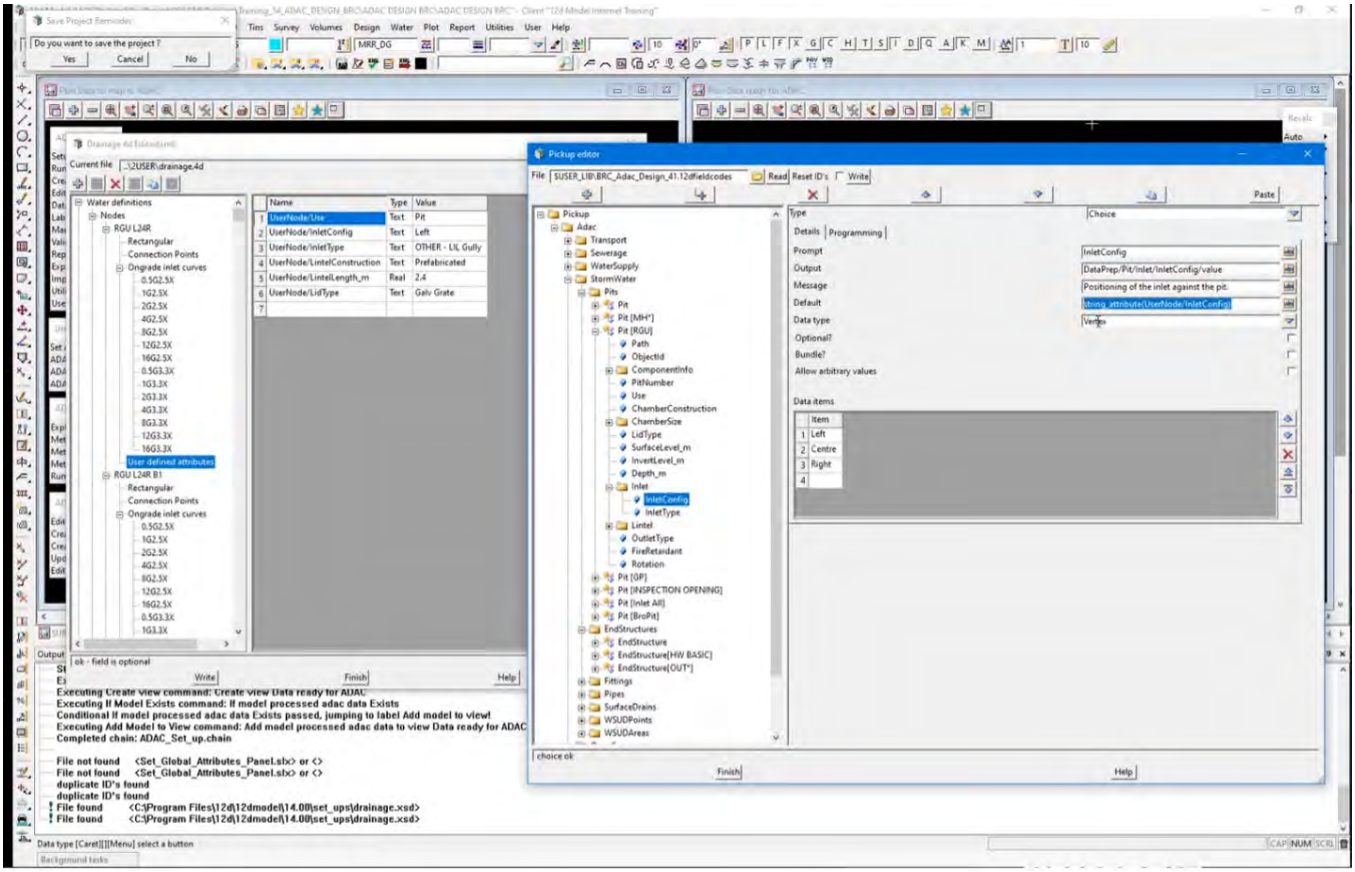
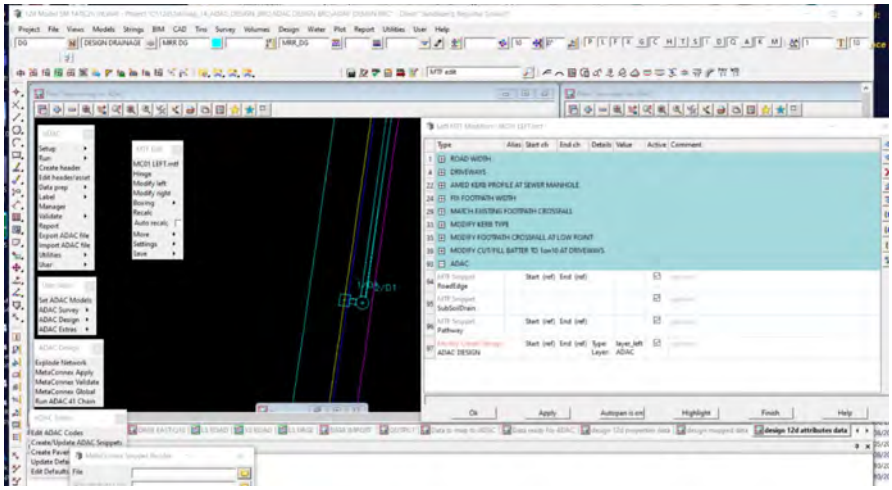


Figure 5 Pickup editor



After Council has a mature program, the intention is to offer training, which should be in the next financial year, to designers in the Wide Bay using some of our examples and volunteer our Power Users as a local contact point.

The key to the next step in the evolution of the use of ADAC Schema is to create an Automated XML Analysis Program (Tool) that is vendor neutral. This may not be possible, and the tool may have to reside in an FME program in Bundaberg's case as it is the current method for importing ADAC. In this regard perhaps the best option is to develop a standard set of customisations in a method that could be used to create future shared scripts – perhaps within the Data Dictionary as shown previously. The program would be configured to incorporate business rules, material types and other constraints given in the planning scheme and the QA process and provide an exception report and mapping tool. This tool could be used equally for the For Construction and As Constructed XML schema. Another part of the Tool would be to allow for a comparison between For Construction and As Constructed and appropriate exception reports.

In discussions with colleagues, it would seem that creating such a tool is a holy grail of ADAC as it is much discussed but not yet found. Realistically this tool will be costly and needs a way to be customized to suit each Council's requirements. With this in mind, a joint venture with IPWEAQ and other parties over the coming months is suggested. More importantly this is where ADAC can transform from something that is used in the Asset Management area to something that is also used as a Project Management tool.

Where will the Design XML lead – with Automation?

There is a golden opportunity to shake-up the construction paradigm. Although not extensive, real opportunities of the previously mentioned transformation are:

- Allowing review of For Construction drawings at a technician level where an exception report could inform closer scrutiny of plans by engineers/project managers
- The Tool could provide an independent service clash report
- We currently get ADAC and As Constructed plans. Is there a need for two methods?

Acknowledgements

Mal Peaker and his 12d team for assisting in the development of the for construction XML

ABOUT THE AUTHOR

Adam Johnston is the Design Manager in the Engineering Services section of Bundaberg Regional Council. He has extensive experience with local government engineering and ran the Port of Bundaberg as its Chief Executive Officer for a period of 4 years.

Adam has undertaken a number of challenging and varied projects within the Bundaberg Region, such as the design of the Wallace Creek Bridge and the prefeasibility study for the Aviation Precinct. Each project has involved considerable involvement in town planning applications under the Sustainable Development Act and the Local Government (Planning and Environment) Act.

Adam also has considerable experience in identifying potential issues and developing suitable designs and strategies to mitigate impacts due to his broad experience across many levels of government and client projects though his experience at Bundaberg Regional Council, GHD and the Port of Bundaberg

NSW COUNCILS JOIN THE ADAC CONSORTIUM

Mark Lamont
Director, Information & Resources

Over the past couple of years, interest in ADAC (Asset Design as Constructed) as an asset management solution for automated data transfer has been attracting interest in NSW. Four NSW councils have since joined the Consortium with several other councils now committed to implementing the ADAC schema to better manage their donated and other assets.

Tweed Shire Council and Port Macquarie-Hastings Council have been involved with the Consortium for several years with 22 other councils, and are now joined by Shellharbour Council, Wollondilly Shire Council, Queanbeyan-Palerang Regional Council and Ballina Shire Council.

ADAC is the preferred solution for automated data transfer for three primary reasons: it was developed by local councils for local council, and it is non-proprietary and available for any organisation to utilise without cost. It also accommodates the range of council business systems and processes already in place and experience has shown that implementing ADAC also streamlines those systems and processes. This has been a key driver for the growing interest in ADAC.

Being a member of the ADAC Consortium, offers an opportunity for member councils to influence the future development of the schema to incorporate attributes that are important for their local conditions, local rules and legislation. The contributions of our NSW member councils have been invaluable in the development of version 6 of the schema to be launched later in 2022.

The fundamental drivers of ADAC also fulfil the requirements of the Queensland Government Strategic Asset Management Plan framework and similar frameworks and policies adopted in other states. The objective of these frameworks is to strengthen the accountability, performance and capability across the public sector.

ADAC contributes to this broader asset management framework by focusing on the registration, valuation and maintenance of assets. This enables councils to effectively plan for the disposal and replacement of their assets.

In other ADAC matters, we would like to acknowledge the tremendous contributions of outgoing Chair of the ADAC Strategic Reference Group, Darren Moore. Darren has taken on a role with KPMG as Manager - Engineering, Assets & Project Delivery - Infrastructure, Assets & Places and we're sure we'll continue to connect with Darren. A new Chair will be announced shortly.

CQ BRANCH PRESIDENT'S REPORT

Celisa Faulkner,
Branch President
Manager Asset Planning,
Gladstone Regional Council

This will be my last report as the CQ Branch President after four years in the role. My plan for the years ahead is to commit time and energy to becoming an RPEQ and studying for a master's degree. I have thoroughly enjoyed my time on the committee and on the IPWEAQ Board, and look forward to continuing as a member of the CQ Branch committee.

In the meantime, I am touring around the top of Australia with my husband and two kids on a 3.5 month sabbatical and adventure of a lifetime. So, my apologies but my last report as your Branch President is a trail of photos of the places we've been to date! I hope it inspires you also to take to the roads and discover this amazing country.

I will however miss the annual pilgrimage to the legendary IPWEAQ Annual Conference in October but look forward to reading all about it in the December issue of Engineering for Public Works. My best wishes to CQ councils nominated for project awards including Bundaberg Regional Council, Gladstone Regional Council and Central Highlands Regional Council. Good luck, CQ!

Congratulations to Adam Doherty who has stepped into the role of CQ Branch President and will keenly represent the branch on the IPWEAQ Board officially from the AGM in October.

I'd like to also thank my fellow Board members over the past four years and our CEO, Leigh Cunningham. I've really enjoyed the opportunity to witness the reconstruction of the Institute and I'm very excited for what's still to come.

Have a great conference in Cairns!

Upcoming PD:

Emerald
16 September 2021

Rockhampton
18 November 2021

Rockhampton
23 November 2021

NQ BRANCH PRESIDENT'S REPORT

Glenda Kirk,
NQ Branch President
Director Infrastructure Services, Mareeba Shire Council

Thank you to everyone who joined us in Townsville 16-18 June for the reconvened NQ Branch conference after COVID-19 cancelled last year's event. Unfortunately, June can be a challenging month for councils in our region with the pressures of budgeting and deadlines for the delivery for funded projects. Fortunately, IPWEAQ members who were not able to attend the conference can access the presentations including the audio visuals, the PowerPoint presentations and papers submitted by authors. Access NQ Branch Conference Proceedings And see conference highlights on pages 89-91.

In just a few weeks, we'll have another opportunity to get together for the Annual Conference in Cairns, 12-14 October. These gatherings are critical for our sector as we make the most of the opportunity to network with colleagues dealing with and resolving similar engineering and community issues across our state and the Northern Territory.

In the north, we are used to flash flooding from weather events and actively engineer solutions that reduce risks to our communities. And at this year's Annual Conference in Cairns, we'll have an opportunity to hear Dr Richard Harris (Harry) SC OAM, 2019 Australian of the Year talk about his involvement in the 2018 rescue of 12 young boys and their soccer coach trapped in a cave in Thailand when monsoon rains hit. Dr Harry's unique combination of interests and career (diving and anaesthetist) catapulted him into the global spotlight in a high risk, apparently doomed operation which was certainly unprecedented. It's an extraordinary story and I hope you will join us 9am Wednesday 13 October for this presentation.

Be sure also to register for presentations being delivered by our colleagues in the north including:

- Paul Ransom and Samantha Guy - Torres Strait Island Regional Council - Mer Island Water Supply
- Tom Ryzak, E2G Joint Venture - Tropical surprises and infrastructure success on the E2G project
- Nicholas Wellwood, Burdekin Shire Council - The Reinvention of the Ayr Drinking Water Supply to meet water quality and resiliency benchmarks
- Justin Fischer, Cassowary Coast Regional Council - Tully Grandstand Project - A different way of delivering (NQ Branch conference Best Paper winner)

I'm also pleased to be participating this year in the panel session on Day 2, 'how do we plan better for resilient and sustainable communities in vulnerable locations?'

Traditionally, the excellence awards gala ceremony and dinner are on the second night of the conference but again this year, it will be the first night offering us an opportunity to celebrate all projects and people for the duration of the conference. Our best wishes for NQ councils vying for project awards: Cairns Regional Council, Cassowary Coast Regional Council, Flinders Shire Council, Kowanyama Aboriginal Council, Tablelands Regional Council, Townsville City Council, Whitsunday Regional Council and the Mt Isa Water Board. And vying for the inaugural Employer of the Year awards (Private Sector) is St. George Project Services. Good luck everyone!

I hope to see you all in what will be another record-breaking event in Cairns (based on early registrations), and to welcome our colleagues from the Northern Territory to their first IPWEAQ Annual Conference as members of the inaugural NT Branch of IPWEAQ.

See you then!

Upcoming PD:

Townsville
3 November 2021

Mackay
11 November 2021

NQ BRANCH CONFERENCE

135 delegates joined us in Townsville for the NQ Branch conference with the Welcome Function at A Touch of Salt offering a chance to reconnect. Our thanks to St. George Project Services for generously sponsoring the evening.

Thank you also to host council, Townsville City Council, and to Danny Lynch who opened the conference with a keynote presentation on Townsville's new stadium and surrounding infrastructure. The conference program included a further 16 thought-provoking presentations on projects and services being delivered in North Queensland.

Prior to the conference dinner held at the new stadium, delegates were treated to a behind-the-scenes tour of the Queensland Country Bank Stadium followed by Q&As with Cowboys CEO, Jeff Reibel and Assistant Coach and former NRL player, Steve Georgallis. A signed Cowboys jersey sponsored by LGIAsuper was auctioned with an impressive winning bid of $1,600. Congratulations Brenden Quabba from St George Project Services!

Once again, our trade exhibition offered delegates an opportunity to discover the latest in products and services available to support them in their roles. Thank you to all our exhibitors for taking the time to travel with us to Townsville. And thank you for the prizes you donated for the legendary IPWEAQ branch conference raffle. $2,100 was raised for Rural Aid.

The success of our events depends on so many of you - our delegates, exhibitors and of course our sponsors. Thank you SpelStormwater, the overall branch conference sponsor, and St George Project Services,

LGIAsuper, Project Delivery Managers and Shepherd.

Glenda Kirk, NQ Branch President presented milestone gifts to IPWEAQ members: Natasha Murray (5 years), James Stewart (10 years) and Brenden Quabba (10 years).

James Stewart, 10 years

Brenden Quabba, 10 years

Natasha Murray, 5 years

Congratulations also to Justin Fischer, Manager Asset Engineering, Cassowary Coast Regional Council who won the Best Paper award for his presentation on the Tully Grandstand. Justin will present this paper at the 2021 Annual Conference in Cairns, 12-14 October.

Justin Fischer, Best Paper award winner

Thank you to everyone who attended the 2021 NQ Branch conference and for sharing their experiences, knowledge, and expertise for the benefit of the wider community. We look forward to seeing you at the Annual Conference in Cairns, 12-14 October!

135 ATTENDEES

43
members

92
non members

108
male

27
female

Lawrence Mills
Student,
Bachelor of Engineering (Honours – civil major),
CQ University

As part of the IPWEAQ Student program, Lawrence was offered a complimentary registration to attend the NQ Branch conference in Townsville. He has been living in Rockhampton for the past 21 years, currently in Yeppoon where he enjoys fishing, mountain biking and scuba diving. He has previously worked as an Environmental Scientist in Brisbane and Canberra.

Lawrence reflects on his experience ...

I accepted an invitation to attend the NQ Branch conference in Townsville, 16 – 18 June, as it offered an excellent opportunity to learn more about the major projects being undertaken throughout regional Queensland. I was most impressed with the trade exhibition, speakers and overall friendliness of the public works community in attendance. I spoke to numerous company representatives who were showcasing the offerings of their respective companies. Many of these exhibitors were also presenting a paper at the conference and some were major sponsors. I noticed that the types of companies with a trade exhibit were quite diverse, ranging from the large consultancies e.g., Cardno and Fulton Hogan, to companies which I was previously unfamiliar with such as Project Delivery Managers (PDM), SPEL Stormwater and Water Modelling Solutions. The level of innovation demonstrated by these smaller scale companies was intriguing, and it provided an insight into the practices of successful entrepreneurship in the civil sector.

As water engineering is my primary interest, I was excited for the opportunity to speak with representatives from a company I had worked with previously for a university project on erosion and sediment control. I had the opportunity to discuss the project with the team based at the Townsville office including civil design, water modelling, my previous experience and even sporting interests. I also mentioned that I was looking to complete an industry-based thesis as part of the Honours program. Not long after the conference concluded, one of the company's engineers connected with me on LinkedIn and passed my details to the manager of the Rockhampton office who showed a lot of interest in my thesis project and arranged for their Principal Water Engineer to be my Industry Supervisor. As a result, I am now in the early stages of planning a thesis on the impacts of Climate Change on Water Sensitive Urban Design (WSUD) which I will implement in 2022.

My attendance at the North Queensland Branch Conference was highly beneficial offering not only an opportunity to hear from practitioners in the sector but now I have an opportunity to work on an innovative project that is highly relevant to sustainable development. I would encourage all students when invited to attend an IPWEAQ conference as it opens up a world of ideas, connections and opportunities providing a base to become known in the industry. The chance to converse with industry professionals, without the added burden of being in an interview, allows potential employers to get to know you as a person and how you may fit with their company values.

Thank you to our sponsors for this year's NQ Branch Conference!

SpelStormwater
Overall Conference Sponsor (Platinum Sponsorship)

St George Project Services
Welcome Function (Gold Sponsor)

Project Delivery Managers Pty Ltd
Morning Tea (Bronze Sponsorship)

LGIAsuper
Charity Auction (Silver Sponsorship)

Shepherd Services Pty Ltd
Morning Tea (Bronze Sponsorship)

SWQ BRANCH PRESIDENT'S REPORT

Andrew Johnson,
Branch President
CEO, Somerset
Regional Council

Following two COVID enforced postponements, the Rural Road Maintenance and Rehabilitation Forum kicked off in Dalby Monday 30 August with 145 eager road enthusiasts. Our thanks to host council, Western Downs Regional Council (WDRC) for providing the Dalby Centre for the Forum. If you were unable to make it to Dalby, the Forum Proceedings will soon be available in the IPWEAQ Knowledge Centre. See the event wrap-up at page 93.

You'll no doubt read plenty of comments in this issue of Engineering for Public Works encouraging you and your team to join us in Cairns, and I'll add to that. It's a great event for like-minded professionals experiencing similar challenges to come together to network, contribute ideas and knowledge and learnings, all of which makes all of us better in our roles.

And as a past winner of an IPWEAQ excellence awards for the Brisbane Valley Rail Trail (featured for January of the 2022 Every Community Needs an Engineer calendar), I particularly look forward to the awards night to learn about all the other great projects being delivered for Queensland communities.

From the SWQ Branch this year, we have two nominees competing for the inaugural Employer of the Year (Private Sector) award: Proterra Group and GHD Pty Ltd and proudly, Somerset Regional Council for Employer of the Year (Public Sector). These will be hotly contested categories with many deserving winners and our congratulations to the IPWEAQ team for this excellent addition to the awards program.

Last year, WDRC walked away with two people award winners (Emerging Professional and Team Member) and we wish them well as they attempt to repeat this feat again in 2021 but with competition from South Burnett in the Team Member category.

Good luck to other SWQ councils and organisations competing in the project categories including Toowoomba Regional Council, Bulloo Shire Council, Paroo Shire Council, South Burnett Regional Council, Quilpie Shire Council plus Proterra Group and GenEng Solutions.

Unfortunately I won't make it to Cairns in time for the award announcements but I'm sure there will be lots of celebrating with all nominees and winners from the south-west of the state. Good luck!

After more than a decade on the SWQ Branch committee, we say farewell to Seren McKenzie who heads to the tropics for an opportunity to appreciate our better climate in her new role as Director Infrastructure and Operations at Townsville City Council. Our best wishes for your ongoing success, Seren.

And on a personal note, thank you to the 205 members who took the time to vote at the recent IPWEAQ Board elections and for choosing me as your next Vice President (and hopefully President in due course). I look forward to further serving you on the IPWEAQ Board.

RURAL ROAD MAINTENANCE AND REHABILITATION FORUM

The weather warmed up in Dalby as we welcomed 145 delegates for our Rural Road Maintenance and Rehabilitation Forum. The program included 12 insightful presentations tackling real issues on our regional roads.

Steve Hegedus, Partner/Director Client Services, Shepherd, kicked off the forum discussing artificial intelligence (AI) for sealed road maintenance management. The project involves representatives from five regional road groups across Queensland. Steve discussed how the project conducts research into the current advancements in the use of AI and machine learning for the purpose of road maintenance management and renewal planning for sealed roads.

Thank you to all our presenters from either side of the private and public works sector:

- Adrian Cahill, Technical Services Manager, RCPA
- Craig Moss, Director, Professional Development, IPWEAQ
- Damian Volker, Senior Technical Officer, Department of Transport and Main Roads
- Lory Noya, Principal Professional Leader, Asset Performance, ARRB
- Sam Fitzgerard, Works Manager, Western Downs Regional Council
- Mahendra Mistry, Department of Transport and Main Roads
- Anil Sesathpura Dewage, Department of Transport and Main Roads
- David Klease, National Manager Machine Control, C.R. Kennedy
- Ray Hicks, Director, Brandon and Associates
- David Bell, Regional Manager South Queensland, Stabilised Pavements of Australia
- Carl Topp, Queensland Technical Manager, Boral
- Zehra Kaya, National Business Manager – Roads and Pavements, Huesker

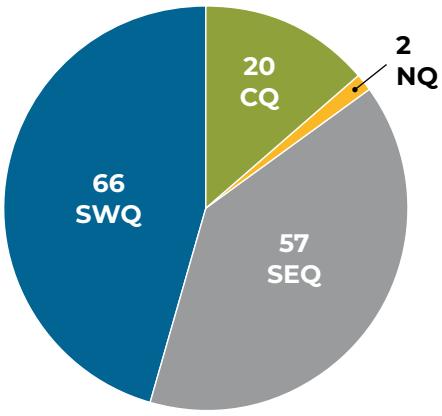
The forum dinner was buzzing at the Russell Tavern, with well over 100 people excited to finally network in person.

Day two of the forum began with a site demonstration conducted by C.R. Kennedy and Western Downs Regional Council. The site demonstration provided delegates with a practical understanding of how machine

control works and an appreciation of the benefits this technology can provide to road construction and maintenance activities.

Thank you to everyone who attended the forum, and for sharing your experiences and expertise in the sector. We look forward to seeing you at the 2022 Rural Road Maintenance and Rehabilitation Forum!
Special thanks to our generous event host, Western Downs Regional Council, the morning tea sponsor, Shepherd and RPQ Group for kindly sponsoring dinner.

145 ATTENDEES



58
members

87
non members

NT BRANCH CHAIRMAN'S REPORT

Peter McLinden,
Director Member Services and Infrastructure, LGANT

I am pleased to present this inaugural NT Branch Chairman's Report following the establishment of an IPWEAQ Branch in the NT earlier this year.

The inaugural meeting of the NT Branch committee was held 26 May 2021 with the following committee members confirmed:

- Peter McLinden (Chair)
- Gary Boyle (Co-Chair)
- Brendan Pearce
- Leigh Carnall
- Usman Siddique
- Nadine Nilon
- Bernie O'Donnell

The NT Branch would like to acknowledge the administrative support and encouragement of IPWEA Queensland especially the CEO, Leigh Cunningham and her team. It is greatly appreciated by the committee.

The first task for the newly formed committee after a briefing from Leigh was to identify possible dates for an inaugural NT Branch conference proposed for Palmerston in May 2022. A Call for Papers will be issued early 2022 and members and practitioners in the NT invited to submit an abstract to develop a program tailored and focussed on NT-specific issues and projects.

The committee also identified training required for NT practitioners including a Supervisor's program, traffic management, Lower Order Road Design and essential (soft) skills including communications, data management and effective decision making. An NT program is underway with a number of courses scheduled – see dates below.

NT practitioners with an interest in asset management are also invited to participate in the NAMS-Q Working Group. Contact David.Thompson@ipweaq.com, IPWEAQ's Industry Engagement Manager if you would like to participate.

And calling any recent graduates within five years of graduation who would like to take up the challenge of being an Ambassador for our sector. For more information on the Ambassador program including benefits, roles and responsibilities, please contact Melissa.Bradley@ipweaq.com.

I am delighted to see articles and news reports in this issue of Engineering for Public Works featuring NT projects and issues including:

- Artificial reef structures in the NT: creating sustainable fishing opportunities for Territorians and tourists – see page 73
- COVID-19 wastewater testing in the NT. How it works and why it's important - see page 70

And we are delighted to have an NT project featured in the 2022 Every Community Needs an Engineer calendar, launching at the Annual Conference in Cairns.

I invite colleagues involved in public works in the NT to register for the IPWEAQ Annual Conference to be held in Cairns, 12-14 October. A 10% discount is available for anyone based in the NT to encourage you to become a part of the wider community. Contact Monica.Robertson@ipweaq.com for the discount code.

If you would like to join the NT Branch, please contact Melissa who will be happy to assist. Members receive discounts of at least $300 for every conference, workshop, event or publication. For the IPWEAQ Annual Conference, the member discount is $500.

Thank you for the opportunity to play a role in the formation of the inaugural NT Branch as the inaugural Chair. I look forward to seeing the branch grow and develop over the coming years.

Upcoming PD:

Darwin 31 August 2021

Darwin 1-3 September 2021

Darwin 3 September 2021

Darwin 28 September 2021

Darwin 1-2 December 2021

Darwin 16 Feb 2022

SEQ BRANCH PRESIDENT'S REPORT

Raad Jarjees,
Branch President
Network Engineering Manager at Unity Water

This is my last SEQ Branch President Report as the time has come to pass the baton to another member. I am pleased to announce that, at the AGM in Cairns in October 2021, Jo O'Brien, Qld Program Manager for Tonkin Consulting Pty Ltd will be sworn in as the SEQ Branch President, the first female Branch President of the SEQ Branch, and the last Branch President position to be filled by one of our female colleagues. Congratulations, Jo!

It is with some sadness that I step down as SEQ Branch President and IPWEAQ Board member after five years of service to the branch and to the Board. My highlights have been:

1. Presenting at the SEQ and SWQ Branch conferences this year with the story of my life in Iraq, studying engineering then being sent to the front line during the war and finally emigrating to Australia to start a new life.
2. Presenting milestone gifts to our many loyal IPWEAQ members, notably Graham Preston, member for 35 years.
3. Attending Annual Conferences since 2016, meeting other members of our community and introducing new sponsors and partners.
4. Attending the Annual Conference in 2020 with my son, Joseph who will graduate this year from QUT.
5. Being a member of the IPWEAQ Board and in a position to endorse the decisions that would drive the organisation forward, for example the proposal from the CEO to move to new premises in Eagle Farm, a move that has elevated IPWEAQ to a new level ready for an even greater future.

Jo will be joined on the IPWEAQ Board by Sarah Hausler who was recently re-elected by members for one of two At-Large positions after two prior years in that position. And with incoming President, Angela Fry and ongoing NQ Branch President, Glenda Kirk, the ratio of men to women on the Board will continue at 50:50 which is quite an achievement for a sector that is otherwise underrepresented by women.

As I step aside, I am delighted to welcome new SEQ Branch committee members:

- Chris Borg, Senior Civil Engineer/Registered Certifier, Barker Ryan Stewart
- Thomas Wager (previously CQ Branch committee member), Principal Water and Wastewater Engineer, Redland City Council

There are three SEQ organisations nominated for the inaugural Employer of the Year awards: two for the Public Sector award (Department of Transport and Main Roads and Moreton Bay Regional Council) and Tonkin for the Private Sector award. We wish them the very best of luck.

There are quite a few CPD opportunities coming up in SEQ but be sure to register early as numbers are still restricted. You can make your compliance life easy by utilising the IPWEAQ Track My CPD portal. The RPEQ Coordinator will monitor your progress towards completion of your 150 CPD hours and keep you informed if you are missing some hours in compulsory areas or falling behind with your CPD hours generally.

COVID-19 reared its head once again forcing the second cancellation of the IPWEAQ art exhibition which will now be held 23 November (in conjunction with the second Public Works Professionals Orientation Intensive). We hope it will be third time lucky, and it is a great time also with the year closing in, for branch members to get together for a few (Christmas) social drinks, networking while also enjoying IPWEAQ's collection of Aboriginal art. Drinks and canapes are included but please be sure to register.

As this is my last report as the SEQ Branch President, I would like to express my thanks and appreciation to the SEQ Branch committee, Gleb Kolenbet (Vice President) in particular, for providing endless support over the years. I also would like to acknowledge our CEO, Leigh Cunningham, all Board members and staff for their hard work and genuine support of the organisation and to the profession. I wish you all the best and I trust the organisation will lead the industry and move upward and onward from strength to strength.

With the IPWEAQ Annual Conference now just a few weeks away, we have an opportunity to take stock of yet another busy year, regroup and finish the year on a high note after celebrating our sector's successes at the annual awards ceremony and dinner. Don't miss it!

Upcoming PD:

Brisbane
21-22 September 2021

Brisbane
26 October 2021

Brisbane
10 November 2021

Brisbane
19 October 2021

Brisbane
11 November 2021

Brisbane
4 November 2021

Brisbane
26-28 October 2021

Brisbane
9-11 November 2021

LGMA AWARDS FOR EXCELLENCE

Congratulations to the winners of the 2021 Local Government Awards for Excellence for their outstanding contribution and commitment to our Queensland communities.

- Sustainability - Bulloo Shire Council - Water Cooling Project
- Innovation - Ipswich City Council - Karalee Library Pod
- Teamwork - Ipswich City Council - Food Truck Friendly Council
- Collaboration - Logan City Council - QPS Safety Camera and District Tasking Partnership
- Community Shaping - Western Downs Regional Council - Shaping Stronger, More Resilient, Productive Communities
- Workplace Wellbeing - Cook Shire Council - Health and Safety Leadership and Culture Initiative
- Above and Beyond - Garry Mason - Douglas Shire Council
- Young Manager of the Year - **Rebecah Brosnan** - Central Highlands Regional Council

CELEBRATING INTERNATIONAL WOMEN IN ENGINEERING DAY

To celebrate International Women in Engineering Day, IPWEAQ hosted *Engineering a Pathway: A Lunch with Else Shepherd* to a capacity audience in their facilities at Eagle Farm on 23 June. The event celebrated Else as one of the first women to graduate with a degree in electrical engineering in Queensland.

Following the introduction by Angela Fry, Vice President IPWEAQ, Else took her audience on a journey of her personal and professional endeavours as a female engineer, across many continents. Born in South Africa to Danish parents, Else relocated to Brisbane with her family. Her father, a Professor of Physiology at The University of Queensland motivated her to pursue education, however, Else's mother and grandmother were her key inspirations, contributing to the strong female legacy Else has continued to share.

When asked about her choice to be an engineer at a time when such a decision was highly unusual, Else shared she had always been fascinated by bridges and satellites and had a profound interest in mathematics and physics. Despite the challenges along the course of her education and professional career, she continued with engineering because "I've realised in my life when people say you can't do that, what they really mean is they feel uncomfortable when you do something out of the norm". This was not a reason to curb her own plans. She advised those gathered to take advantage of any opportunity, as "you learn fast if you have to".

Else's ability to take on pioneering engineering roles across regional and metropolitan Queensland was assisted by her focus on developing a range of interests outside her working life, with a lifelong love and involvement in choirs, music education and hiking.

Even though Else feels the acceptance of women in non-conventional fields such as engineering has improved dramatically over time, she emphasised we are not quite there yet. In honour of her outstanding contribution to the state, Cross River Rail named one of their tunnel boring machines after Else. Apart from receiving

such an esteemed honour, the most rewarding aspect of being a female engineer for Else will be when we omit 'female' before the term engineer. Her stories give other women the courage to do what they want to do.

Following the presentation, Else and guests networked and enjoyed a roaming lunch throughout the Public Works Professionals facilities. We would like to thank our principal event sponsor, Board of Professional Engineers of Queensland, and Proterra Group for sponsoring the delegate gift packs.

IPWEAQ members and delegates can view Else's presentation at http://ow.ly/E07z50FngTR

INAUGURAL PUBLIC WORKS PROFESSIONALS ORIENTATION

Emerging professionals from Central, South West and South East Queensland attended IPWEAQ's facilities in Brisbane on 28 to 29 July for the inaugural Public Works Professionals Orientation. This two-day intensive provided an insight into the public works industry including big-picture context and resources for competently navigating the sector.

The Brisbane Airport Corporation team hosted an onsite tech tour of Brisbane's new runway, with delegates appreciating the extent of future planning that forms a critical element of public works. Dinner and refreshments offered delegates an opportunity to meet and network and connect with the presenters.

Attendees included representatives from local and federal government and the private sector, which enabled broad discussions on session topics. Special thanks to our guest speakers: Jacqui Hansen, IPWEA; Patrick O'Brien and Troy Webb, McCullough Robertson; Jimmy Scott, Queensland Reconstruction Authority; Michael Claydon, Queensland Audit Office; Tony Brett, Local Government Finance Professionals; Michael Whereat, Sunshine Coast Council; and the Brisbane Airport Corporation for their time and contribution to the success of this event.

Access to these presentations is available via the Knowledge Centre.

What a great few days at the IPWEAQ Public Works Professionals Orientation session last week! Having spent six years working business-to-business in the private sector before transitioning to a business-to-government role two years ago with Proterra Group, this orientation session provided great insight into the ins and outs of the public works sector.

Clare Ferguson, Technical Officer, Proterra Group

ADVENTURES IN ENGINEERING – UPDATE

Juliet Schaffer
Learning and Assessment Coordinator

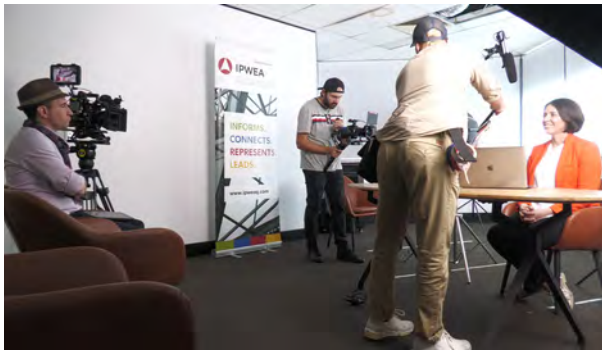
IPWEAQ's *Adventures in Engineering* storybooks drew national attention on Thursday 17 June 2021 when a film crew visited us at *Public Works Professionals*. Traveling across Queensland to film interviews with recipients of Partnership Grants from the National Careers Institute, Blackfish spent the morning with us interviewing me and Clarissa Campbell, one of the engineers featured in one of the stories.

The interviews provided an opportunity to explain the importance of the storybooks to our sector. With the lack of uptake of STEM related university courses despite considerable investment in this initiative, Clarissa talked about the opportunities and benefits of working in the public works sector. She emphasised the importance of young children, especially girls, having a better understanding of engineering and other STEM related occupations, to broaden their career options when older.

Our storybooks feature six engineers, each involved in various aspects of civil and public works engineering. IPWEAQ's focus, and a key message delivered by the stories, is how public works engineering promotes the safety, security and sustainability of our communities, and the rewards and privilege that comes from working in this sector.

Our thanks to Johnny Lopez, Director, and his Blackfisch crew for capturing the importance of our *Adventures in Engineering* storybooks, filmed at our facilities *Public Works Professionals*.

The video will soon be available on Social Media.



Juliet's interview in our own Video Studio.

Clarissa Campbell being interviewed in PWP's Engine Room.

Clarissa and Juliet in our reception area at PWP.

WORKING GROUPS UPDATE

Craig Moss
Director, Professional Services

The public works community is privileged to have many talented individuals who are willing to give generously of their time to help develop technical solutions that support those involved in the planning and provision of public works and services. While the past 18 months have proved challenging, our working groups continue to operate effectively to benefit the sector.

I would like to acknowledge the efforts and contribution of all members of the IPWEAQ working groups and the support of their employers.

NAMS-Q

The NAMS-Q Advisory Group is tasked with identifying industry needs and provides leadership that results in more informed decisions and better outcomes for our infrastructure, community assets and services. At the Asset Management Symposium held in May 2021, delegates had the opportunity to provide information that will form the basis of achieving this goal.

From the intelligence-gathering exercise, the advisory group was able to identify six common themes that reflect the challenges faced by our asset management community. The primary areas identified have been categorised into three main groups:

- Data
- Education
- Lifecycle costs and decision making

These are supported by three smaller but equally important areas:

- Innovation
- Resources
- Risk

Over the coming year, the advisory group will hold regular online discussion forums with interested parties to build greater collaboration and link the analysis of available information to strategic decision to help our sector mature and advance. IPWEAQ encourages anyone involved in asset management to participate and grow our community of practice.

Another initiative supported by the group is to investigate the need for formal nationally recognised asset management training for practitioners and paraprofessionals. PwC's Skills for Australia has been conducting significant industry consultation to gauge the need for learning pathways and design training product solutions for the sector. This process identified solid support to develop a Certificate IV in Civil Infrastructure Asset Management, with a skill set 'micro-credential' option for those seeking to complete higher-level training.

PwC's Skills for Australia has worked with industry to develop these training products which have undergone a staged review process. The project is on-track to be submitted to the Australian Industry and Skills Committee in October 2021, making these qualifications and skill sets available in 2022.

TTM Toolkit

The Temporary Traffic Management (TTM) Products Working Group has been developing a compliant toolkit to support the planning and design of safe, cost-effective and efficient temporary traffic management solutions for low-volume category 1 roads.

The TTM Toolkit will assist traffic management designers (TMD) prepare traffic management plans and guidance schemes for low-volume roads (up to 250 vpd). The Austroads Guide to Temporary Traffic Management states a *TMP **shall** be developed for every project to address the identified risks. The length and complexity of the TMP is proportionate to the level of risk associated with the works* (AGTTM Part 2, Section 2.2). Central to this toolkit is a risk-based decision-making process that will identify project and site-specific risks, using a traffic light system to help the TMD control the risk.

The working group has completed a draft version of the toolkit which is undergoing field trials. The group will be supported by a newly formed Technical Reference Committee through the validation of products against regulatory requirements and industry leading practice. The TTM Toolkit will be included in the suite of IPWEAQ technical products available through the Public Works Technical Subscription. Future work will investigate solutions for category 1 roads above 250 vpd.

IPWEAQ acknowledges the significant contribution of Toowoomba Regional Council and Townsville City Council representatives in the development of this product.

Standard Drawings

The Standard Drawings Working Group continues to update the existing drawings to meet the new standard format while also ensuring references to existing standards and drawings are current. The existing suites of drawings have been expanded and the numbering system changed to a 100-series. This enables a more logical collation of drawing types while allowing for additional drawings in the future. The new groupings will

likely be:

- PSD (Parks Standard Drawings)
- RSD (Roads Standard Drawings)
- DSD (Drainage Standard Drawings)
- ASD (Active Transport Standard Drawings)
- PCD (Pedestrian/Cycle Facility Standard Drawings)
- FBD (Fence/Barrier/Retaining Walls Standard Drawings)

One specific area being considered is the suitability of existing drainage drawings and their application to all types of pipes. The working group welcomes practical input on this topic from experienced practitioners.

CAD Standards and Survey Standards

The Survey Standards have been completed and the draft user guide is currently under review. The Department of Transport and Main Roads has recently expressed interest in these standards and discussions have commenced about the alignment of standards sector-wide.

The CAD Standards have been finalised and the draft user guide is nearly complete. While some councils represented in the working group have already adopted the new standards, the CAD Standards and Survey Standards will be released at the same time.

Lower Order Road Design Guidelines

The *Lower Order Road Design Guidelines* has been used across Queensland since its release in 2016. In 2020, IPWEAQ requested feedback from practitioners regarding issues, conflicts and potential improvements on the current version. A Review Group has been formed to consider the feedback received and update the guide to ensure the new version reflects best practice and can be applied appropriately and consistently across the sector.

This group will also investigate the development of an app that links the risk matrices to the evaluating scoring system. Functionality would involve taking geo-coded photos onsite that would be included in a formal report documenting the decision-making process. Progress updates will be provided to industry on a regular basis.

Street Design Manual

The *Street Design Manual: Walkable Neighbourhoods* was released in September 2020. To ensure the Manual continues to document leading practices, we are seeking feedback from users. If you would like to contribute your knowledge and experience, please complete the form at the bottom of the Street Design Manual webpage and return to Jodie Oldfield by 17 December.

QLDWATER REPORT

Dave Cameron
*CEO, **qldwater***

Well, the upside of lockdowns includes a chance to catch up and write your newsletter articles (while you're hoping that it doesn't last so long that it impacts your major annual event, in this case our Annual Forum hosted by Redland City). We were fortunate to hold our Charters Towers event in July and attend the AWA NQ event a week later, and I had the opportunity to get out for a week in June to visit a number of members between Brisbane and Rockhampton.

Let's assume everything has gone well and as you read this, you're about to join us for a bit of automated metering, touring, asset management and strategic planning. With the latter we hope to emulate a process trialled at our 2019 event which takes some interesting provocations around the future of the sector with some inspiring topic leaders to promote warts and all discussion and generation of good ideas. It's been great to see people embrace these networking opportunities, and we've been relatively lucky to be able to host some while supporting some others run by our collaborating associations.

Since the last newsletter, our focus activities have included:

- QWRAP – delivery of projects, taking on coordination for the Wide Bay Burnett group of councils, working with program partners in LGAQ and the Department of Regional Development, Manufacturing and Water to build the case for renewal of the grant;
- SWEAP – ongoing work with the Department of Environment and Science and other regulators on a range of projects including Model Conditions, End of Waste Codes, Recycled Water, commencement of planning for a "Green" Card training platform to complement existing Aqua and Brown card courses, and a number of other activities for the ***qldwater*** Consortium for Research and Advocacy on Contaminants of Emerging Concern (e.g. CRC CARE);
- SWIM – obviously annual performance reporting at this time of year but also the first major development addition to SWIM software in some time with our dashboards module;
- Skills – plenty of "Fundamentals" webinars and other course coordination, but also the development of our biennial workforce snapshot report key indicators and advocacy including a briefing with the Minister for Employment, Small Business and Training;
- Other advocacy including meeting the Minister for Regional Development, Manufacturing and Water to promote key "roadmap" messages;
- A large number of emerging technical/ policy issues including pursuing an exemption from WHSQ to allow high pressure jetting of AC sewer mains,
- Facilitating new industry collaborations including a Drinking Water Advisory Panel, potentially supporting the Interlab group of LG-owned NATA accredited labs, strategy session for the SEQ Joint Operations Committee and continuing national representation for skilling, through WSAA reference groups and joint advocacy, NSW and Vic water directorates… there's plenty on.

Thanks to all our members who've weathered the extra bureaucracy associated with our move to direct billing – hopefully we will soon be able to report another 100% membership result.

There's not a lot to report yet in the national policy space as the extra lockdowns have slowed the release of key industry reports and position statements. We expect that there will be more information available to present at the Annual Forum and hopefully a few more state-based initiatives as well. The recent announcement of a Building Our Regions round devoted to water and sewerage is a good indicator of the increasing profile of our sector.

Finally, I think we can confirm our regional events for 2022 as Port Douglas, Yeppoon, and Gympie. If we are able to run the Water Connections Tour week, we hope to focus on FNQ councils. We are still talking to the NSW Water Directorate about a joint event close to the border, and you can expect the skills forum and annual forum around March and September again.

Operator Registration

There have been a number of amendments made to the national Framework for Operator Certification – now registration. These are currently out for stakeholder consultation and are expected to be finalised very soon.

These mostly reflect name

changes:

- Water Industry Operator Registration Framework 2021;
- Water Industry Operator Registration Taskforce;
- Registering Body in lieu of Certifying Body; and importantly
- Registered Professional Operator to replace Certified Operator.

Grandfathering provisions apply to all Operators "Certified" under former Frameworks – those staff will automatically be recognised as "Registered Professional Operators" under the conditions of this Framework provided conditions of previous Framework versions including timeframes remain met.

The change has been driven by a desire to remove confusion with the term "Certification" as it relates to national VET terminology, creating a clear distinction between a person who may be a Qualified Operator (holding a VET Certificate, or Certification) and a Registered Professional Operator who has been through the independent review process in accordance with the Framework and committed to CPD and other conditions of maintaining "Registration."

Other amendments amend the listings of units of competency to reflect updates to the National Water Training Package (NWP).

If you are interested as an individual or organisation in participating in the scheme, contact WIOA (info@wioa.org.au) or visit www.wioa.org.au. Any questions about the WIORT or the Registration Framework should be directed to Dave Cameron (dcameron@qldwater.com.au).

SNAPSHOT OF THE QUEENSLAND URBAN WATER INDUSTRY 2020

qldwater waterskills PARTNERSHIP

Industry Profile

- **66** local councils outside of SEQ
- **3** local councils in SEQ
- **2** statutory authorities managing water and sewerage for **8** SEQ local councils
- **2** state owned bulk water suppliers
- **2** state owned statutory authorities

75 water service providers in QLD*

370 water supply schemes

265 sewerage schemes

6686 people employed in the QLD water industry

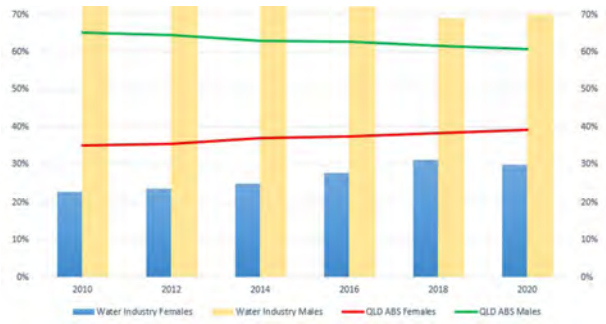
**75 suppliers supporting drinking water, sewerage and recycled water services for Queensland communities, 180 total registered suppliers.*

Age Profile

- **35%** of the workforce is aged **over 50** years
- **11%** of the workforce is aged **under 30** years

Total Workforce by Job Role

Gender Profile Trends



In 2020, women form **30%** of the total water industry workforce.

Download the full report at www.qldwater.com.au /Skills_Workforce_Resources_and_Publications

Industry Skills Shortages

Survey participants were asked to indicate whether they had any shortages in key job roles and if they were expecting shortages to occur in the next three years. There are concerns for the following job roles:

Civil Construction and Maintenance Workers:
Potential shortage due to increased civil construction and maintenance activity through COVID stimulus spending.

Plumbing Trades:
Some regions reported advertising for plumbers without success, leading to greater recruitment of apprentices instead. In some regions, there are better salaries offered for plumbing roles by the resources sector.

Engineering Professionals and Paraprofessionals:
In some regions, competition with the resources sector makes it difficult to attract engineers to roles in local councils and it can be challenging to recruit the specific water and sewerage skills needed.

Treatment Plant Supervisors:
This job role has a significant ageing profile with a large cohort approaching retirement. A number of organisations have active programs to attempt to better address workforce planning.

Treatment Plant Operators:
There is a general recognition that it is increasingly difficult to source/attract experienced operators with current water industry qualifications, leaving organisations the option of recruiting and training trainees, or in extreme cases outsourcing roles.

WHY IS IT SO DIFFICULT FOR ORGANISATIONS TO IMPROVE GENDER DIVERSITY?

Jessica Kahl

Even with present day evidence substantiating how a gender-diverse workforce enables greater innovation, productivity and profitability, progress has been slow (Hunt, Dixon-Fyle, Prince, & Dolan, 2020). So, what makes diversity so hard to achieve in the workplace despite extensive policies and motivated leadership?

According to a classic economics lesson, "the bad economist sees only what immediately strikes the eye; the good economist also looks beyond" (Hazlitt, 2010, p. 12). This same advice applies when economic theories appear to contradict conventional wisdom. If gender diversity in the workforce is to be wholly addressed, we need to look beyond current corporate efforts and economic rationale.

There are now more college-educated women than men in the workforce than ever before (WGEA, 2021). Yet, despite women obtaining more bachelor's degrees than men, major hurdles to close the gender pay gap still exist (Hughes, 2021). A major contributor to the pay gap is labour market wage differentials, as average remuneration in female-dominated organisations continues to remain lower than those in male-dominated organisations (WGEA, 2019). Unequal pay is also driven by explicit and subtle effects of gender bias in the workplace, which significantly impacts the proportion of women in male-dominated professions (WGEA, 2019). While a reduction in occupational segregation can perhaps lessen the gap for fields such as engineering, where the earning potential is significantly higher than most, women's rationalisation for remaining in lower-paying female-dominated fields may hold true (Mace, 2011).

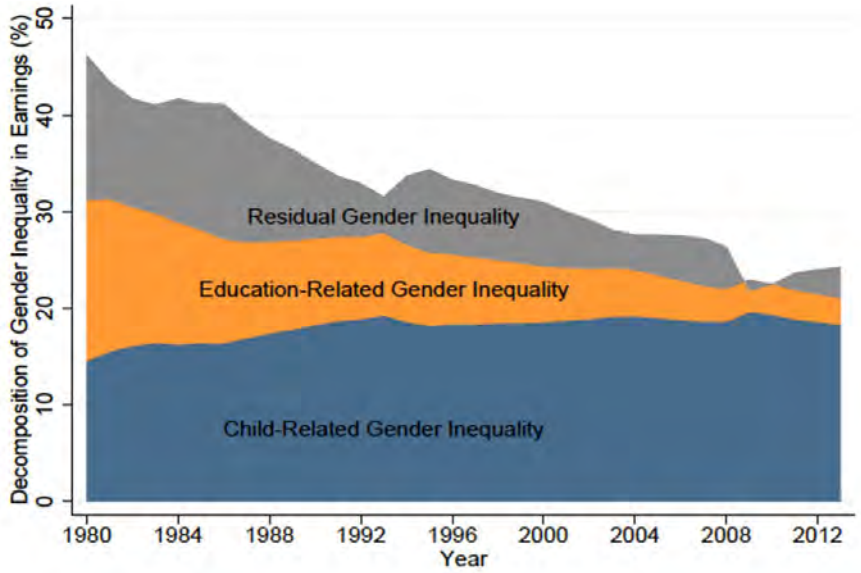


Figure 1 Decomposition of the aggregate gender gap *(Kleven, Landais, & Søgaard, 2018).*

With conventional wisdom pointing towards stigma and discrimination as root causes, rational economics suggests there is more credible evidence for why organisations are not leveraging diversity as a competitive advantage (Mace, 2011).

Basic economics teaches us that participants behave rationally by weighing up the costs and benefits of actions to choose the option which maximises utility, satisfaction, and budget. Assuming women are rational economic participants with full knowledge of opportunity costs, the incremental improvement we're seeing suggests there's more to women's progress than meets the eye when looking at how organisations support equality (Gregory & Duncan, 2015).

Strong evidence suggests that inequality of wages outcomes results from disparities in maternity leave, and not enough leave being available (Kliff, 2018). According to the Workplace Gender Equality Agency, the availability of paid parental leave and the equal division of unpaid care improves work-life balance, gender equality and women's workforce participation

(Workplace Gender Equality Agency, 2018). A possible cause of Australia's gender gap can also be linked to Australia offering the least funded Government Paid Parental Leave Scheme amongst OECD countries at just 7.6 weeks full-time equivalent pay for women. Bias in the dominant caring role still exists with partners only entitled to a two-week minimum wage, meaning there is little or no opportunity for shared primary parental leave (Workplace Gender Equality Agency, 2018).

As a result of women still bearing the brunt of childcare, they are more likely to seek employment which offers flexibility, and sacrifice earnings or career progression for the benefit of being available for caregiving (Elsesser, 2019). The cumulative effect in women's earnings compared to men's is shown in Figure 2 and 3.

There are two core challenges for organisations to address for women to rationalise opportunity cost. First, workplaces need to offer greater flexibility so both male and female parents are not deterred from pursuing roles which compromise home responsibilities (WGEA, 2019; Elsesser, 2019). Secondly, to accelerate gender equality for all, men need to become equal partners at home. With schools and childcare centres closed during COVID-19, equal, shared parenting increased from 28 to 37% (Hand, Baxter, Carroll, & Budinski, 2020).

To promote and normalise gender equality, there is a need for greater political will within the Australian Government to act quickly on major reforms which support women's economic development. Workplace gender balances and the doubling of Australia's GDP growth by 2025 can be achieved if a greater gender balance was reflected in politics (Morse, 2020).

The old supply and demand argument of qualified women holds less weight considering

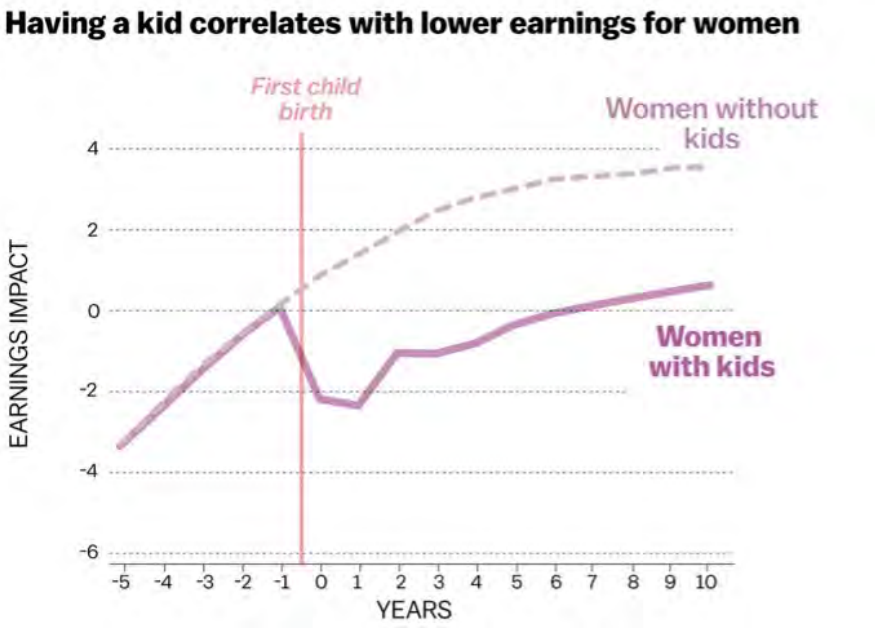


Figure 2 Earnings impact on women with and without kids *(Kliff, 2018).*

Figure 3 Earnings impact on men with and without kids *(Kliff, 2018).*

opportunity costs of women's income disparity, maternity leave, shared care and flexible working arrangements (OECD, 2020; Parents at Work, 2021). With solid evidence substantiating the economic payoff, disregarding the gender gap phrase in economics rationale can soon be achieved by promoting gender equality and diversity both at home and in the workplace.

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NEW IPWEAQ TEAM MEMBERS

Jodie Oldfield
– Project Coordinator

Thank you to all the IPWEAQ staff for welcoming me. I am very glad to be part of the team. When I am not working, I enjoy watching Netflix and Stan and finding a series that I can binge watch. I enjoy watching sport so these past couple of weeks have been very exciting watching the Olympics and seeing new sports in a competitive way. The BMX and the skateboarding were a blast to watch although quite scary to see what tricks they can do on a bike and board. I relish spending time with family and friends and catching up for a drink and a meal which at times has been challenging with lockdowns and restrictions.

Melissa Bradley
– Member and Services Coordinator

Known to be a mixed bag of lollies kind of person, as I do welcome (nearly) any new experience, habit and season of life.

Born and bred in Sydney, raised by a family of Kiwis (I'm the only Aussie), I moved to Brisbane in 2008. I'll never move back!

A minimal, simplicity driven individual who is also a mother to a 7-year old son, half marathon runner, a wannabe personal growth writer, wine and coffee lover. In my free time, you'll find me humming away on a hike, yelling at the referee watching any kind of football or either around or in the water.

If there was a Guinness World Record for losing the most at 'scissors, paper, rock', my name would be right next to it.

James Price
– Media Coordinator

I am a recent Business and Media & Communications graduate. I love capturing exciting moments on film and editing those moments into interesting and fun to watch videos. Regardless of what I'm filming, it's always enjoyable being behind a video camera. When I am at home, I enjoy spending time with my family, watching YouTube and playing games.

I enjoy being active and spend a lot of time playing volleyball, tennis and being at the gym. Come next year, I hope to be playing for a Brisbane club volleyball team on a more competitive level.

Savannah Roberts
- Events Coordinator

Part Brisbanite, part Goldie Girl, I grew up on the Gold Coast riding horses and playing touch footy. Later I moved to Brisbane to complete my Bachelor's degree in Business majoring in Events Management at UQ. I have been an event professional for many different industries for the past 10 years across the Sunshine Coast, Brisbane and the Gold Coast but eventually returning to Brisbane for love!

My partner and I recently got engaged and settled on our first block of land in Tingalpa in June this year. I am becoming very familiar with the building process and seeking building approvals. As I am currently living with my in-laws, I would like the process to move a little quicker.

I also have a fur baby – Charlie. Feel free to check out his Insta page @awesomelifeofcharles for your daily dose of cuteness!

CONGRATULATIONS, VARUNI!

Congratulations to IPWEAQ Marketing Coordinator, Varuni Chandola graduating with a Master of Communication (Strategic Communication). Since graduation ceremonies have been cancelled indefinitely, the IPWEAQ team hosted a morning tea to celebrate this achievement with Varuni.

Varuni is excited about applying her learnings and developing her skills at IPWEAQ.

MILESTONES AT THE WATER DIRECTORATE!

Congratulations Dr Rob Fearon and Dr David Schletinga, celebrating 15 years and 10 years service to ***qldwater*** and the Queensland urban water and sewerage industry.

Rob Now

Then

David Now

Then

Rob commenced with ***qldwater*** in 2006 as CEO before moving into his current position as Director, Innovation Partnerships. His current priority is the Queensland Water Regional Alliances Program (QWRAP) as well as advocacy work. In 2018, Rob received the Australian Water Association Regional Service Award in recognition of his pivotal role with QWRAP and promoting regional collaboration.

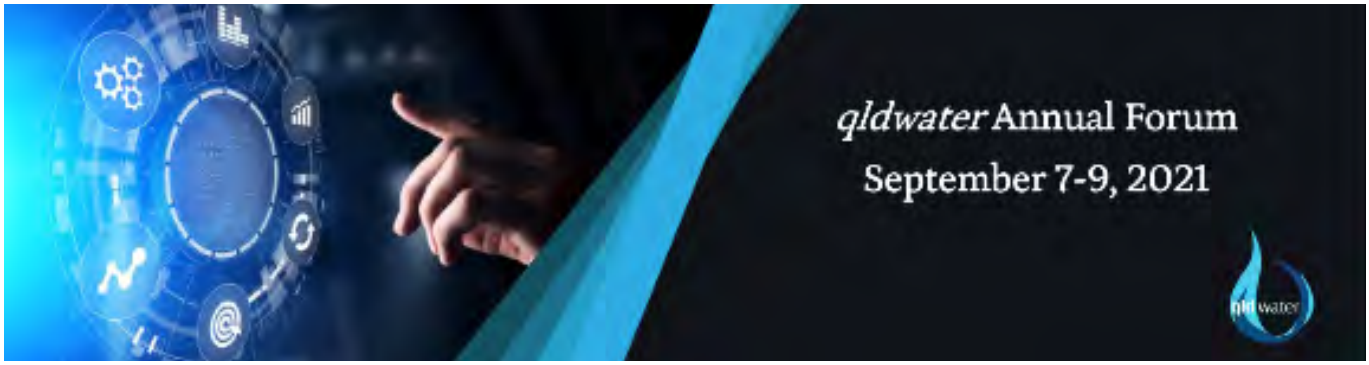
Rob's enthusiasm for developing and advocating the industry is well-known and demonstrated by his support for initiatives which ultimately improve the capacity of our members. His strategic foresight, technical understanding, and policy and government experience are core to the success of ***qldwater***.

Rob is also known for his interesting presentations, for example, A Brief History of Urine. But as a result of his efforts, the industry has witnessed tangible improvements to drinking water for communities and environmental health.

David commenced with ***qldwater*** in 2011 and is responsible for managing the SWIM program. Since joining us 10 years ago, David has managed the growth and development of both SWIM and swimlocal, with 100% of members now using SWIM for reporting purposes and 47 subscribing to swimlocal.

David has produced nine Benchmarking Reports and travelled the width and breadth of Queensland to support members in their compliance requirements each year. He has an incredible work ethic and has been at the core of reducing the reporting burden on members, including influencing various regulators to improve consistency. He brings vast knowledge and value to the industry and is a vital asset.

Congratulations, Drs Rob and David!



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- CQ Branch Conference, Gladstone
- NQ Branch Conference, Mackay
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- Symposium (date and topic to be finalised)
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PRINCIPAL $12,800

EXCLUSIVE

Exclusive offerings and priority across all our partner services for our Principal Partners.

All entitlements in Enterprise plus the following exclusive Principal Partner benefits:

- A double trade booth at the Annual Conference (value $9,000).
- Branding/sponsorship of an excellence award and presentation of the award on stage (value $1,200).
- A Public Works TV episode (value $1,000).
- Guaranteed booths at all branch conferences.
- A VIP table in a prime position at the 2021 excellence awards gala dinner.
- Full page advertorial or two 1/2 page advertorials in any issue of Engineering for Public Works (value up to $1,560).
- A branded community in our globally-recognised Knowledge Centre. Upload videos, product guides, media releases, photos and other promotional materials (value $1,800).
- 20% discount on venue hire at our facilities in Eagle Farm.

Total value $22,000 plus

Note: all prices plus GST

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Contact Senior Manager, Events & Marketing
Monica.Robertson@ipweaq.com 07 3632 6802

www.ipweaq.com

PRINCIPAL PARTNERS

Queensland Government

reece civil

RCPA THE AUSTRALIAN PIPE COMPANY

WAGNERS

ENTERPRISE PARTNERS

AUSTRALIAN CONCRETE MATS

BORAL

DANLEY

Delnorth

Fulton Hogan

HIG HARRISON INFRASTRUCTURE GROUP

Humes

HUESKER Ideen. Ingenieure. Innovationen.

INGAL CIVIL PRODUCTS A valmont COMPANY

Interflow

Leading Roles People Performance Partners

LGIA super Let's Grow

localbuy

McBERNS INNOVATIVE SOLUTIONS

Lawyers McCullough Robertson

ORION

Pavement Management Services

peak services

PelicanCorp

PROTERRA GROUP

saferoads

SHEPHERD asset management solutions

spelstormwater joy in water

S.P.A. STABILISED PAVEMENTS OF AUSTRALIA STRENGTH • FLEXIBILITY

SUPERSEALING

Trimble

solutions WATER MODELLING

SUBSCRIBERS

PUBLIC WORKS TECHNICAL SUBSCRIPTION

SUBSCRIBERS

PUBLIC WORKS TECHNICAL SUBSCRIPTION

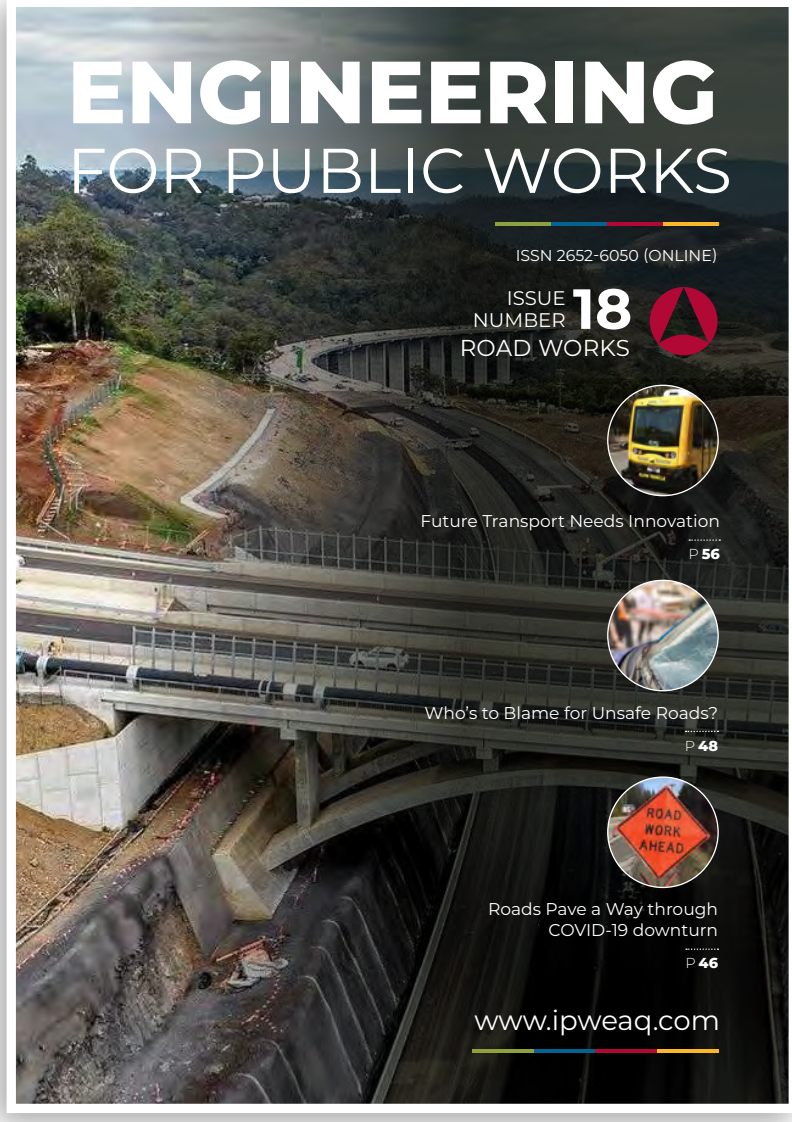
Queensland

IPWEA

INSTITUTE OF PUBLIC WORKS
ENGINEERING AUSTRALASIA

ENGINEERING FOR PUBLIC WORKS

MEDIA KIT 2021



IPWEAQ is the peak body representing those actively involved in the public works sector in Queensland.

Our purpose is to enhance the quality of life for all Queensland communities by advancing the skills, knowledge and resources available to those involved in the planning and provision of public works and services.

Our Value Propositions

1. Members enjoy a strong sense of community through our proactive branch network.
2. Our Knowledge Centre is an essential resource for anyone involved in public works in Queensland.
3. Our quarterly e-journal is valued for its technical and industry relevant content.
4. IPWEAQ technical products are widely-adopted and are leading edge.
5. IPWEAQ conferences are must-attend events.
6. IPWEAQ's comprehensive professional development program is innovative and exceeds the needs of members and industry.
7. Our water directorate *(qldwater)* strengths the urban water industry to maintain and improve the safety, health, wellbeing and sustainability of Queensland communities.
8. An IPWEAQ excellence award is highly sought after.
9. IPWEAQ upholds professional standards as an RPEQ assessor.
10. IPWEAQ influences government and industry.

INFORMS. CONNECTS.
REPRESENTS. LEADS.

PUBLICATION DATES

Four issues per year:
- March
- June
- September
- December (conference feature)

Special editions:
- Excellence Awards commemorative book
- Annual Conference handbook (November)

Artwork and editorial due 15th day of prior month eg 15 February for March issue.

WHY ADVERTISE IN EPW?

Your connection to thousands of professionals delivering projects for state and local government across Queensland.

Engineering for Public Works
Articles, reports, features and news on the public works sector in Queensland with a focus on the engineering of our communities.

Distribution:
Circulated quarterly to over 6,000 contacts across the sector and around the world.

Performance:
Over 150,000 digital impressions, more than 22,000 Reads and 600 Clicks.

Readers:
Engineers, technicians, surveyors, financial professionals, planners, designers, legislators, councillors and others involved in the delivery of public works and services.

EPW reaches more than 6,000 members, industry partners and local government decision-makers.

Top 5 countries reading EPW:

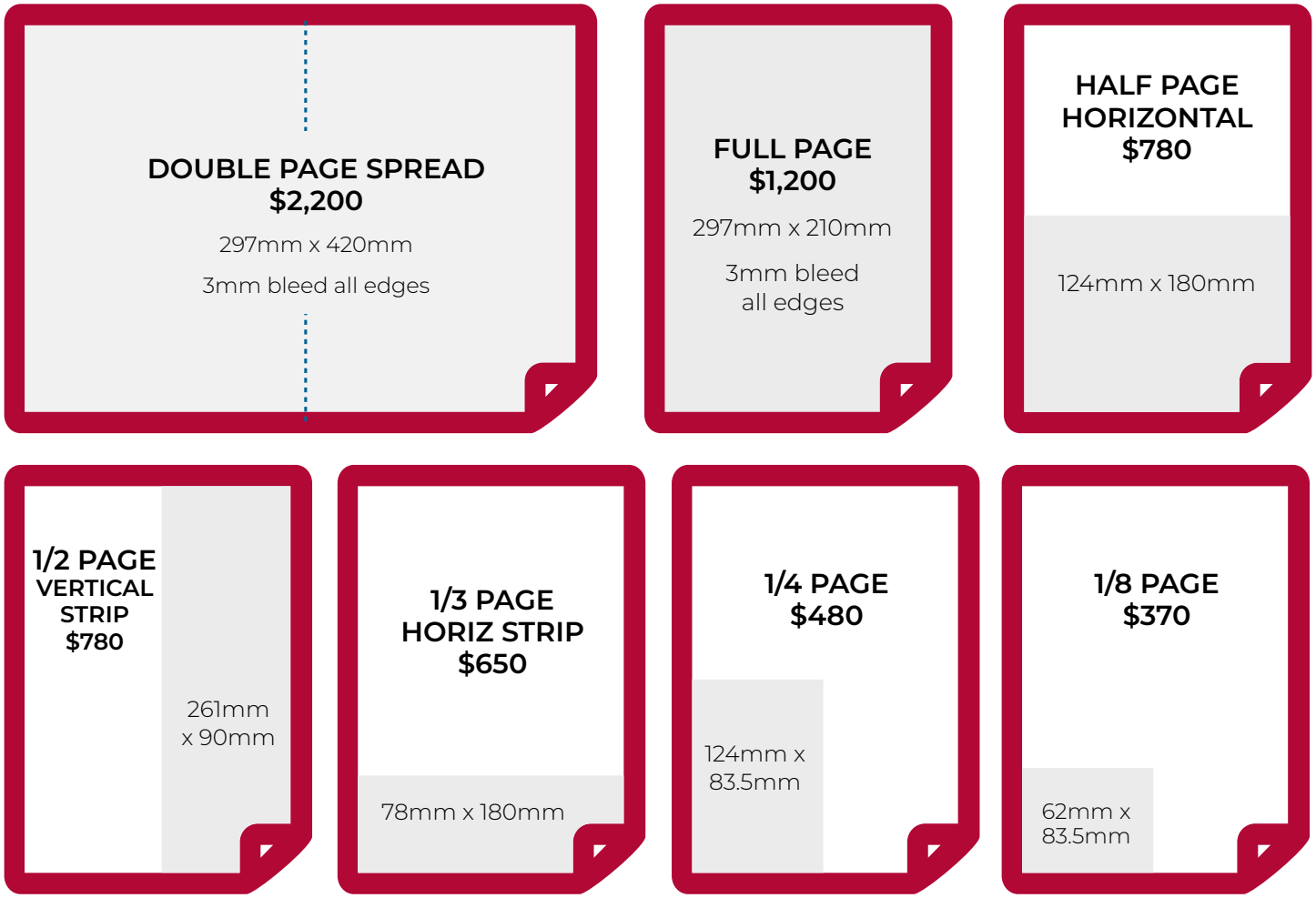
Australia	USA	New Zealand	UK	India
20,110	1,184	186	109	23

ADVERTISING RATES AND SPECIFICATIONS

- Prices do not include artwork design
- Prices are exclusive of GST
- Artwork must be supplied in high-resolution print ready format - PDF preferred
- No crop or bleed marks (except for full and double pages)
- Fonts must be embedded and graphics linked
- Files supplied as CMYK colour space
- Images must be at least 300dpi at the correct size
- Large files can be sent via Dropbox

Front Cover - $3,490 per issue

- Front cover image
- Full page display ad
- Double page spread with 800 word feature article in first ten pages
- Circulated to up to 500 contacts provided by you



Queensland IPWEA
INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALASIA

Monica Robertson
Senior Manager, Events & Marketing

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INFORMS. CONNECTS. REPRESENTS. LEADS.

Professional Development

- Native Title and Cultural Heritage
- Urban Planning
- Traffic Engineering
- Construction Practices
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- Stormwater Drainage
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