



ACAA – Technical Paper

# Echuca Moama Bridge Project Stage 3

For a community that stood together,  
there's now a bridge to connect them all.

**MCCONNELL  
DOWELL**  
CREATIVE CONSTRUCTION™

 **MAJOR ROAD  
PROJECTS**  
VICTORIA



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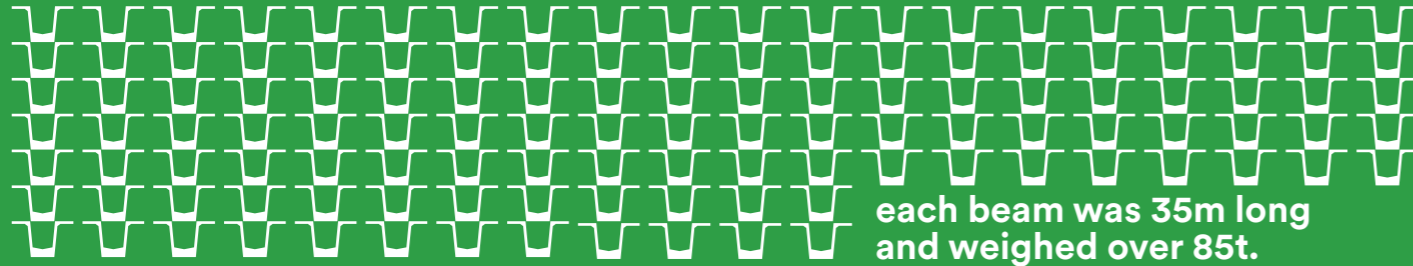


# Project Snapshot



The eight-span, 300m Yakoia Bridge over the Campaspe River was completed in 10 months and features a separate walking and cycling bridge.

**125** Super-Tees installed for bridge approaches



**2x** new flood relief bridges.



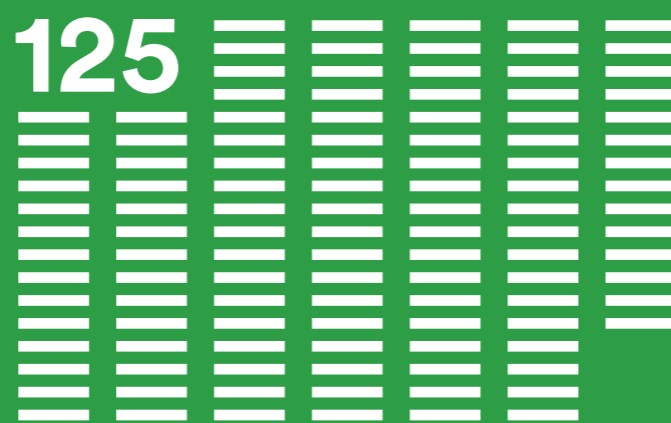
Noise walls and safety barriers installed along alignment.



**400,000** tonnes of soil



seamlessly transported into the worksite via a carefully coordinated program of delivery with continual community engagement – through busy precincts.



precast Super-Tee beams successfully transported through a popular tourist destination, featuring boutique accommodation, historic residential areas and busy school precincts.

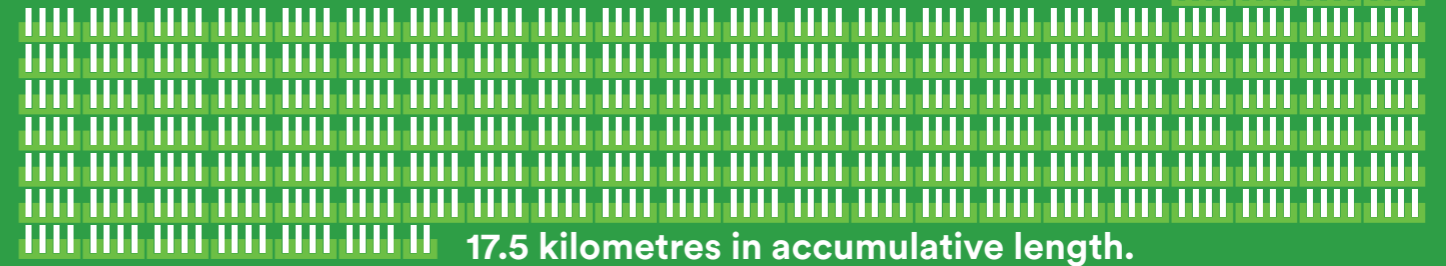


Positive outcome working in a high-profile sensitive cultural heritage area, due to a high level of project engagement with local Aboriginal Elders.

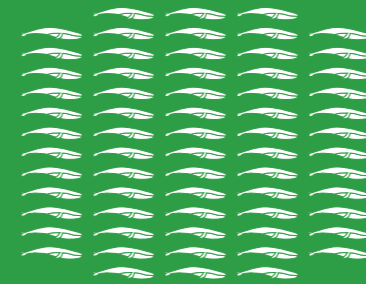


A new 4.9km scenic walking and cycling path along the route and over the new bridges.

**570** concrete piles driven for foundations



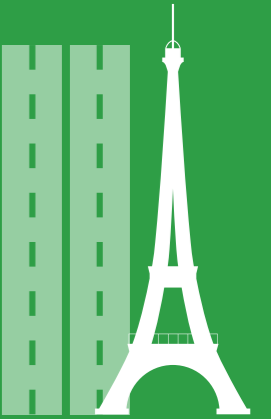
**10,000** tonnes of asphalt laid – approximately the weight of...



66 blue whales (150 tonnes).

OR

the Eiffel Tower (10,100 tonnes).



**622m** of elevated structures including a balanced cantilever box girder cast in-situ for the 115m main span Murray River crossing.



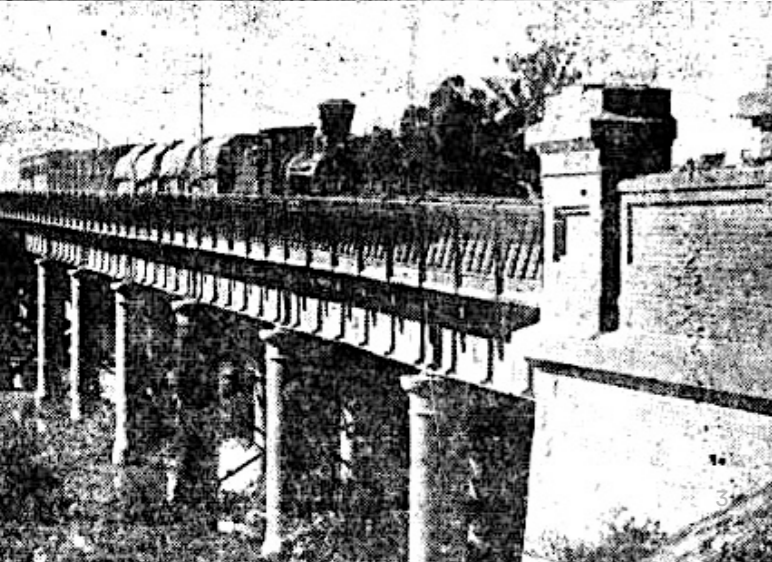
Highly successful and inclusive community engagement

in tourist towns across two local government areas and two states.



High achievements in area of social procurement

including Aboriginal employment, engagement with Aboriginal-Owned Businesses and local disability services.



The existing bridge across the Murray River opened in 1878 (noting the first patent for a ‘car’ was not submitted until 1886) and operated as a combined road and rail bridge until a separate rail bridge opened in 1989. For 144 years, the two towns were connected by this single river crossing, with the nearest alternative bridge in Barmah involving a round trip of 101km. The old bridge’s narrow structure has struggled for years to cater for the long-term needs of the region and was unable to sufficiently cater for the high volume of traffic during peak tourism seasons.

has, therefore, been incurred in using the former, the opening being 112 feet.  
The foundations were not ascertained before designing the piers.  
The design from which the bridge was built, so far as the traffic over it is concerned, is such as, in our opinion, will meet the requirements of the district for some time—indeed, until the traffic is increased far beyond anything that can at present be anticipated. No doubt a combined railway and road traffic is objectionable where it can be avoided, yet there are a number of cases where they are combined with a large traffic, without much complaint of inconvenience. A select committee of the House of Commons, appointed in the session of 1877, and presided over by Mr. Arthur Peel, to consider and report on the subject of street tramways, have reported that there are no objections to tramways worked by steam in streets where there is a very much larger traffic than will pass over the Echuca bridge, and a bill has passed the House of Commons containing such a report. The provision made in the bridge for the flood waters is, in our opinion, insufficient. The sectional area of the bridge, including flood openings, is 25,178 superficial feet. The sectional area of the flood in 1870 was

*“The design from which the bridge was built, so far as the traffic over it is concerned, is such as, in our opinion, will meet the requirements of the district for some time — indeed, until the traffic is increased far beyond anything that can at present be anticipated.”<sup>1</sup>*

Since 1965, the twin towns have publicly campaigned for a second bridge, and the project was the subject of decades of on-again-off-again funding commitments from various levels of government and a number of community campaigns. In 2012, the community showed its greatest frustration with the bridge process, with 2,000 people – tradesmen, families, office workers, community groups and the elderly – marching across the bridge, while boats also displaying the slogan ‘build the bloody bridge’ joined the march from the water.

The Australian, Victorian and NSW governments committed \$323.7 million to build the bridge. After nearly 60 years of vigorous community campaigning, construction on Stage 1 of the Echuca-Moama Bridge Project started in late 2017.

- 1878 'THE ECHUCA—MOAMA BRIDGE,' The Sydney Morning Herald (NSW : 1842 - 1954), 28 September, p. 8., accessed 06 Feb 2023, nla.gov.au/nla.news-article13416500
- Photo of a drawing depicting the construction of the iron Murray Bridge Victorian Collections, victoriancollections.net.au/items/576b344fd0cdd11fd4911cda accessed 6 Feb 2023
- Photo of Murray Bridge. Riverine Herald (Echuca, Vic. : Moama, NSW: 1869 - 1954; 1998 - 2002), Saturday 6 November 1948, historicalaustraliantowns.blogspot.com/2018/03/echuca.html, accessed 6 Feb 2023
- Photo of iron bridge, Ministry of Tourism, 1971 victoriancollections.net.au/items/59c2fbc821ea670ecc5af102, accessed 6 Feb 2023
- Print of photo, original photo c.1910 victoriancollections.net.au/items/5938aec7d0cdd41fdc5f2cce, accessed 6 February 2023

# Project Summary

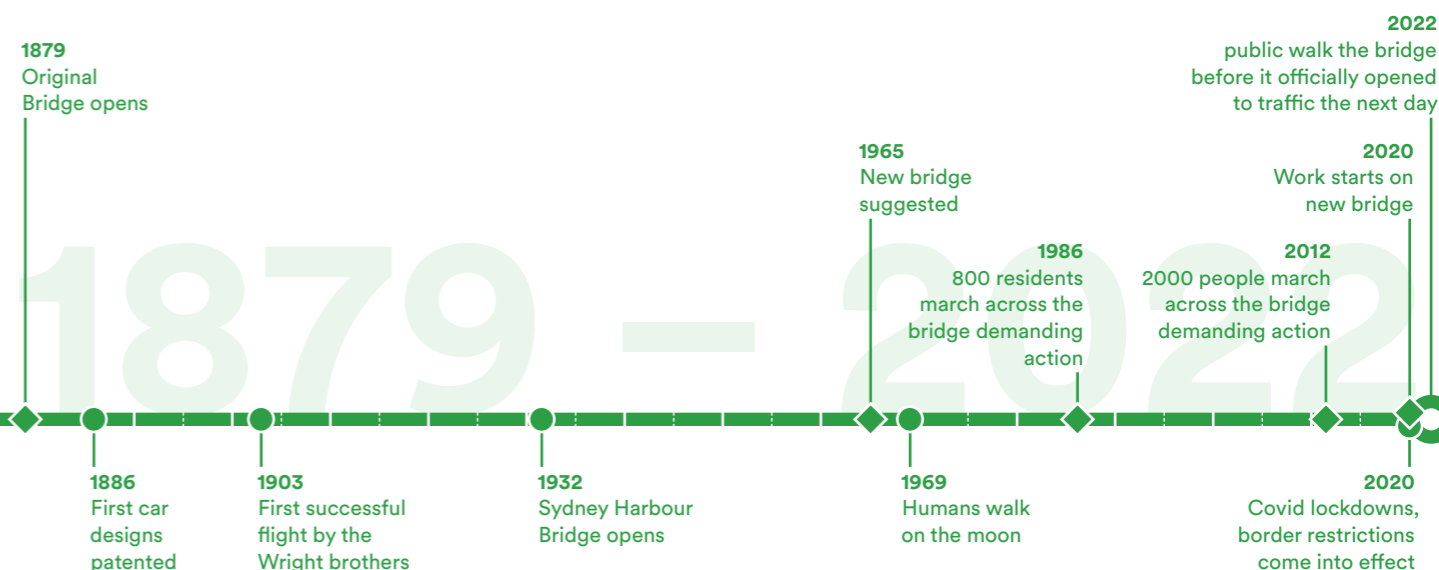
**The Echuca-Moama Bridge Project was the largest infrastructure project in northern Victoria. Stage 3 of the project featured the construction of two new bridges over the Campaspe and Murray rivers. This means locals and visitors to the region can now enjoy safer and easier travel between Echuca and Moama. The project was jointly funded by the Australian, Victorian and New South Wales governments.**

For more than 140 years the communities of Echuca (Victoria) and Moama (NSW) have only ever had a two lane bridge connecting the towns across the Murray River. The new 5km section of road that connects the Murray Valley Highway in Echuca with the Cobb Highway in Moama has improved access for high productivity freight vehicles, while local businesses, residents and visitors

to Echuca-Moama enjoy a greater sense of liveability and connectedness. The key feature of the project is the 307m long balanced cantilever bridge over the Murray River with a main span of 115m. Designed to integrate with the surrounding environment, the ‘bridge through the treetops’ design concept has been named the Dhungala Bridge which is the local Yorta Yorta Nation name for the Murray River. The riverine environment is a motif embedded in the balustrades.

The new Dhungala Bridge is the third longest in Victoria and one of few in Australia to be built using the balanced cantilever method, which required careful coordination between construction and engineering teams.

Stage 3 was delivered by Major Road Projects Victoria (MRPV), in partnership with McConnell Dowell, designers GHD, Douglas Partners, Tract, and CM+, and international bridge specialists Tony Gee and VSL.



# Project Scope

An innovative bridge solution saw McConnell Dowell secure the design and delivery of this important new river crossing for the Victorian and New South Wales state governments.

Completed ahead of schedule, construction of this vital second crossing between Echuca and Moama included new bridges over the Murray and Campaspe rivers, and two new flood relief bridges.

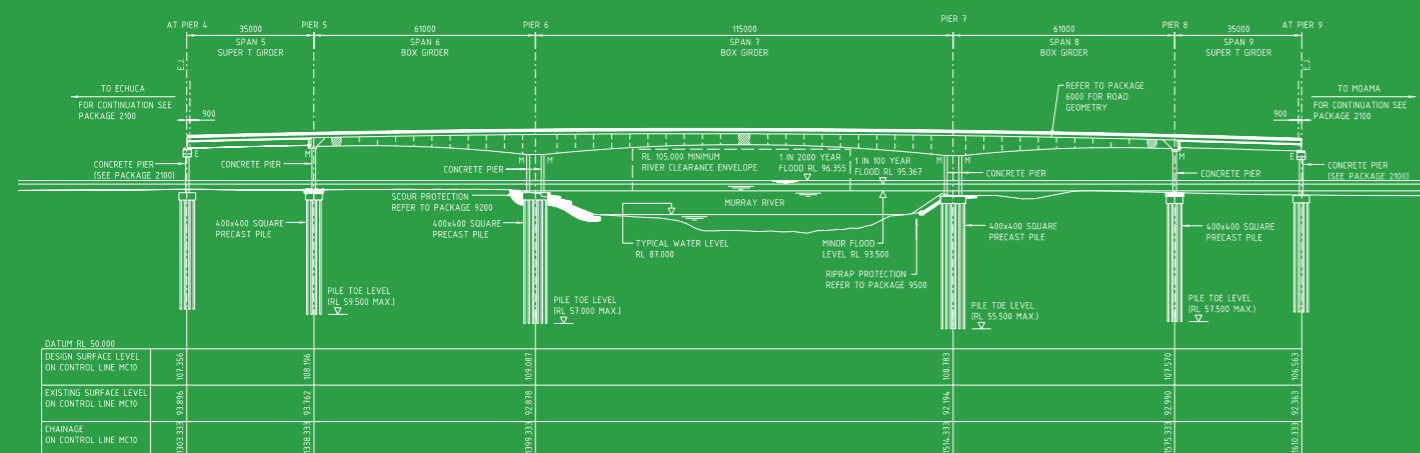
The new bridges have a single lane in each direction, meeting projected traffic demands for at least the next 30 years. The design allows for additional lanes to be added in the future. The project also included a new 4.9 km scenic walking and cycling path..

To secure the project McConnell Dowell challenged the design (in a number of places) and developed an alternate main bridge solution, which included a number of enhancements to streamline construction and reduce costs, including:

- A cantilevered 115m main span box-girder bridge solution that avoided temporary or permanent marine-based structures. This solution also reduces maintenance, minimising the need to access the waterway and waterflows
- Reduced cantilever back span lengths to maximise the use of a less complex and hence time / cost effective Super-Tee bridge form

- The Murray River bridge cross-section and vertical alignment was re-engineered to maximise longitudinal fall - optimising drainage performance thereby reducing drainage infrastructure
- The gradient of the road was increased while maintaining river span clearances. This enabled the removal of redundant clearances at abutments and reduced earthworks volumes
- The proposed dual purpose road and bridge over the Campaspe was split by function, improving pedestrian engagement with the surrounding environment and safety for road users.

McConnell Dowell included innovative subgrade treatments and pavement optimisations that supported the construction of future flexible pavements in areas where traditional subgrade treatment was not possible out of respect for cultural considerations and the legislative controls of the Cultural Heritage Management Plan. This also negated the need to construct concrete roads as concrete roads are an option strongly discouraged by the Victorian Department of Transport (the roads' future maintainer).



# Design and Construction

## Bridge Form

McConnell Dowell and design teams challenged the original specification to explore and confirm scope and core functionality requirements, and to drive greater value into our solution altering the configuration of the bridge during the tender period and interactive process as noted in the project description above, achieving:

- **Capital cost:** reduced abutment height, reduced piers, and removal of cable stays
- **Reduced construction complexity** and program risk as the reduced span length was achieved with a standard segmental box girder section. Removing the cables reduced the required width of the box and hence the cost
- **Whole-of-life considerations:** Incorporation of the integral bridge piers on riverbanks
- **Urban Design Integration:** 'bridges through the treetops' and 'bridges in the bush' concepts.

As a result, the final solution for the balanced cantilever bridge consists of a five-span continuous prestressed concrete bridge with a symmetrical span arrangement of 35m-61m-115m-61m-35m. The central three spans are formed from a prestressed concrete box girder while the two outer spans are constructed using Super-Tee beams. The segmental bridge structure was constructed in-situ using the balanced cantilever method. The superstructure is continuous along the full 307m length and connected monolithically to all the intermediate piers such that there are no bridge bearings, apart from at the abutments where the expansion joints are located. The main span piers are located on the river embankments avoiding temporary or permanent marine-based structures. This solution also reduces the need to access the waterway and waterflows for maintenance purposes.





## Construction

### Bridge

The balanced cantilever construction technique utilised two pairs of travelling form machines that allowed the bridge to be built across the river from both banks at the same time without the need for a temporary support structure in the waterway. This ensured minimal disruption to river-based businesses and the region's popular tourist industry, while also ensuring that the Southern 80 annual water-ski race could continue to be held, uninterrupted (notwithstanding COVID restrictions in place at the time). The travelling form machines were initially installed on the two main piers at the riverbank and acted as movable concrete moulds to sequentially cast 5m bridge segments progressively further away from each pier.

The construction process for each segment was undertaken in a five-to-seven-day cycle. The first stage required the reinforcement to be positioned for the 5m segment, followed by concrete placement and curing. The cables were then tensioned, and the traveller form machine moved to the next segment.

### Earthworks and Digital Engineering

With 400,000 tonnes of earthworks needed for embankment formations, our construction team had to meet different designs, specs, quality and planning standards for both the Victorian and New South Wales jurisdictions. Using state-of-the-art flyover drone survey technology and software (Propeller) to create regular digital models of the project, combined with various design and survey files, McConnell Dowell's Echuca-Moama Bridge Project team was able to accurately forecast and assess productivity rates of the project's various sub-sites on a fortnightly basis. This technology assisted the wider project with:

- Section data and volumes completed monthly and used to substantiate and clarify progress claims with both the client and subcontractors
- Detailed planning of works, such as lift studies, by accurately modelling space, distance, radius and movement room.

The contract stipulated the existing Murray River bridge could not be used for major haulage. This challenge was managed by sourcing materials from north and south of the project – securing surplus imported fill in NSW from a local sand

quarry that was otherwise a waste product, and in Victoria, nearly 200,000 tonnes of fill was obtained by establishing an off-site borrow pit through stakeholder engagement with a local landowner.

Staging and detailed coordination of the 'import and place' program required installation of temporary construction access points. The project's elevated finished levels needed large-scale temporary entry ramps for heavy machinery to complete the roadworks. Propeller technology was also able to provide up-to-date data, so staging was continually assessed to factor in compaction results of each work front and clearly identified when each area became available for final quality assurance and continuation to next stage of fill.

We used landscaping (hydro-mulch) to stabilise the soil embankments in preparation for heavy rain events. This avoided potential scouring and erosion to the embankments.

The project was originally required to import an additional 3m of fill and delay works for six months to allow for designed settlement. By closely monitoring the actual settlement and water levels using settlement rods, pezos and space axial arrays,

combined with data from drones and Propeller, it was established that the level of settlement (rate of change) occurred earlier than anticipated. This significantly reduced the surcharge amount and duration, allowing McConnell Dowell to reprogram and sequence the project works to save considerable time and create float in significant sections of the program – ultimately and positively changing the critical path.

## Urban Design

The bridge form and associated urban design was purposely chosen to integrate into the natural environment and be conscious of the Aboriginal cultural heritage of the local area. The balanced cantilever bridge form allowed a relatively slender structure that facilitated a simple and clean 'bridge through the treetops' design. The long span allowed piers to be located outside of the river and minimised impacts on river activities, tourism business operators and aquatic habitat during the construction period.





# Community Engagement

**Bringing the community on the journey was essential for the success of this project. Locals had campaigned for decades for a second bridge, one that could again provide a much-needed connection between the two busy communities of Echuca and Moama.**

## A natural viewing platform

People young and old came to see the construction site by the mighty Murray River, knowing they were witnessing history in the making. The Victoria Park boat ramp provided the community with a natural viewing platform. As part of the project PR and legacy strategy, the communications team developed interactive signage situated at the boat ramp, providing visitors with the ability to view artist's impressions of the new bridge structures and also the option to [scan a QR code](#) and take a journey through the treetops and essentially follow the route of the new bridge from their mobile phones. The project team also became aware of regular 'followers' – members of the local Probus Club gathered chairs and eskies to watch the bridge construction on a daily basis. This included retirees, John and Daryl, who took to their deckchairs from mid-2020 through to completion. The lads became so well known to the project, they caught the attention of a Channel Seven News camera crew and much to the surprise of their wives, were featured on the news bulletin about the Echuca-Moama Bridge Project!

## Community Support

Community support was critical, so the team engaged community groups early, hosted presentations, tours and other activities which included participation from schools, the local historical society, business groups and disability service providers. The project diversified its engagement during the pandemic, hosting open-air presentations by the Murray and Campaspe rivers when State Government health regulations allowed. The most popular engagement activity proved to be the first-of-its-kind river boat site tours.

Using a local river boat operator, the tours gave local residents and visitors to the region a unique and unparalleled view of our works as we built the new bridge over the Murray River. It was during this time many local people took to open-air exercising – walkers, joggers and cyclists were exposed to the project's progress during lockdowns, as they participated in permitted exercise regimes – accessing safe paths through the site, designed to provide recreational access to the much-loved, Victoria Park in Echuca. This was a planned initiative by the construction team to continue to provide recreational access to the park during construction by carefully designing paths and providing traffic management and community information (including posters and updates) throughout the project – with much appreciation and relief from the community.

## Consultation

Local residents were regularly consulted throughout the project, and the team achieved a high level of participation from the local business community and they also encouraged local jobseekers to join the workforce whenever possible. In particular, during the COVID restrictions, when the business community of Echuca and Moama, and the wider region were hard-hit, the construction team aimed to support local businesses, further creating long-lasting goodwill for the project.

## Walk of the People

To celebrate the completion of the bridge, the project held a community bridge walk on Sunday 10 April 2022. The event attracted more than 8,000 people (exceeding the anticipated 5,000 by 60%). As part of the event, a floatilla of paddle steamers conducted a floating procession on the river, while two aerobatic planes from the Echuca-Moama Aero Club did fly-bys overhead. Local marching bands were on hand to entertain attendees, while local vendors and charity groups were invited to participate and were situated in several locations across the site serving free

refreshments. For two hours, locals and visitors were able to walk the carriageway and soak up the festival atmosphere.

To cater for people with mobility requirements, a convoy of buses departed prior to the event opening to pedestrians. More than 150 people took up this opportunity including many thrilled and thankful aged care residents, some who thought they would never see the bridge completed in their lifetime.

The road officially opened to traffic the next day – with the spectacle of colourful, historic cars leading the way. This event attracted politicians from local, state and federal governments, and also included a smoking ceremony organised by the local Yorta Yorta Nation Elders.

For many, like Tom Glazebrook, it felt surreal. The 95-year-old ex-divisional engineer with the Road Construction Authority, started campaigning for a second bridge in 1970.

"As a matter of fact, at my retirement, I said, 'I'm going to be at the Echuca bridge opening, even if I'm in a wheelchair,'" he said. "Well, I've got a stick, not a wheelchair, and I'll be 96 in a few weeks' time."<sup>1</sup>



1. [abc.net.au/news/2022-04-11/echuca-moama-second-bridge-opens-after-decades-of-campaigning/100980518](https://www.abc.net.au/news/2022-04-11/echuca-moama-second-bridge-opens-after-decades-of-campaigning/100980518)

Click on the image above to check out the piece featured on the Channel Seven News



# Stakeholder and Communications Management

The project conducted a series of community satisfaction surveys to measure how the community valued the project's communications and engagement efforts, receiving an average score of 84% across the 3-year construction period - one of the highest ratings of all MRPV projects across Victoria. The rating from the community for 'Project Awareness and Knowledge' was 88%.

Highlights include:

- Percentage of complaints across all interactions: less than 4%
- Response times for community enquiries: less than 24 hours
- Updates to community: 10,000 construction newsletters distributed monthly to residents and businesses
- Strong focus on community values/priorities/updates through prestart information and site inductions to keep workers updated on community and working in regional Victoria
- Emphasis on collaboration with local schools, offering regular information sessions, site tours, hosting career workshops and coordinating tree-planting projects
- Providing/maintaining safe, recreational walking and cycling track access through parklands (which crossed the construction alignment in two locations) for residents and tourists, and regularly updating stakeholders
- Continually updating traffic management teams, acknowledging them as the project's 'front of house' with a high level of interaction with the public (and fostering a culture of feedback, back to the project)
- Connecting with stakeholders through door-knocking and small community meetings and through restricted periods, diversifying

how we communicated. Regularly updating stakeholders by phone/email, or open-air meetings near worksites

- Intensively communicating with residents during haulage of 400,000 tonnes of soil, 125 Super-Tee beams and 570 concrete piles through prestigious residential, school and tourist precincts
- Working with tourism bodies, river authorities and riverboat operators to update all navigational changes to river access during works over water during the form traveller works schedule.

During the pre-COVID-19 period, we were able to connect with residents through door-knocking and small community meetings. As a very personalised approach, in a tight-knit community, it enabled the Communications and Engagement Team to produce a comprehensive contact list of residents and businesses that could potentially be affected by works. During periods of lockdown, the team was able to follow up by phone and update all stakeholders on a one-to-one basis. This approach was effective at building relationships and a valuable communication method as stakeholders wanting 'peace of mind' through knowing what activity was coming up during the construction program. In a regional community, where approximately 40% of residents are aged over 55, this strategy was very successful.

This stakeholder group needed information and reassurances to manage their anxiety about the project adding to the already-busy local thoroughfares. Weekly phone calls, letterbox drops and the distribution of coffee and food vouchers to affected stakeholders (to support local businesses hit hard by the pandemic), strengthened relationships and assisted in managing identified risks, such as misperceptions and misinformation about the bridge project and the truck traffic.

The Communications and Engagement Team promptly attended to stakeholder matters, adhered to notification timeframes, and always aimed to go 'above and beyond' for the stakeholder. Quick attention to issues impressed residents in the small community, such as the prompt placement of a vibration monitor near a property within two hours of a complaint that was made about excessive vibration during piling works, turned the situation into a positive one. Similarly, when one resident asked about dust and dirt appearing in the

street, we stepped up our street sweeping water truck operations and ensured workers manually swept specific areas.

The McConnell Dowell and MRPV team strengthened bonds with local schools by planning collaboration throughout the project. Two of the region's major schools, both located near the busy truck haulage route, were identified as key stakeholders in the project's traffic management plans. The project team presented information sessions to the school communities and was involved in career workshops and environmental sessions.



# Social Benefits – Leaving a Lasting Legacy

## Social Inclusion

On the Echuca-Moama Bridge Project McConnell Dowell formed a partnership with Vivid, a regionally based not-for-profit Australian Disability Enterprise which empowers local people living with disability. Through its social enterprise, Vivid Work Crew, the organisation offers its mentored and supported employment 'crews' to fulfil local work opportunities.

The Vivid Work Crews provided the project with ongoing site maintenance and cleaning services. The Vivid Work Crew participants completed a total of more than 25,000 hours on the project, with up to 20 people involved in its site operations over 24 months.

The project team also collaborated with Bendigo TAFE to provide formal training qualifications for nine of the Vivid supported employees at TAFE's Echuca Campus. This educational pathway aligns with Vivid's objectives of providing future employment pathways for their supported employees.

The employees commenced their studies in September 2020 and graduated in January 2022. This was the first time the graduates had followed a vocational education pathway and achieved a formal, nationally recognised qualification. During their studies, they attended TAFE one morning a week, while continuing to work in a supported environment at the project site. At TAFE, they experienced both virtual face-to-face classroom learning and a real-time classroom environment aided by workbooks, with Vivid support workers in attendance.

At the graduation event, families and carers spoke of their increased personal growth with less dependency, boosted motivation and communication skills, attributed to their teamwork on the project. The lasting difference the project leaves includes how this collaboration has added value to the lives of project staff and workers,

who have experienced an increased sense of diversity in the workplace. This inclusion has displayed a commitment by the project team to transform the lives of local people living with disability, and thereby delivering positive outcomes to this close-knit local community.

The graduates have accepted offers in mainstream permanent part-time employment now, due to their increased personal confidence and work capacity. The project continued to engage with Vivid and its supported workers throughout construction, and the project's work team was collectively in awe of the high degree of dedication and commitment it witnessed from the Vivid Work Crew.

Through the partnership, which was Vivid's largest commercial procurement contract to date, it has now developed greater capacity for expanded opportunities in regional Victoria. The organisation reported that the experience taught the Vivid team to stretch expectations, both in a business sense and with regards to the local people Vivid works with. According to Vivid, the organisation learned that their supported employees living with disability, "have a lot more to give".

Now the organisation reports it's looking at new prospects for projects and new engagements with the business community including major projects, that the team may not have considered before.

A spokesperson for Vivid said, "Because we have seen what positivity has come about through the 'bridge' project, we have a new ethos about 'let's try that' and being involved with the 'Project' has really changed the way we look at new business."



To find out more about our partnership with Vivid, visit:



## Spotlight on Luke Peters

Luke Peters was one of 20 Vivid Work Crew supported employees who were proudly part of the Echuca-Moama Bridge Project Team. A fanatical fan of Lee Kernaghan, when Luke wasn't wearing PPE - he donned his cowboy hat with pride. He's enthusiastic, decidedly cheeky, and has enjoyed his role of site 'peggy'.

Luke's mother, Jill Peters says, "(During his work on the project) I've seen Luke's confidence grow, his speech has developed. And by conversing with the workers on the project site, he's learned more skills, he's having more conversations."

"The project has motivated him, and he's so proud to have been part of building the new bridge."

LTI free hours completed **701,075**

Peak workforce (including subcontractors) **170**

Percentage of workforce that is First Nations **5%**  
Twice the target of 2.5%

First Nations-owned businesses, social enterprises and not-for-profit organisations **14**  
at a value of \$6.4M

**12** Trainees | **2** Apprentices | **4** Cadets

One assistant in our Communications and Document Control team was recruited through a local disability employment service.

Social Procurement Expenditure Target **3.00%**

Total	<b>2.02%</b>	<b>1.64%</b>	<b>3.66%</b>
First Nations Businesses		Social Enterprises and Disability services	



## First Nations Partnerships

During the delivery of the Echuca Moama Bridge Project, the team took every opportunity to support local First Peoples' businesses and increase employment opportunities for First Nations Australians.

Aboriginal artwork was incorporated along the newly constructed walking and cycling path – it presents the tale of The Woman and The Serpent, a Dreamtime story from the Yorta Yorta People and the creation of the Murray River. The artwork was created by local artist, Yorta Yorta Elder Aunty Judy Atkinson using 17 steel panels. The artwork is named Dhungala Dreaming – 'Dhungala' being the Yorta Yorta language name for the Murray River.

The artwork is placed at a natural wayfinding point of the project as a way of improving navigation. It is a key example of urban design integration with the alignment and structures design disciplines.



To find out more on our relationship with Yorta Yorta Nation Aboriginal Corporation click or scan the QR code.

The region's Traditional Ownership is also reflected in the naming of both the Dhungala Bridge and the Yakoa Bridge which cross the Murray and Campaspe rivers respectively. The naming of the Dhungala Bridge included consultations with the Yorta Yorta Nation Aboriginal Corporation and the Cummeragunja and Moama Local Land Councils.

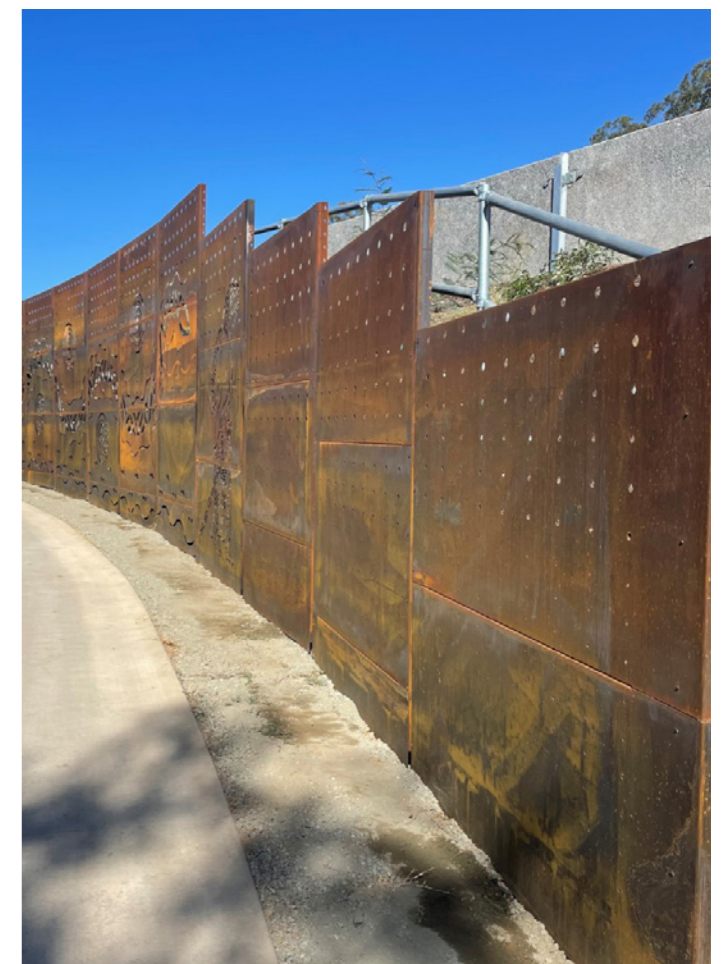
The project works were in an environmentally complex area of Echuca and Moama, which included the Murray River and sensitive Aboriginal sites, such as the Sandhill, a significant area of cultural heritage featuring a remnant section of sub-surface stone artefact deposits. This area is also of considerable scientific value and the project team worked in close collaboration with the Yorta Yorta Nation Aboriginal Corporation, including its team of Aboriginal environmental monitors to ensure respect for the land and its fragile ecology.

One example was the strong relationships developed with AKO Earth and the Yorta Yorta Nation Aboriginal Corporation. Through this relationship, AKO Earth was endorsed by the local Yorta Yorta Elders to work on some of the project's most culturally sacred sites. Supported by the project team, AKO Earth's business grew

from sole trader status to that of an experienced subcontracting company. They employed eight people at peak times during the project.

The project team assisted AKO Earth in completing the qualification process so that they are now qualified to work on other major government projects. McConnell Dowell also supported its certification through the Kinaway Chamber of Commerce as a 100% Aboriginal Owned and Operated Business.

Through the close engagement with local Aboriginal communities, Aboriginal employment on the project peaked at 7.3% of the workforce, with \$3.45 million spent with Aboriginal businesses.



# Managing COVID-19 Challenges

Although COVID was a significant challenge to the entire construction industry, the impact on the project was beyond anything anyone predicted. The Murray River is the border between Victoria and New South Wales. With the bridge being built over an interstate border, which was closed for a significant proportion of the construction program, accessing each side of the project site became challenging – having to contend with police and checkpoints. New South Wales closed their border once, and Victoria closed their border twice, for extended periods during construction. The Victorian legislation had over 58 workplace revisions, additional industry obligations, and over 39 editions of the Victorian Border Crossing directions – New South Wales had a similar number of changes. Construction crews were isolated to one side of the river or the other, and coordination of the construction of the bridge from each riverbank had to be coordinated remotely.

The elected Health and Safety Representatives informed the workforce of change, and embraced proactive measures such as RAT screening. A full time COVID-19 specialist was engaged to review and assist in dissemination of health regulation updates and provided hygiene specialist services to conduct testing. Although activities reduced to critical path activities (due to availability of personnel), the project continued every day during the pandemic.

During the early days of the closure, workers couldn't move across the border until the permit scheme was introduced (and the permit directions were revised multiple times). Only some of the workforce was considered local and part of the “border bubbles” which allowed them free movement, but much of the workforce could not travel back home. When travel was allowed, many workers returned home for the Christmas break, but then following the announcement of border closures, were unable to return to site. Employee Assistance Programs were engaged to discuss with our workforce these

challenges and stigma about mental health. This was extremely well received and provided good life tools for the workforce to manage their wellbeing.

The majority of materials had to be sourced from suppliers within the same state, and supply lines became constrained as the border closures continued. The project team worked through these issues by securing work crews and materials to enable the project to finish ahead of schedule. The decision to self-perform the project critical path as the border restrictions impacted the consistency and availability of the planned workforce, was a combination of staff and workers from different subcontractors who met the government criteria to travel and work on the project, this involved pre-casting barriers, installation of barriers, concrete, and steel.

Managing the community needs during COVID-19 lockdowns was also a challenge. Locals responded to lockdowns by increasing their exercise regimes in local parks close to the project's construction footprint. Closure plans had already been established for the duration of the project for a popular walking circuit due its proximity to the works zone. Once the community was notified about this change, the project received negative feedback from residents, many citing that this pathway was very important to the community, and even more so, during the pandemic.

McConnell Dowell communications team in consultation with MRPV, worked with the construction site team to configure and maintain safe pedestrian access through this complex construction area. This action was accomplished by creating practical solutions with regards to machinery placements, changes to works schedules and a redesign of access paths – enabling safe pedestrian and cycling access. Listening to regional community members and acting quickly to bring about solutions was a priority and each complaint about the planned closure was responded to promptly, and subsequently those very stakeholders became positive opinion leaders for the project in the community.





# Environment

The project managed a substantial vegetation clearing process involving a staged approach to mitigate potential impact on native fauna. A team of ecologists worked a day ahead of the tree clearing team to clear hollows prior to felling. The process successfully relocated, four brushtail possums, six bats, 16 ringtail possums and four sugar gliders, all without injury.

Seven wildlife crossings were installed as part of the project so that the squirrel gliders could move between trees and safely between habitats. 450 habitat hollows were also created to provide shelter for local wildlife and we conducted annual inspections to assess their effectiveness.

A reduction in the number of large trees earmarked for removal was also a priority, which was achieved through micro alterations to the design of the shared use path, and construction techniques to avoid impacts within the Tree Protection Zones. A total of 34 large old trees were saved through this process. Seven Scar trees were identified within the project's right-of-way, and through consultation Yorta Yorta Nation Aboriginal Corporation, McConnell Dowell designed its works to ensure there were no impacts to the trees during construction and the related operation of machinery. The tree clearing process also had to consider the risk of impact to culturally sensitive sites, particularly the Sandhill. Dropping limbs and trees onto the surface posed a risk of damage to sensitive sites and a breach of the project's Cultural Heritage Management Plan. A process was developed involving the gradual clearing of trees and the creation of a working pad to progress through the sensitive areas.

The team managed works on significant cultural heritage sites, with engagement from the local Aboriginal community including the First Nations Elders and Registered Aboriginal Party. The compound was installed on the broader extent of the culturally sensitive Sandhill (a potential burial site). To overcome the risk of ground-breaking activities uncovering artefacts, the compound and laydowns were installed on a layer of geofabric covered with crushed rock. All utilities were installed above ground.

The project also unearthed a 'midden' which triggered the 'unexpected finds procedure'. The subcontractor working on the site and works team preserved the heritage site and the proper repatriation occurred to the satisfaction of the RAP with minimal delays. Another finding involved three bones – requiring a referral to the Victorian coroner. All were confirmed as non-human.

Working over the Campaspe and Murray rivers posed a significant risk to water quality. To mitigate these risks:

- No piers were constructed in the rivers to avoid direct impact to the water
- Marine-based Erosion and Sediment (ERSED) controls were installed
- Formwork/falsework were sealed, and proving of seals was undertaken before concrete pours could commence – including flooding the structures with water and patching any leaks
- Inspections were carried out daily to identify any emerging environmental risks as works process and measures to rectify them immediately
- Upstream and downstream water quality of Campaspe and Murray River were monitored weekly, when there were rain events and works near water.

At the start of the project the New South Wales site was inundated with water following heavy rainfall. The area had to be dewatered before works could commence. The water had a high sediment load and could not be discharged directly off site. An in-line dosing unit was set up with a flocculant to treat the water before it was pumped to a settling dam. Once tested and deemed suitable, the water was discharged off site.

Other measures undertaken also included ongoing training for the MCD team in environmental compliance and correct controls, including toolbox sessions at worksite prestarts and team meetings, and strong interface with the project's stakeholder engagement and safety teams.

# Sustainability

The project far exceeded the IS design rating target score of 50. A Leading score of 75.4 was achieved with minimal additional spend. Resourcing the role well and strong support from all levels of management were the key contributors to its success. We achieved sustainability outcomes by ensuring:

- 33% reduction in materials impact
- 22% ecological improvement
- 21% reduction in carbon emissions
- 16% overall reduction in water use
- And left a legacy, empowering adults living with a disability to achieve a Certificate II in Cleaning.

One of the initiatives included the use of Green Pipe which is 100 per cent recycled High Density Polyethylene (HDPE) fabricated into VicRoads-approved drainage pipe and locally produced in Moama. The Green Pipes were manufactured from 100% recycled plastic which includes a minimum 95% food grade containers.

We designed for the reuse of crane pad materials, salvaging, and transporting the material progressively. This reduced the need to procure and dispose of virgin material, and salvaged material was placed as fill under the new cycling and walking path.

The project reduced one span each in the bridge approach and flood relief structures, leading to the removal of piers, Super-Tee beams and associated foundations. Along with the use of 40% supplementary cementing materials ready mix concrete and around 20% supplementary cementing materials in precast concrete items, the initiative led to a reduction of 33% in material life cycle impacts.

Electricity purchased for the project was 100% accredited Greenpower renewable energy with a net-zero emission factor.

During operation, new walking and cycling path lighting was designed with photoelectric (PE) sensors as opposed to conventional timed lighting reducing ongoing energy demand by 15%. Furthermore, the project's riverside toilet block construction will be lit using a solar battery and PV cell.

McConnell Dowell collaborated with local schools through our engagement team, to embark on tree planting with secondary college students. Both school students and teachers were part of a park revegetation project situated near the project alignment, which was included in their environmental studies work and contributed to the project's native vegetation offset credits program.







# Safety

McConnell Dowell on Echuca-Moama Bridge Project was certified as a 'Gold Standard Site', due to its high level of Industry COVID-19 Guideline compliance on its regional site. This was the first MRPV project certified as Gold Standard through this high level of compliance via the McConnell Dowell Safety team.

The ongoing commitment by the McConnell Dowell Safety Team to regular, positive communication and consultation with local emergency services and key stakeholders was maintained through regular contact, provision of construction updates, site walk-throughs aiding familiarisation with changing conditions, attending toolboxes and construction risk assessment workshops.

The project offered Victorian and NSW local emergency services training opportunities when pandemic restrictions were lifted. This initiative was effective and welcomed by all, as these teams had limited opportunities to train during lockdowns.

The project provided realistic emergency drills to help train and assess in high-stress situations on the project's high scaffolds and around construction site environment. These drills were also an effective way to connect with the wider emergency service teams.

The Safety team intensively worked on cross-border issues and the changing COVID-19 restrictions between the two states, and the project site offices spanning Victoria and New South Wales. Team updates, specialised toolboxes and continual prestart information occurred across all sites plus the implementation of hand-wash areas, sanitiser, QR code registrations and distribution of community made facemasks made by the local CWA.

McConnell Dowell also engaged a traffic management company that was a social enterprise, further adding to its positive, local, social procurement outcomes.

“ The Echuca-Moama Bridge Project, completed in April 2022 is one of the largest transport infrastructure projects constructed in northern Victoria. The project which includes a 622m long bridge over the Murray River with a main span over the river of 115m, was completed under budget and ahead of schedule. The project was constructed almost entirely during the COVID-19 pandemic and is unique because of its location on the Victorian/NSW border. Border closures, and varying travel restrictions across the two states posed significant challenges to the project team throughout. MRPV and its construction partner, McConnell Dowell worked collaboratively to overcome the challenges posed by the pandemic to ensure the project was completed successfully.

The project teams' efforts in engaging with local communities and ensuring that the works were carried out in an environmentally sensitive manner were exceptional. It is a credit to both the MRPV and McConnell Dowell teams. ”

**Antony Carecos**  
Director – Delivery, MRPV

# Quality and Completions

Learning from recent projects across the industry, where legacy defects have caused ongoing issues for projects on both the constructor and client sides, the Echuca-Moama Bridge Project made quality and completions a real focus from day one. This resulted in not only dedicated quality resources, but a heavy involvement and joint ownership from the delivery team who were ultimately tasked with driving the outcomes.

Quality was embedded as a core function, carving out its own space in all key project areas such as involvement in the various delivery team and client meetings, setting of individual KPIs in their performance reviews, and onboarding of the various subcontractors.

Further to weekly client quality meetings (which always involved the respective delivery team members), the project also implemented regular (monthly progressing to weekly) completions focused meetings with the client 18 months out from project completion. This drove a joint focus on the end results desired by both McConnell Dowell and MRPV. Aligning on what was important to both parties cleared road blocks that can otherwise hamper projects.

Four months out from project completion, McConnell Dowell efforts were ramped up with the creation of a dedicated completions team led by previous members of the delivery team, and supported by the quality team. This allowed the project to execute everything that was previously developed and aligned in the previous 12 months.

The ultimate goal was to meet all project quality and handover requirements well within the project completion timeline (practical completion plus eight weeks) contractual window.

In addition, McConnell Dowell also implemented:

- A proactive defect approach through internal tracking by all engineers and internal defect/omission walks to allow any required rectifications to commence months prior to project completion
- Proactive client and stakeholder walks. These involved not only MRPV, but also at different times; TfNSW, the two local councils, maintenance authorities and ultimate asset owners
- Specific contract and specification requirements for project completion close out tracking. This was developed early to efficiently prepare and complete requirements and was a key focus of the completions team which could be regularly measured and reported on in the joint completions' meetings
- Open and effective communication to promote teamwork between all stakeholders to achieve best for project outcomes. Process and requirements are clear and understood by all
- Additional, early road safety audits over and above requirements to ensure any issues could be suitably addressed before final audits and project completion.

Construction supported the quality function by consistently making decisions which considered the end quality objectives. Key examples include:

- The decision to self-perform earthworks over a subcontracting model, which included the self-perform creation, set up, and management of the main project borrow pit – and gave full control over product, moisture content, and supply rate. It also enabled prioritisation of the best product for the upper portion of the formation which resulted in the refinement of pavement layers. This also allowed for full control over sequencing, and reprioritising civil works when required, to always ensure best for project outcomes were maintained in all disciplines.
- Adoption of emerging drone technology. This not only assisted with production tracking, progress claims, forecasting of upcoming works and smooth and efficient site operations; but also proved crucial for effective planning activities, and areas and quantities were known in advance. This resulted in more effective use of engineering time, allowing resources to focus on other key aspects such as quality.
- A close working relationship with our concrete supplier to set up a second dedicated batching plant for the project in Echuca (VIC), to supplement the Moama (NSW) batching plant. This ensured security and back-up of supply on both sides of the border. Guaranteed supply helped mitigate delays particularly through COVID-19 border restrictions, and meant discharge times could be met.

- Bluetooth probes installed in each concrete segment at tendon anchorages to relay temperature data back to the testing lab for an accurate strength indication. Hence, segment strength could be achieved in shorter time frames compared to ambient temperature cured cylinders, which resulted in less than 1% of deliveries rejected, and zero poured elements rejected. This was all key to the sequential nature of an in-situ balanced cantilever structure.

All of the above combined resulted in the project achieving the following market leading results:

- 100% defect closure at project completion – plus one week
- Handover fully populated at project completion – plus four weeks
- 95% lot closure at project completion
- 99% lot closure at road opening
- 98% non-conformance report closure at project completion
- 97% handover populated at project completion
- 100% of all items above achieved one week ahead of project close out date.

These outstanding outcomes led to MCD's Echuca-Moama Bridge Project being regarded both internally and externally as 'the new benchmark for project completions'.





# Conclusion

**It takes a community to build a bridge, and when a vision takes 60 years to realise – it's important that the community comes on the journey too.**

When the team mobilised to site in early 2020, we knew that we needed 400,000 tonnes of soil hauled through the twin towns; had 570 concrete piles to drive into the ground, and 125 precast concrete beams, 35 metres in length, to seamlessly negotiate their way through this busy tourist destination.

What we didn't anticipate was the lasting legacy and the positive impact we would make on the community and individuals. From our bridge watchers, retirees John and Daryl, Vivid Work Crew member Luke Peters, 96-year-old divisional engineer Tom Glazebrook, to the future generations who will now be connected – we've appreciated the ongoing support of the entire community throughout construction.

## Additional Information and Resources

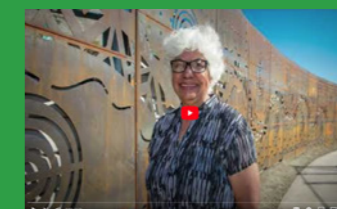
Click on the thumbnails below for more information



**Timelapse of the Echuca-Moama Bridge Project Construction**



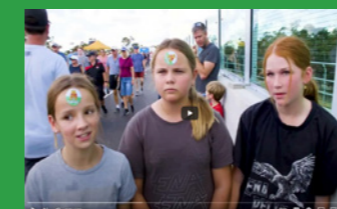
**Channel 7 News – The Murray River crossing 60 years in the making**



**Reconciliation Week 2022 – Echuca-Moama Bridge Project**



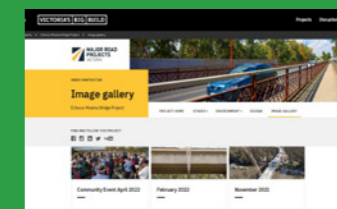
**Echuca-Moama Bridge Project – River Boat Tours**



**Echuca-Moama Bridge Project Open Day**



**Vivid Graduation**



**MRPV Image Gallery**

