



SWAN RIVER CROSSINGS: Project Annual Sustainability Report 2024/2025

Prepared by the Fremantle Bridges Alliance

This annual report covers the period from 1/07/2024 to 30/06/2025. This is the third annual report to be prepared for the project. Previous annual sustainability reports include 2020/2021 and 2021/2022.

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Acknowledgement of Country

Fremantle Bridges Alliance acknowledges the Whadjuk People as the Traditional Owners of the land and waterways on which the project is located.

Fremantle Bridges Alliance pays our respects to the local elders past and present and we thank them for enriching the project with their culture knowledge and practices.

Main Roads - Approval for Publication

Date	Approved By	Position
22/09/2025	Virginia Castellano	Project Sustainability Lead

Disclaimer

All information was true and accurate at date of publication. Data is subject to change pending audits, verifications, and reviews.

Abbreviations and Acronyms Table

Abbreviation	Full Form
ANC	Acid Neutralising Capacity
ASS	Acid Sulfate Soils
BIM	Building Information Modelling
CIC	Customer Information Centre
CO2	Carbon Dioxide
CRC	Crushed Recycled Concrete
CWMS	Construction Work Method Statement
DBCA	Department of Biodiversity, Conservation and Attractions
DWER	Department of Water and Environmental Regulation
EMP	Environmental Management Plan
EPA	Environmental Protection Authority of Western Australia
FBA	Fremantle Bridges Alliance
FPA	Fremantle Port Authority
GHG	Greenhouse Gas
GRI	Global Reporting Initiative
GWP	Global Warming Potential
Ha	Hectares
Hrs	Hours
IS	Infrastructure Sustainability
ISC	Infrastructure Sustainability Council
kL	Kilolitre
km	Kilometre(s)
LCA	Lifecycle Assessment
LOR	Laing O'Rourke
LTIFR	Lost Time Injury Frequency Rate
Main Roads	Main Roads Western Australia
MJ	Megajoules
NGA	National Greenhouse Accounts
PASS	Potential Acid Sulfate Soils
PSP	Principal Shared Path
PTA	Public Transport Authority
RTR	Roads to Reuse
SCM	Supplementary Cementitious Materials
SCRM Act	Swan and Canning Rivers Management Act 2006
SDG	Sustainable Development Goals
T	Tonnes
TEC	Threatened Ecological Community
UN	United Nations
VOC	Volatile Organic Compound
WAPC	Western Australian Planning Commission

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1 About this Report

1.1 Purpose

This report has been prepared for the Swan River Crossings Project (herein 'the Project'). This report was compiled by Fremantle Bridges Alliance (FBA, herein 'the Alliance') for Main Roads Western Australia (herein after 'Main Roads') and reflects our approach and commitment to Sustainability. This report will accompany the Main Roads Annual Sustainability Report and will ultimately be integrated into the Main Roads Annual Report. This report provides a snapshot of the Sustainability performance by the Alliance, including various sustainability initiatives pursued and the potential environmental, social, and economic impacts of the Project.

The report content is prepared in accordance with Global Reporting Initiative (GRI) principals. Material topics reported in this report have been determined through a materiality process that adheres to the Infrastructure Sustainability Council (ISC) framework and the United Nations Sustainable Development Goals (SDGs).

1.2 Sustainability Statement

Sustainability is the commitment to creating lasting benefits through an integrated consideration of social, environmental and economic aspects in all that we do. The Alliance is committed to delivering a project that achieves the best sustainable outcome aligned with the SDGs, Main Roads' strategy ('Keeping WA Moving'), and the Sustainability Policies of each Alliance Participant organisation.

The Alliance will deliver the Project in a way which seeks to improve the overall transport system and connectivity by ensuring the social, environmental and economic aspects of the Project are delivered in the most sustainable and practicable manner possible, with due consideration our local environment. This is reflected in a Project objective to maximise sustainability through economic, social and environmental responsibility.

Our targets for the 2025 financial year relate to the delivery phase and are further described in the Sustainability Targets section. These targets reflect the most material topics for the Project, both in terms of addressing the UN SDGs and the Global Reporting Index. The priority issues for the Project include, but are not limited to, stakeholder values, heritage (European and Aboriginal), environmental impacts and opportunities, as well as leaving a lasting legacy long after the asset becomes operational.

The Alliance Sustainability Strategy allows the Project Team to provide a unique set of targets and deliverables to augment a focused delivery to the environment and neighbourhood. This includes the recycling and reuse of the existing bridge timbers for continued use in supporting the WA timber bridges portfolio. Our project initiatives target the first use of B5 in our riverside cranes, and the largest electric crane in the state at our laydown yard; together with an approach to drive low carbon concrete and steel. Unique projects in the river including restoring habitats provide a balanced and targeted Sustainability Agenda.

Aidan Brannan – Alliance Director

1.3 Sustainability Summary

The project has developed a tailored Sustainability Strategy to focus on practical, demonstratable and effective sustainability outcomes, with the following objectives:

- **HERITAGE & LEGACY:**
 - Acknowledging and interpreting Aboriginal and European heritage of the area.
 - Maximising social value through positive impacts on people, communities, and stakeholders.
 - Maximising social value through the positive impact we have on our people and the communities and stakeholders we engage.
- **ENERGY AND CARBON:** Reducing energy demand and GHG emissions and promote renewable energy innovations in construction.
- **RESOURCE EFFICIENCY:** Ensuring resource efficiency during design, procurement, and construction.
- **ECOLOGY:** Enhancing the environmental value of the project site.
- **CLIMATE CHANGE ADAPTATION AND RESILIENCE:** Incorporating climate adaptation into the assets that we build.

To achieve the set objectives, the SMART targets have been identified for the most material aspects, ensuring sustainable outcomes across the Project, and are further described in Section 3.

The sustainability targets for the project are largely on track, with several strategies outlined in the Heritage Interpretation Plan and design to acknowledge and interpret European and Aboriginal Heritage. A Social Inclusion Committee has been established and meets monthly, implementing various initiatives and volunteering opportunities. Plans to ensure the safety of river and road users during construction are under implementation.

Energy use and carbon emissions are on track to be reduced by at least 10% through the use of Green Power, electric equipment, solar light towers and B5 biodiesel. Water use reduction is facing challenges due to limited opportunities, but the project is exploring potential initiatives. Material life cycle impacts are on track to be reduced by at least 15% through the use of low carbon concrete and reinforcing steel.

An ecological enhancement opportunity for the riverine environment is being further developed for feasibility. A detailed Climate Change and Resilience assessment has been completed, with all treatment measures integrated into the design.

2 Project Overview

2.1 Project Introduction

In April 2019, the Federal and State Governments allocated funds for the development and construction of the Project. The Alliance was appointed in February 2021 and comprises Main Roads WA, Laing O'Rourke Australia Construction, Arup Australia and WSP Australia. A team of architects, urban and landscape designers and heritage specialists have been included in the Fremantle Bridges Alliance team to prioritise heritage interpretation, urban landscape, and design for this significant Project.

The Project involves the development, design, and construction of a dual carriageway road bridge over the Swan River, on the same alignment as the existing Fremantle Traffic Bridge. The new structure will be an Extradosed bridge. The redundant Fremantle Traffic Bridge will be demolished as part of the project with relocations of utilities (water, power, gas, sewer, communication) through horizontal directional drilling. The value of the project is \$430 million.

On completion, the Project will provide opportunities for improved river, road, pedestrian and cycling infrastructure to and from Fremantle.

KEY FEATURES OF THE NEW BRIDGE



Two traffic lanes in each direction for road users.



Ties into existing Queen Victoria Street at the northern end and Canning Highway intersection to the south.



Wider and safer pedestrian and cyclist paths on each side of the new bridge (up to 4 metres wide).



Minimises impact to the limestone escarpment.



Improves navigational safety for boats, kayaks and river users with higher and wider clearances (up to 9 metres).



Provides space for any future rail bridges west of the new bridge.

Design quality is a vital component of the Project. Design objectives include the highest standards for functionality (for vehicular traffic, pedestrians, and cyclists), respect for its landmark significance, and sustainability and resilience.

Objectives in the delivery of the Project include providing optimal value for money and minimised risk for Main Roads, avoiding impacts to the operations of Fremantle Port and road, rail, and river operations, conducting the works in an environmentally and socially sensitive manner, and providing upskilling and employment for lower-tier contractors and Aboriginal people.

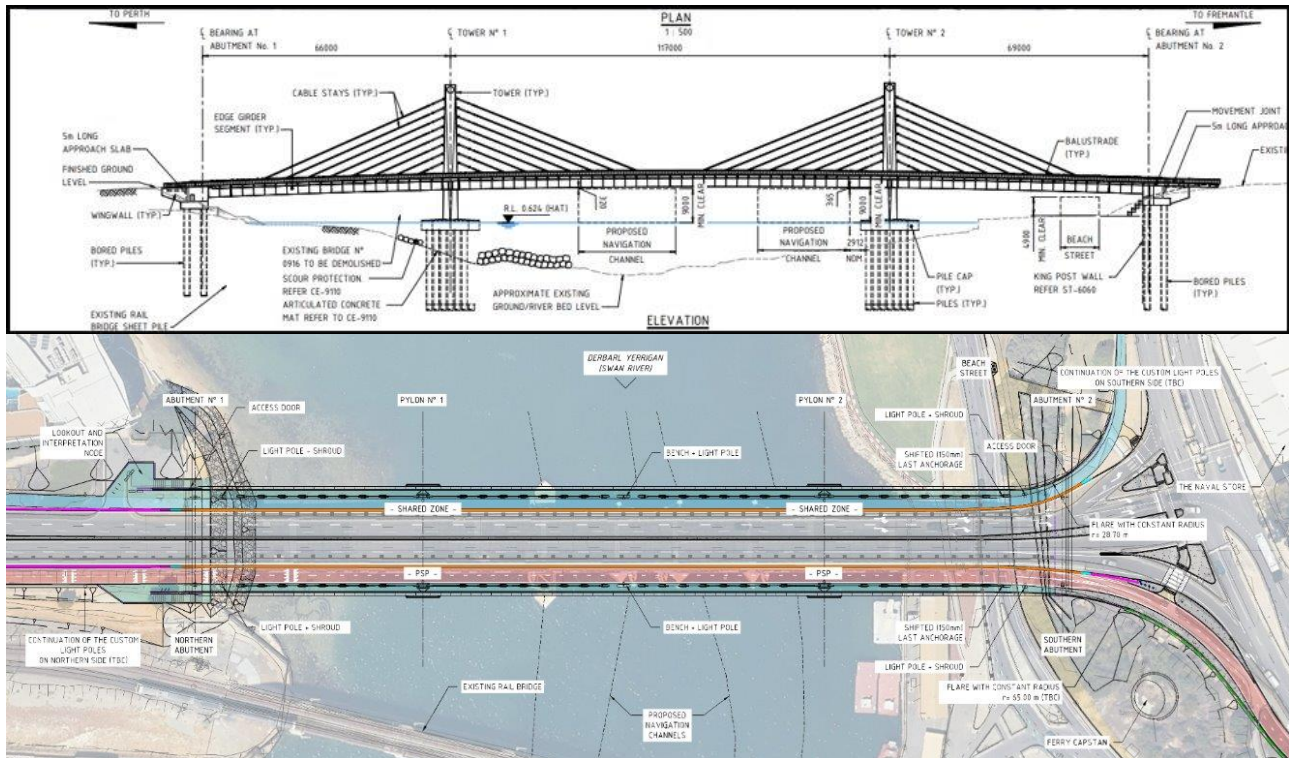


Figure 1: General Arrangement and Features)

2.2 Project Location

The Project is located on Whadjuk Noongar lands, in Walyalup (Fremantle).

The site occupies a unique space between Fremantle Port and industrial land to the west and urban to the north, east and south. There are a mix of local land-uses in the project area and surrounding environs which comprise:

- North Fremantle Local Centre on the north side of Tydemans Road
- Residential (single dwellings, town houses and apartments) and Industrial either side of Queen Victoria Street between the Swan River and Tydemans Road
- Port Installations (Port Authority) and Railway (PTA) to the west
- Parks and Recreation along the north (Sorrell Park) and south banks with Public Purposes - Special Use (East Street Jetty)
- Residential on the southeast of Canning Highway
- Public Open Space (Cantonment Hill) on the south of Canning Highway.

The Project is situated within the City of Fremantle local government area, and forms part of the North Fremantle Locality and the Rous Head and Fremantle City Centre, on the City of Fremantle Town Planning Scheme No. 4 District Scheme.

The project website can be found here: [Swan River Crossing Project](#)



Figure 2: Construction of the Fremantle Traffic Bridge (1939)

2.3 Project Map

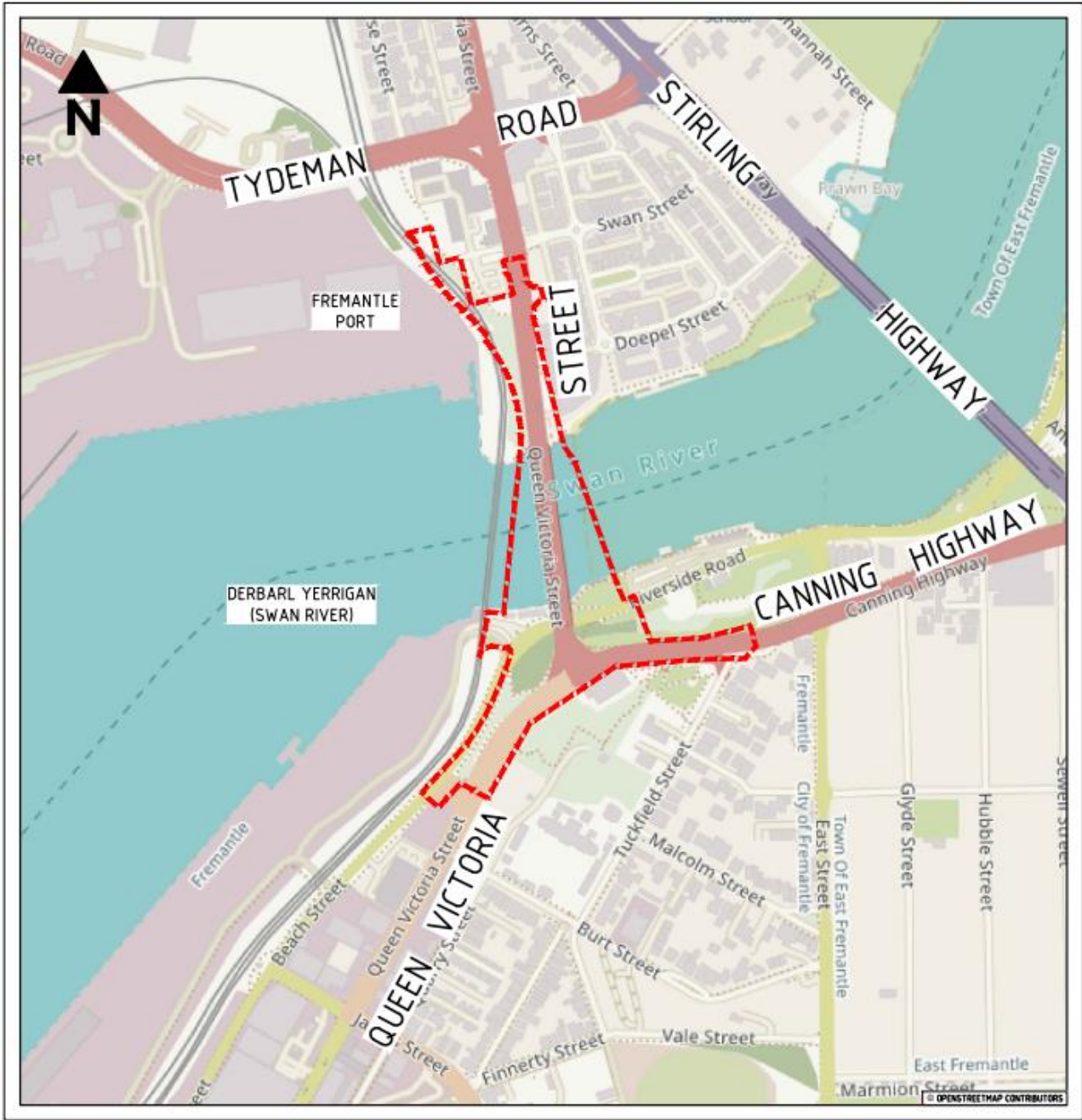


Figure 3: Project Location

2.4 Project Timeline

The project is currently in Construction, with Detailed Design for all portions finalised, having undergone several years of pre-development and concept work.

During 2024 – 2025, the following milestones have been achieved:

- Set up of Bracks Street laydown and logistics area.
- Relocation of essential services off the bridge via horizontal directional drilling under the riverbed.
- Installation of retaining walls to the south.
- Installation, commissioning and use of four substantial, temporary jetties as the work front for in-river works.
- Installation of permanent piles and pile caps.
- Commencement of the installation of edge girders.

Works planned for the coming year include the construction of the pylons, edge beams and bridge deck, alongside the demolition of the existing Fremantle Traffic Bridge.

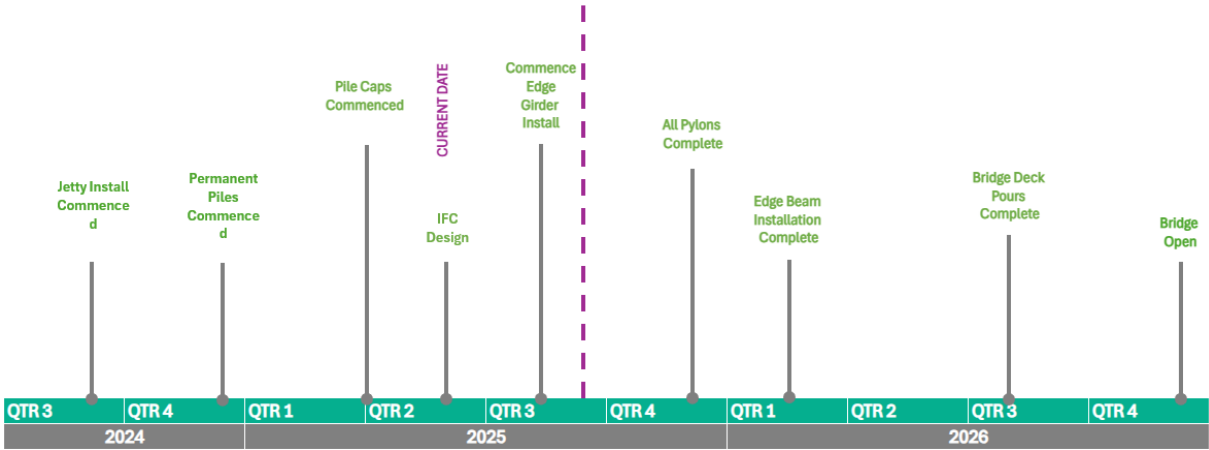


Figure 4 Project Timeline

2.1 Construction Milestones

The following section, with both live and digital model imagery, showcase the construction milestones achieved in this period.

2.1.1 Horizontal Directional Drilling for service relocations



Figure 5 Horizontal Directional Drill Rig and pipe

2.1.2 Installation of Temporary Jetties



Figure 6 Photo of temporary jetties and cranes to the East of the existing bridge

2.1.3 In-River Piling

2025-03-20 at 14:21:37
-32.041769, 115.755662



Figure 7 Photo of North-East temporary jetty with permanent piles in the background and a pile being lifted by a crane

2.1.4 Abutment Piles

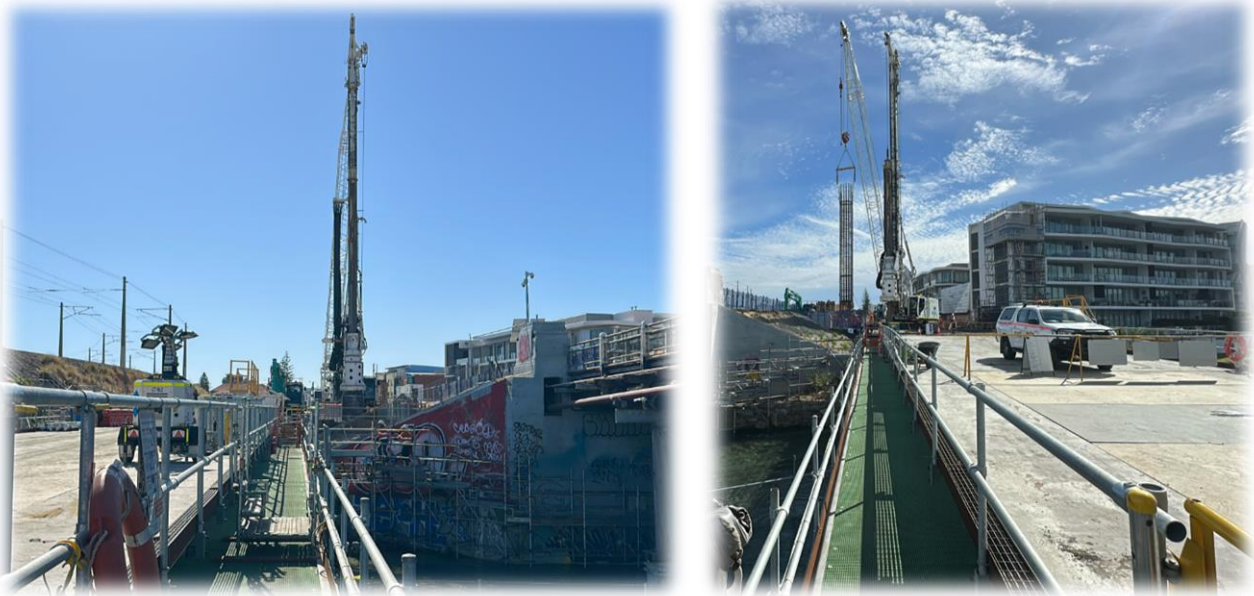


Figure 8 Photos of North-East and North-West abutment piles being drilled

2.1.5 Pile Cap Shell Installation

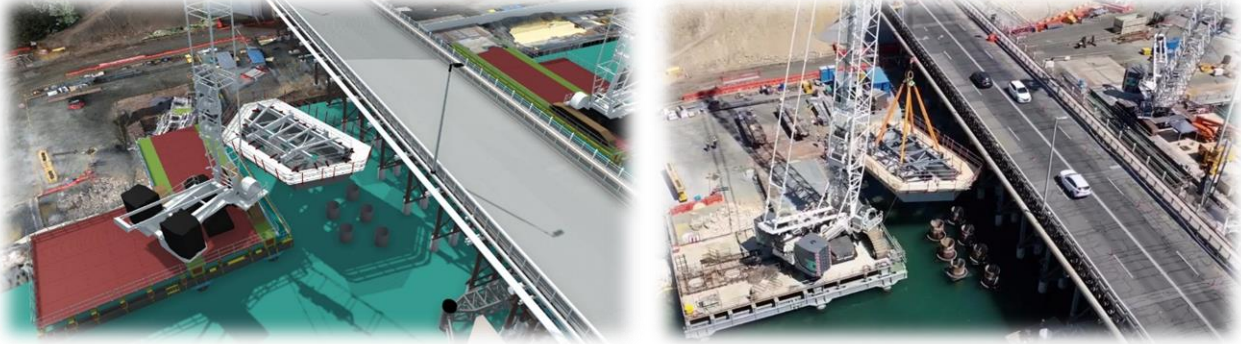


Figure 9 Digital image and corresponding photo of South-East pile cap shell installation

2.1.6 Pile Cap Concrete Pour



Figure 10 Digital image and corresponding photo of North-East pile cap concrete pour

2.1.7 Pile Cap Prefabricated Reinforcement Cage Installation



Figure 11 Digital image and corresponding photo of South-East pile cap prefabricated reinforcement cage installation

2.1.8 Lower Tower Installation

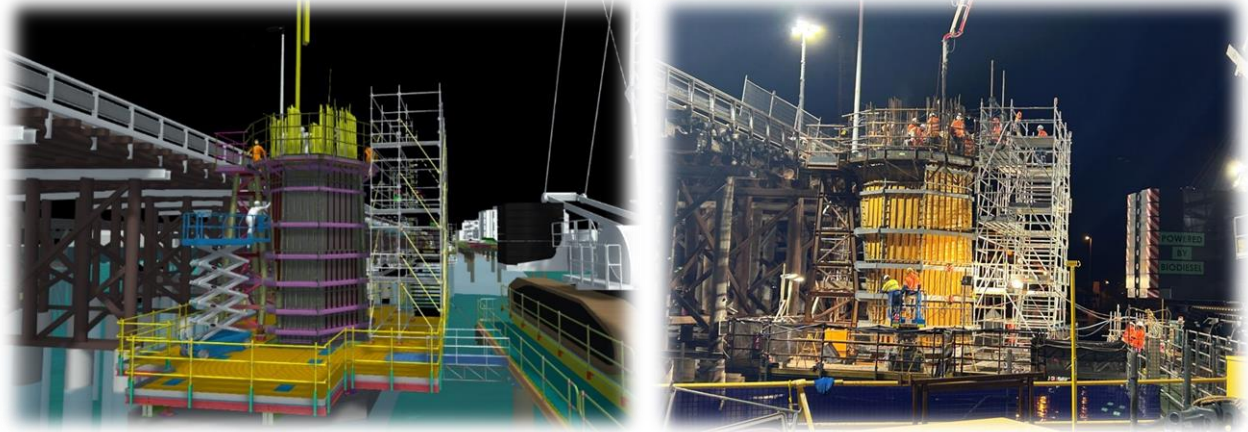


Figure 12 Digital image and corresponding photo of South-East lower tower installation

3 Governance

3.1 Approach to Sustainability

The Project underwent a significant transformation from its initial design to its final scope in 2023, which influenced the decision to focus efforts on practical, demonstratable and effective sustainability outcomes through the development of a tailored Sustainability Strategy.

The process to establish a Sustainability Strategy for the Project included:

- **Re-evaluation of Materiality Assessment and Objectives:** A Materiality Assessment was integral to developing the project's Sustainability Strategy. Alongside the Planning stage Objectives and Targets, the materiality and the Sustainability Strategy were reassessed, with input from the Alliance Management Team (AMT) and the broader Alliance team.
- **Preliminary LCA Development:** A preliminary Concept Design Life Cycle Assessment (LCA) was developed to understand the environmental impacts throughout the project's life cycle and to identify areas for improvement.
- **Identification of Opportunities:** The Concept Design LCA was used to identify and evaluate opportunities for meeting Energy & Carbon, Water and Resource Efficiency targets. Initiatives for priority delivery were recorded in the Sustainability Strategy, summarising the key opportunities for further investigation and implementation during the delivery phase.
- **Record and Review of Initiatives:** All initiatives are documented in the Project Risk and Opportunities Register. As new opportunities arise, they are reviewed and further investigated.
- **Refinement and Finalisation:** Preliminary results were discussed in multiple rounds with the project team, priorities were refined, and a final list of Objectives and Targets was proposed.
- **Implementation Planning:** The Sustainability Management Plan outlines the implementation actions, including timeframes, monitoring methods, responsibilities, and reporting procedures.

Fremantle Bridges Alliance has an experienced Sustainability Lead and Sustainability is managed in line with a developed Sustainability Management Plan (Plan) aligned with the Sustainability Policies from Main Roads and each Alliance Partner organisation. The Plan captures the vision and objectives that set the strategic direction for sustainability for the Project and focus on these areas will allow the Project to achieve sustainability outcomes beyond business as usual.

The Plan provides guidance on the work to be undertaken during the project Delivery phase and outlines the dependencies for facilitating successful integration of sustainability into the design and other activities to be carried out by the Fremantle Bridges Alliance. It is intended to provide guidance on the process the team will use to aim for the highest possible sustainability outcomes for the Project, and provides information on the:

- General approach to Sustainability for the Fremantle Bridges Alliance and the proposed methodology
- Details of the Sustainability aspects material to the project, its context and across its value chain (including methodology used to determine these aspects)
- Objectives, targets and reporting framework based on project's Sustainability Strategy
- Measures that seek to maximise project sustainability outcomes to guide the delivery of this phase of the Project

- Tasks and activities to be undertaken to deliver Sustainability outcomes for the Project
- Key roles and responsibilities of identified stakeholders
- Key recommendations for Sustainability, including specific initiatives to be included in the Project and opportunities for further investigation including estimated costs and benefits

3.2 Material Sustainability Issues

The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership (Figure 5). They recognise that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests.

The UN SDGs assessed as material to the Project include:

- UN SDG 3: Good Health and Well-Being
- UN SDG 6: Clean Water and Sanitation
- UN SDG 8: Decent Work and Economic Growth
- UN SDG 9: Industry, Innovation and Infrastructure
- UN SDG 11: Sustainable Cities and Communities
- UN SDG 12: Responsible Consumption and Production
- UN SDG 13: Climate Action
- UN SDG 14: Life Below Water
- UN SDG 15: Life on Land
- UN SDG 17: Partnership for the Goals



Project material sustainability issues were assessed as part of a materiality assessment in FY21 with key internal stakeholders, considering external stakeholder values in an interactive workshop. The materiality assessment was completed using the evaluation tool provided by the Infrastructure Sustainability (IS) Council and comprised a series of questions related to each credit within the IS rating scheme to identify and rate the most material Sustainability issues, objectives, opportunities and potential impacts (both positive and negative) from the perspective of both the project team and its stakeholders. Based on the materiality scores, the tool calculates the most material aspects and adjusts the credit weightings accordingly, as shown in the figure below.

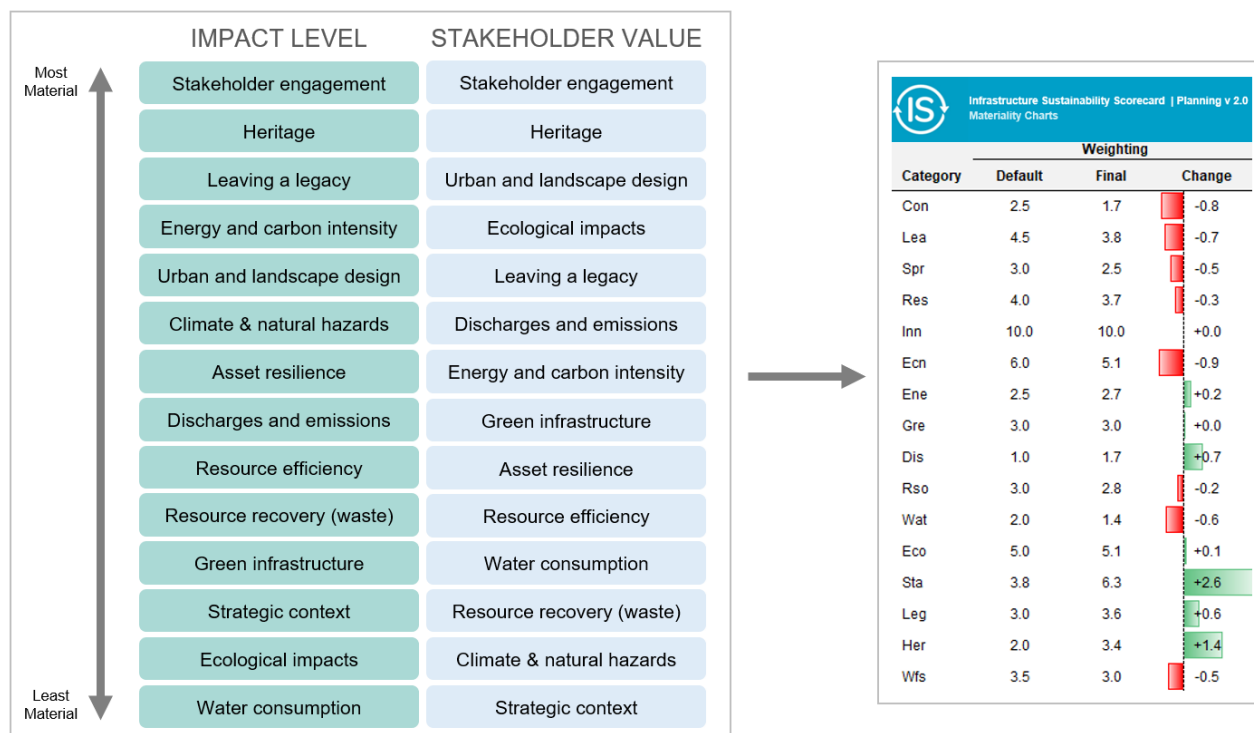


Figure 13 Materiality assessment based on the GRI method and using the IS tool

The materiality assessment was reviewed in August 2021 using the Global Reporting Initiative (GRI) 101: Foundations standard (2016) and the Natural Capital Protocol (2017). The GRI method assesses the significance of economic, environmental and social impacts, both now and in the future, as well as their importance to stakeholders. The GRI method identified the project's most material sustainability issues to be:



Stakeholder engagement

The Project has a high level of stakeholder and community interest due to its location, heritage status and funding allocation.



Protecting and enhancing heritage

There are various heritage sites within the Project boundary that will be impacted, including the historic Fremantle Traffic Bridge & Ferry Capstan, and the Swan River which is an Aboriginal heritage site.



Impacts to water, land and air

Construction impacts such as noise, vibration, dust, light and discharges/spills affect both the environment and our community.



Leaving a lasting legacy

Given the location and importance of the project, there are opportunities to leave a lasting legacy through social inclusion programs, heritage interpretation, ecological restoration, and supply chain advancement.



Energy and carbon intensity of the infrastructure

Carbon intensity is considered high due to materials used and operational energy expended. The Project will produce Scope 1, 2 and 3 CO₂-e emissions through construction, operation and maintenance through combustion of fuel, electricity consumption, production and transport of materials, vehicles on the roads, rail operations and decomposition of waste sent to landfill.



Ecological impacts and opportunities

The Project is located within the conservation area of the Swan River and has high social value, however it is a highly disturbed area with limited ecological significance.

During the development of the Sustainability Strategy, the materiality assessment was reviewed with the Alliance Management Team and the broader Alliance team, reassessing the new project scope. Objectives and targets were drafted for the reassessed material sustainability issues, or focus areas, being:



Figure 14 Sustainability Focus Areas

3.3 Sustainability Objectives and Targets

Table 1 Project Sustainability Objectives and Targets

Sustainability Objectives	Sustainability Targets	Performance
HERITAGE & LEGACY: Acknowledging and interpreting Aboriginal and European heritage of the area. Maximising social value through positive impacts on people, communities, and stakeholders. Maximising social value through the positive impact we have on our people and the communities and stakeholders we engage.	Incorporate at least three (3) specifically designed strategies to acknowledge and interpret European and Aboriginal Heritage in the design.	On track – several specifically designed strategies outlined in the Heritage Interpretation Plan and design.
	Establish a project Social Inclusion Committee to identify two (2) initiatives and volunteering opportunities that support the local community.	On track – social inclusion committee established, meet monthly with several initiatives and volunteering opportunities implemented with St Pats Community Centre and Friends of Cantonment Hill.
	Implement plans to ensure the safety of river, and road users, including maintaining connectivity during construction ensuring public safety during construction and minimise community impacts.	On track – plans developed and under implementation.
ENERGY AND CARBON: Reducing energy demand and GHG emissions and promote renewable energy innovations in construction.	Reduction of at least 10% of energy use and carbon emissions for capital and operational carbon.	On track – use of GreenPower, electric equipment including an electric truck and an electric crane, solar light towers, B5 biodiesel in construction.
RESOURCE EFFICIENCY: Ensuring resource efficiency during design, procurement, and construction.	Reduction of at least 5% of water use and demand compared to the approved baseline.	At risk – limited opportunities for reduction due salinity of bore water and requirement for establishment irrigation. Use of river water to cool pier concrete pours will reduce potable water use.
	15% reduction in materials life cycle impacts compared to the approved baseline.	On track – via use of low Global Warming Potential (GWP) concrete and reinforcing steel.

ECOLOGY: Enhancing the environmental value of the project site.	Incorporate at least one (1) opportunity for ecological enhancement of the riverine environment within the design.	In Progress – One legacy benthic habitat improvement opportunity was developed and supported by DBCA, but deemed unfeasible due to cost and uncertainty over ongoing maintenance & monitoring requirements. FBA have identified a second benthic habitat enhancement opportunity which has been endorsed by DBCA and is a first in Western Australia. It is currently being further developed.
CLIMATE CHANGE ADAPTATION AND RESILIENCE: Incorporating climate adaptation into the assets that we build.	Undertake a detailed Climate Change and Resilience assessment to ensure design mitigates all identified high or above natural hazard and climate change risks to roads.	Achieved – A detailed assessment for the revised bridge design was completed in November 2024 with all treatment measures integrated into design.

3.4 Climate Change Assessments

The climate change, natural hazard, and community resilience work completed for the project was initiated in 2021, as part of the planning phase, and continued into 2022 during the early design phase. The following tasks were completed as part of this phase of the project:

- Completion of climate change and natural hazard risk screening assessment
- Completion of community resilience shocks and stresses screening assessment
- Identification of climate change and natural hazard risks related to the project
- Identification of resilience shocks and stresses related to the project
- Socialisation of associated risks to internal project team through a workshop
- Identification of relevant adaptation measures to reduce associated risks to Project
- Socialisation of design and operational requirements to relevant external stakeholders
- Completion of a Climate Change, Natural Hazards and Resilience Plan to summarise findings from the above activities

The assessment was then updated to reflect the change in Project scope following the redesign, in November 2024 at 85% design stage, confirming that the risks identified are still relevant, and identifying any new risks emerging due to the changes in design, including identified adaptation measures. The main changes in design scope assessed were as follows:

- Removal of new rail bridge from scope, existing rail bridge to remain and is not within the scope of the Project.
- Simplified interchange to the south of the SRC with Canning Highway no longer running underneath the bridge structure.
- New road bridge to be built over the existing bridge, with the existing bridge to be demolished during this process, rather than being built to the west of the existing.

As the project assets will have an asset life of over 100 years, two emissions scenarios were considered (RCP4.5 and RCP8.5). RCP4.5 was considered for 2030 for the immediate future for assets with less than 10-year asset lives, e.g. some road surfaces and landscaping elements. Other assets with a longer asset life were assessed against both the RCP4.5 and RCP8.5 to capture the full life of the asset.

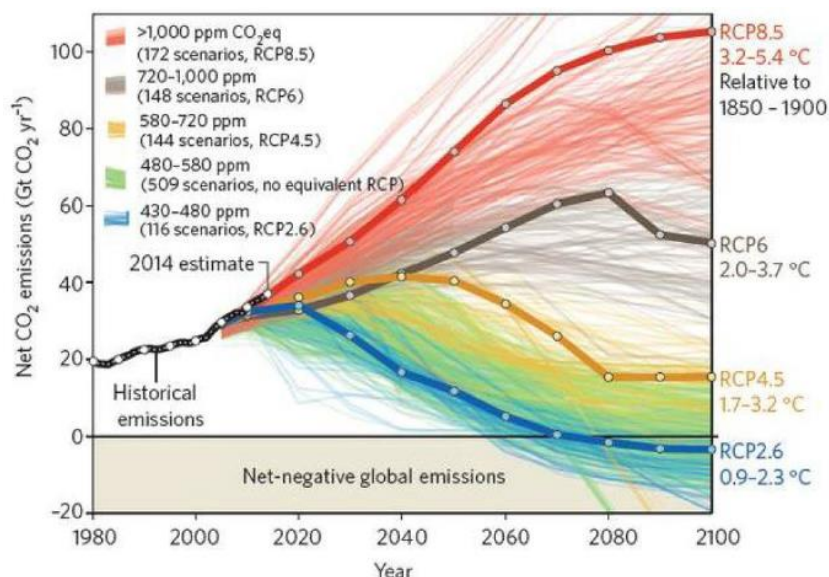


Figure 15 Emissions Scenarios, Intergovernmental Panel on Climate Change

3.5 Technology and Innovation

One of the goals of the Alliance was to leverage Building Information Modelling (BIM) across the design, construction, and handover phases of the project. Part of that meant utilising the BIM models and digital tools for measuring, tracking, and reporting on carbon. The Alliance also has ambitious embodied carbon targets and is utilising low-carbon materials, such as low-carbon concrete, in the construction.

There was a hypothesis that BIM can automate quantity take-offs of designs and link the BIM models to embodied carbon information, thereby automating the measurement of embodied carbon in construction projects. In this case study, we have embedded the embodied carbon information back into the model.

The embodied carbon information comes from the Global Warming Potential (GWP) of products provided to the Alliance from our suppliers through the procurement process. This integration allows us to visualise the carbon 'hot spots' of the design and serves as a powerful communication tool for the Alliance team to better understand the complex issue of embodied carbon in construction.

The implementation of this process requires several key factors to be successful:

- Collaboration from all relevant stakeholders on the project (Designers, Sustainability team, BIM team, Procurement team, etc.) to ensure the right information is embedded into the models.
- Consistent naming of elements in the BIM models is critical to ensure that the data entered into the model leads to verifiable outcomes.
- It is essential to ensure quantity information is included in the BIM model to allow for automation of the take-offs.

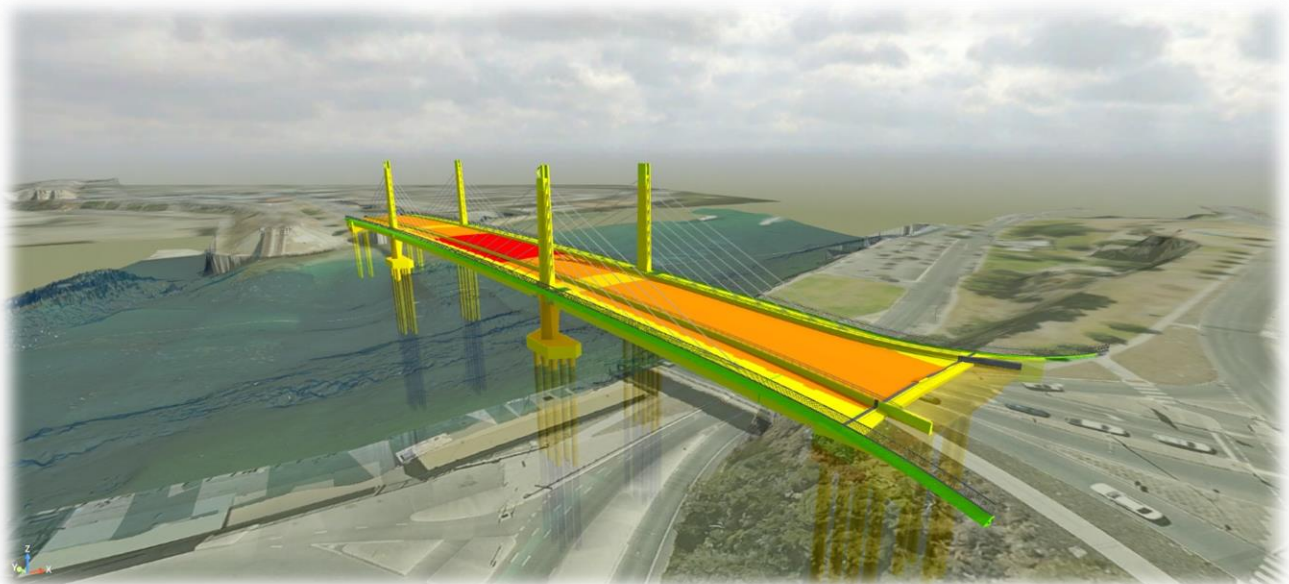


Figure 16 Embodied Carbon Heat Map in Revizto

3.6 Innovation Case Study – Australian First

The project, in collaboration with Select, have driven the use of electric vehicles and equipment, as well as renewable energy sources to reduce greenhouse gas emissions. The project has utilised the following throughout construction:

- Electric flatbed truck
- Solar powered fuel pods x 4
- Solar powered temporary lights x 8
- Solar powered caravans for onsite office/crib rooms x 2
- Hybrid vehicle

Further to this, the project wanted to push the boundaries and has invested in utilising the first mobile powered Electric Crane in Australia, for exclusive use in the Bracks Street laydown yard. The crane is a high performance 250t Liebherr Crawler Crane, with a powerful, efficient and reliable electro-hydraulic drive system combined with a high-performance lithium-ion battery. It offers the same lifting performance as conventional diesel models, however it operates with zero emissions. Its battery-powered system reduces fuel use, lowers maintenance costs and significantly decreases noise on site - key advantages for urban construction environments. It is estimated to save 18,750 litres of diesel annually, which equates to an annual saving of 50,000 kgCO₂eq.

The key with use of this crane is the addition of a portable battery on a trailer delivering 210kwh to the crane. Charging of the cranes was a drawback for hire previously with the other crane used in a Sydney project being stationary and plugged in at all times to an electricity source. The battery on a trailer revolutionises it to an autonomous crane and the project is currently investigating the addition of solar panels for the battery to utilise a renewable energy source as well as mounting an additional battery to the crane.

The crane's performance in 'plugged' operation is in no way inferior to a diesel driven crane and it can be used without limitations as the battery charges continuously always delivering sufficient energy. The crane's performance in 'unplugged' operations allows for travelling approximately 650 meters with full counterweight or for approximately 8 hours of crane operation.



Figure 17 Electric Crane with battery

3.7 Innovation Case Study – Western Australian First

The project is using B5 biodiesel to fuel all four cranes on the temporary jetties located at each corner of the bridge construction for 2 years, which equates to approximately 740 kilolitres (kL) of B5 biodiesel. This is the first construction project in Western Australia to use biodiesel, enabling the supplier to create market transformation and availability for future projects due to certainty of use on this project.

The environmental performance outcomes of using biodiesel include greenhouse gas benefits: on a full life cycle basis the B5 greenhouse emissions are 2 per cent lower than petroleum-derived diesel and air quality benefits: on a full life cycle basis B5 has a reduction in carbon monoxide emissions of almost 12 per cent and a reduction in volatile organic compounds (VOCs) of 5 per cent.

Biodiesel is typically derived from renewable feedstocks such as fats, vegetable oil, used cooking oils, agriculture and forestry residues, household waste and animal tallow. These feedstocks can be produced indefinitely, using sustainable farming techniques to provide an environmentally friendly, sustainable fuel. It offers carbon neutrality – plants absorb CO₂ from the atmosphere and store the carbon primarily in the form of carbohydrates and oils. By using vegetable oils as a raw material, biodiesel recycles carbon through the biosphere, allowing a significant reduction in carbon emissions when compared to traditional sources of energy.

The B5 biodiesel blend incorporates 5% biodiesel mixed with 95% traditional petroleum diesel. B5 diesel serves as a bridge fuel, easing the transition from conventional diesel to more sustainable alternatives. Its relatively low biodiesel content means it's largely compatible with existing diesel engines without modifications.



Figure 18 Temporary Jetty Cranes on project site powered by biodiesel

4 Economic

This section provides a summary of the Project's economic context and key objectives driving the Project delivery phase.



Figure 191 Aerial image of Fremantle

4.1 Economic Context

Fremantle | Walyalup has always been a place of connection, trade and exchange. A significant place for Whadjuk Noongar people for over 60,000 years, and for 120 years home to a working port – a key economic driver for the local community and Western Australia.

Road network links across the Swan River at Fremantle Harbour are serviced by two bridges, each performing complimentary transport tasks. The Fremantle Traffic Bridge crosses the Swan River upstream from the Port of Fremantle's Inner Harbour and the Fremantle Railway Bridge. Safe and reliable commuter and local transport access in the area surrounding the Port (as provided by Fremantle Traffic Bridge) is necessary for efficient movement of local people and vehicles and to ensure that freight routes are not congested with local traffic.

The Fremantle Traffic Bridge carries approximately 25,000 vehicles per day. It provides a connection for general vehicles and public transport services between North Fremantle (and areas further north) and Fremantle centre to the south. Ferries and private water vessels are required to pass under the bridge to travel into or out of Fremantle Port's Inner Harbour and further up the Swan River towards the Perth CBD.

To the east of the Fremantle Traffic Bridge is the Stirling Bridge which is a designated Strategic Road

Freight Route connecting Canning and Leach Highways to the south with the Port of Fremantle's Inner Harbour to the north. The Stirling Bridge currently carries approximately 34,400 vehicles per day, of which approximately 16% are heavy vehicles.



Figure 20 2Fremantle Port

In parallel to the Swan Rivers Crossings Project, the Westport Taskforce (Westport) is proceeding with planning to resolve future container trade constraints in Western Australia by relocating container trade from Fremantle to Kwinana. This includes planning new port facilities, a connected road and rail freight system, and logistics operations.

In line with this relocation, the State Government Future of Fremantle Planning Committee has developed a comprehensive social and economic strategy that will unlock the site across six unique precincts as a future waterfront city. It will reconnect Fremantle with its waterfront and create a pathway to deliver a range of homes, open spaces and supporting infrastructure for 55,000 new residents. It has potential to support 45,000 new jobs and to generate \$13.6 billion in gross state product annually.

4.2 Economic Aspects Management

The Sustainability commitment of the Alliance to create lasting benefits by incorporating practical, demonstratable and effective Sustainability outcomes was integrated into the Procurement and Commercial strategy of the project.

The Alliance procurement processes incorporate sustainable procurement into the Procurement and Commercial Management Plans. These plans align with the State Government's industry sustainability and participation policies and strategies, including:

- WA Buy Local Policy
- WA Industry Participation Strategy (WAIPS)
- Aboriginal Procurement Policy (APP)

4.3 Key Economic Outcomes

4.3.1 Project Economic Parameters

Table 2 Summary of Economic Metrics

ECONOMIC METRICS	UNIT	TOTAL THIS PERIOD	TOTAL FOR PROJECT
Funding Received	\$	162,000,000	430,000,000
Aboriginal Business Spend	\$	4,430,000	4,730,000
Aboriginal Businesses	#	26	31
Disability Enterprises	#	0	0
Suppliers Engaged	#	215	224
Buy Local Spend	\$	156,291,000	173,533,000
Length of Principal Shared Path (Addition/Refurbished)	km	0	0.85

4.3.2 Project Economic Benefits

Key benefits from the Project include the following:

- Significant improvements in safety for vessels navigating the river channel, through removal of the Fremantle Traffic Bridge, which is particularly hazardous for navigation, including increased bridge clearance.
- Improved safety for pedestrians and cyclists through the provision of an improved principal shared path (PSP) across the new road bridge. This will be a significant improvement over the current pedestrian walkway which provides inadequate separation from vehicles.
- Supporting the WA economy and creating local jobs during the road out of COVID-19.
- Better pedestrian and cyclist access: Dedicated modern facilities will streamline non-vehicular movement, reducing conflicts and delays for all users.
- The new infrastructure is designed to accommodate more vehicles per day than the current bridge, which was built in 1939 and no longer meets modern traffic demands. The project aims to significantly boost daily throughput by replacing outdated infrastructure with high-capacity, safer alternatives.

- The Swan River Project contributes to the greater economic development strategy by improving road, pedestrian, and cycling infrastructure, the project supports WA's integrated transport strategy, which is key to long-term economic efficiency and sustainability.

The key economic focus areas and priorities for the client and stakeholders related to the project are summarised below:

Table 3 Summary of Economic Metrics

Stakeholder	Key Economic Focus Areas
Main Roads WA	- Transport efficiency - Safety and sustainability - Integration with WA transport strategy
Fremantle Bridges Alliance	- Innovation and engineering excellence - Local job creation - Cost-effective delivery
WA State Government	- Economic recovery and growth - Infrastructure-led development - Urban revitalisation
Australian Government	- National infrastructure pipeline - Freight and logistics efficiency - Regional development
Local Governments	- Place-making and urban renewal - Local business support - Heritage and cultural values
Local Businesses & Industry	- Improved access and logistics - Increased foot traffic - Reduced transport costs
Community & Residents	- Job opportunities - Improved mobility and safety - Enhanced amenity and connectivity
Environmental & Heritage Groups	- Sustainable development - Cultural and environmental preservation

4.3.3 Sustainable Procurement

The Project has committed to work constructively with Australian industry to identify and develop options for maximising local content in performing the work and delivering the Project.

Main Roads has developed an over-arching Industry Participation Plan (IPP) to help achieve this objective and to ensure consistency with the State Government's Building Local Industry Policy. The Industry Participation Plan details the strategies that will be undertaken to ensure Australian industry is provided a full, fair, and reasonable opportunity to participate in all aspects of the Works.

Furthermore, the Procurement Management Plan has been developed for the Project to identify and award separate packages of works to a range of lower level prequalified (under the National Prequalification System) road and bridge contractors. The aggregate value of these packages must be a minimum of \$15 million.

The Project has undertaken an assessment to identify procurement packages that have material Sustainability risks and/or opportunities. The Procurement Management Plan also ensures procurement processes integrate with sustainable outcomes, especially for significant subcontractors and supplier packages. Through early engagement with the supply chain, we provide greater

transparency on our Sustainability targets and influence others to embed sustainability in their policies. All packages are assessed on their sustainable policies and practices as part of the non-price evaluation as part of our procurement process.

All contracts include sustainability requirements, as well as audit and reporting requirements with monitoring of compliance through our contract management processes. Significant subcontractors and suppliers are required to engage with our sustainability team to identify their sustainability objectives, initiatives, resource efficiency, innovations, and their commitment to sustainable procurement in their supply chains.

An Aboriginal Participation Plan has been developed by the Project and provides opportunities for employment to Aboriginal People and opportunities for Aboriginal Enterprises to tender for subcontract works to provide goods and/or services to the Project. The Project has implemented the following targets for Aboriginal participation:

- Aboriginal Employment Target –at least 8% of the Total Work Hours by Aboriginal Persons
- Aboriginal Business Procurement Target – works and/or services to a value of at least \$5million are undertaken by Aboriginal Businesses.

All suppliers and subcontractors are required to subscribe to the relevant strategies in the Industry Participation Plan and Aboriginal Participation Plan and cascade them to all tiers of their supply chains.

4.3.4 Aboriginal Participation

The Alliance completes continual reviews of the procurement packages that are aligned to known Western Australia Aboriginal business capabilities. Initially over 20 packages were identified as high opportunity areas for Aboriginal businesses have been specifically identified, with the Project aspiring to involve Noongar and Walyalup businesses. The Project has an Aboriginal Business procurement target for works undertaken by Aboriginal Business, being a business registered on Supply Nation's Indigenous Business Direct or the Aboriginal Business Director of WA. The project spend to date is on track to achieve this target with future growth forecasted to exceed this requirement.

The Project, in collaboration with the Construction Participant Laing O'Rourke (LOR) have developed and continue to run the Connect-Gather-Grow Program. The LOR Connect-Gather-Grow program has been designed to foster the inclusion and development of Aboriginal businesses into the supply chain. Connect-Gather-Grow will be used to communicate the Project tendering opportunities and generate sustainable development of Aboriginal businesses beyond the life of the Project. There are multiple briefing sessions during the Connect-Gather-Grow program, increasing opportunities to interact directly with the Aboriginal businesses that are participating.

The Alliance has been provided a standing inclusion on the Connect-Gather-Grow agenda, so Project updates and upcoming tender opportunities can be presented at each event.

4.3.5 Disability Enterprise

Cameron Collects is a business created for Cameron who lives with an acquired brain injury after surviving Pneumococcal Meningitis as a baby. With support, Cameron is collecting recyclable drink containers and recycling them through Containers for Change WA to help save the planet and spread awareness that anybody with disabilities can live a meaningful life.

Collection bins have been set up at the Project site office in North Fremantle. Staff now have an easy way to ensure their drink containers are recycled through Containers for Change WA while supporting Cameron on his journey to reach his goals.



Figure 21 Cameron with project team members³⁴

To learn more about Cameron Collects and his inspiring initiative, please view his website [here](#).

4.3.6 Sustainable Transport

Existing connectivity for pedestrians and cyclists in and around the site and in the general area has the opportunity to be greatly improved.



Figure 22 Existing connectivity

The project has considered connectivity through urban and landscape design planning, with the following principles:

Principle 4 | Functionality & Build Quality

The project meets the needs and expectations of the local Fremantle community, providing robust and functional amenity to pedestrians, cyclists and vehicles as well as quality built form for train, boat and vehicular movements.

Principle 5 | Sustainability

The project delivers positive environmental, social and economic outcomes contributing to the protection and enhancement of the Swan River environment, social connectivity and supports the urban growth of Fremantle.

Principle 6 | Amenity

The project provides accessible, comfortable public spaces and pedestrian networks, that encourage social engagement, cultural connection and flexibility in activation enabling a range of uses.

Principle 7 | Legibility

The project is easy to navigate, with clearly defined and cohesive movement networks and good connectivity to local businesses and residential communities, local destinations, PSP networks and regional traffic networks.

Principle 8 | Safety

Movement throughout the project is underpinned by safety, to ensure local community and visitors to the project feel safe and comfortable both day and night.

The Project aims to greatly improve existing connectivity for pedestrians and cyclists in and around the site and general area, as evidenced by the new path connectivity the figure below.

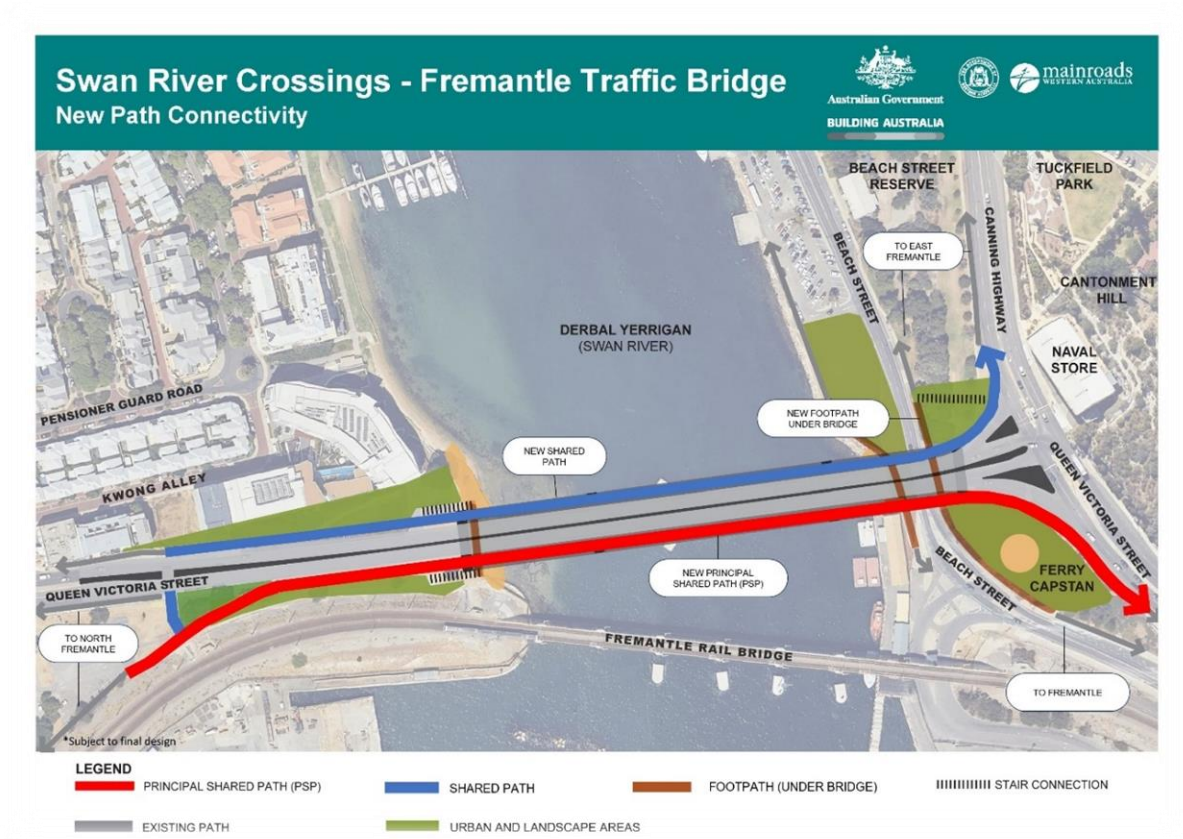


Figure 23 Improved connectivity following the project build

4.4 Economic Case Study

As part of its efforts to promote industry sustainability, the Alliance assessed companies listed in the National Prequalification System for Civil Construction to find qualified subcontractors among smaller (2nd and 3rd tier) road and bridge contractors. Following the mapping against the procurement packaging plan and workshops with Engineering, Commercial and Design teams, the Alliance jointly agreed upon a list of both prequalified and not qualified potential subcontractors suitable to tender on set packages.

Brady Marine & Civil Pty Ltd

Table 4: NPS Prequalified Contractor Details

ASSESSMENT DETAILS						MUTUAL RECOGNITION							
Assessing Road Authority	Highest Category Awarded		Financial Level	Pre qualification Status	Expiry Date	* Assessing Authority ✓ Mutual Recognition							
	Road	Bridge				ACT	NSW	NT	QLD	SA	TAS	VIC	WA
TMR	R2	B4	F75	FULL	28-Feb-26		✓		*		✓		

The procurement and approval process for the complex marine piling construction package for the Project focused on sustainability embedded throughout various stages. The selected contractor, Brady Marine & Civil Pty Ltd, chosen for their expertise in delivering complex marine infrastructure and their capacity for collaborative engagement. Sustainability was considered in both the project planning and technical evaluation, from the economic benefits of upskilling a Tier 2 contractor to working in Collaborative Commercial models to environmental benefits associated with the removal and reuse of the temporary jetties on future projects.

Brady Marine & Civil Pty Ltd is a national marine infrastructure contractor with specialist skills in the design management, procurement, construction, and installation of complex marine infrastructure. Brady provides self-delivery expertise with its own fleet of company owned marine construction plant and equipment, offering a reliable, whole-of-project solution.

The package included marine-based environmental management activities and aims to minimise ecological disruption during construction. Brady’s proposal included to use a modular jetty platform to increase future reuse demonstrating commitment to cost effective solutions, reducing material wastage and environmental impact. The procurement strategy also prioritised early contractor involvement to ensure constructible design and reduce waste. Social impact, Aboriginal engagement, and local content were evaluated during the procurement process.

The contract structure incentivised performance through a risk-sharing model, encouraging efficient and responsible delivery. Despite challenges in the marine construction market, such as resource scarcity and logistical complexity, the project team proactively addressed these through strategic planning.



Figure 245 Economic Case Study - Brady Marine & Civil Pty Ltd

5 Environmental

A summary of environmental performance and parameters for the Project is detailed in the table below.

Table 5 Summary of Environmental Metrics

ENVIRONMENTAL METRIC	UNIT	TOTAL THIS PERIOD	TOTAL FOR PROJECT
Vegetation Cleared	ha	0.07	2.6*
Vegetation Retained (due to design)	ha	0.15	0.15*
Revegetation/rehabilitation Undertaken	ha	0	0
Number of Significant Trees Retained (due to design)	#	5	5
Water Consumption	kL	13,407	13,407
Non-Potable Water Consumption	kL	4,160	4,160
Potable Water Consumption	kL	9,247	9,247
Energy Consumption (100% Green Power)	MJ	540,468.43	540,468.43
Renewable Energy Consumption	MJ	16,794.00	16,794.00
Imported Virgin Materials (Used Onsite)	t	28419.18	28419.18
Recycled Materials (Used Onsite)	t	9185.30	9185.30
Reused Materials (Used Onsite)	t	13.76	13.76
Waste Sent to Landfill	t	155.52	155.52
Waste Diverted from Landfill	t	1421.81	1421.81

* Based on current Urban Landscape Design with inclusion of vegetation to be retained based on constructability.
* 0,07 of native vegetation and 2,53 of non-native vegetation

5.1 Environmental Context

The Project directly intersects the Swan River, immediately upstream of the Fremantle Port and is within the Swan Canning Riverpark. The Swan River Estuary, classified as an Estuary-Waterbody, is a Conservation Category geomorphic wetland and discharges to the Indian Ocean approximately 2.7 km southwest of the Fremantle Traffic Bridge. Conservation category wetlands are the highest priority wetlands, with management having the objective of preserving and protecting existing conservation values.

The Swan River contains a mix of marine and estuarine species, including turtles, swans, seals, crustaceans, fish and sharks. The Inner Harbour is an important route for the migration of fish, crabs and prawns between the Swan River and the ocean. As well as being home to a small resident community of Indo-Pacific bottlenose dolphins (*Tursiops aduncus*).



Figure 25 Fremantle Traffic Bridge, Swan River and Cantonment Hill

5.2 Environmental Management

5.2.1 Approach to Environmental Management

The environmental significance of this Project is widely understood by Main Roads and the Alliance and is a fundamental priority for the local community and stakeholders. An Environmental Management Plan (EMP) and several sub-management plans have been prepared outlining requirements for environmental management; the relevant environmental legislation and other environmental obligations associated with construction of the Project.

DBCA is responsible for the management of the Swan and Canning rivers. DBCA approves commercial activities permits and makes recommendations on development proposed in the Swan Canning Development Control Area (DCA) to the Minister for Environment. The detailed methodology, planning and staging for each key phase of the project is provided to WAPC and advising stakeholders including DBCA for review and endorsement via detailed Construction Work Method Statements (CWMS). CWMS are developed and when approved, provide additional guidance on management controls and construction methods for each approved stage of works. During the review process of each CWMS, related environmental management plans are updated to reflect changes to management controls as required.

The Project is committed to best practice environmental management, in line with the Environmental Policies endorsed by both the Alliance and Main Roads. The Project team is committed to protecting the natural environment and social values in all activities.

5.2.2 Approvals and Permits

An Environmental Impact Assessment was completed by Main Roads to assess the potential for environmental impacts from the Project. The proposal was referred to the Environmental Protection

Authority (EPA) for assessment in 2020. Following completion of the environmental studies and public consultation, the EPA received an updated referral pack on 24 September 2021. Following a review of the information and a period of public comment, the EPA decision was that the Project did not warrant formal assessment under Part IV of the *Environmental Protection Act 1986*.

The following table details the applicable environmental approvals for the Project.

Table 6 Environmental Approvals

Approval	Applicable Legislation	Relevance to Project	Lead Authority
Development Approval	<i>Planning and Development Act 1997</i>	Main Works [Note – excludes works considered to be permitted development (rail works within the “rail reserve”, road works within the “primary regional road reserve” and port works within the “port reserve”)]	Western Australian Planning Commission
Activity Permit (Form 7)	<i>Swan & Canning Rivers Management Act 2006</i>	Early works and investigations within the Development Control Area	Department of Biodiversity Conservation & Attractions (DBCA)
Section 18	<i>Aboriginal Heritage Act 1972</i>	Impacts to Registered Sites (Site ID 3536 Swan River, Site ID 3419 Fremantle: Cantonment Hill and Site ID3 596 Rocky Bay)	Aboriginal Cultural Material Committee (DPLH)
Port Approvals	<i>Port Authorities Act 1999</i>	Required for any proposed developments or changes within the Fremantle Port	Fremantle Port Authority
Dewatering Permit	<i>Rights in Water and Irrigation Act 1914</i>	Licence to install a well (26D) Licence to abstract water (5C)	Department of Water and Environmental Regulation (DWER)

Due to the complexity of the project and number of stakeholders involved as ‘Advising Agencies’, a staged approach to clearance of WAPC Development Approval (SDAU-061-23) conditions is required. For each main phase of works, detailed Construction Work Method Statements and site-specific management plans are prepared and issued to eight advising agencies for review and approval before works can commence. These Development Approval Clearance and key works phases have been apportioned as follows:

- Phase 1A: Clearing and Temporary Jetty Abutments
- Phase 1B: Temporary Jetties Construction
- Phase 2: Permanent Piles & Pile Caps
- Phase 3A: Design Strategies
- Phase 3B: Bridge Substructure
- Phase 3C: Remaining Permanent Works
- Phase 4: Bridge Demolition and Jetties Removal

Some environmental approvals and licences provision specific allowances including clearing permits, water extraction licences, industrial licences for emissions or discharges etc. A summary of environmental allowances and approved environmental quantities are provided in the table below.

Table 7 Environmental Allowances, Approvals and Permits

ENVIRONMENTAL ALLOWANCE TYPE	UNIT	PROJECT ALLOWANCE	ALLOWANCE USED (Project to date)
Native Vegetation Clearing Permit Allowance (CPS818)	ha	0.83	0.07
Water Abstraction Licence (annual)	kL	75,000	13,407

5.3 Key Environmental Factors and Outcomes

5.3.1 Vegetation and Clearing

The project area has been previously cleared and landscaping planted from the 1970s to early 2000's following bridge and roadworks through the area. Vegetation on the southern embankments is replanted but contains a significant portion of locally occurring species as if to be representative of (i.e. mimicking) native vegetation. Whilst vegetation within the application area is not considered native vegetation, some areas may contain limited natural regeneration. As such, the same approvals process used for native vegetation has been employed as a precautionary measure for the purposes of project clearing approvals.

Bush Forever Site 490 (Cantonment Hill) is adjacent to southern edge of Project area but will not be impacted by the works.

Clearing activities associated with this Project have been minimised as far as reasonably practicable, however some clearing of planted/verge vegetation has been required for the construction of the Project. The Alliance has implemented a hold point for any site clearing and vegetation trimming, whereby a Ground Disturbance Permit is required to be prepared, verified and confirmed the disturbance footprint has been approved by relevant stakeholders prior to the commencement of vegetation removal.

5.3.2 Revegetation/Rehabilitation

An Urban and Landscape Design Strategy has been developed for the Project, identifying opportunities to enhance vegetation through landscaping and foreshore rehabilitation, which is currently under review with stakeholders.

A key component of the landscaping design involves the retention of a large stand of mature trees on the southeast escarpment that contains a significant portion of locally occurring species. Disturbance of this area has been avoided through careful design and construction management, including the development of terraced landscaping, relocation of permanent structures & utilities, on-site controls and advice from experienced arborists to guide works near tree protection zones.

5.3.3 Fauna

The Swan River contains a mix of marine and estuarine species at the Fremantle Traffic Bridge, including invertebrates, dolphins, seabirds, sharks and bony fish. The Fremantle Inner Harbour is an important route for the migration of fish, crabs and prawns between the Swan River and the ocean, and a resident group of Indo-Pacific Bottlenose Dolphins use the Inner Harbour year-round.

The Inner Harbour has a low level of benthic habitat and communities, due to historical disturbance of the area in its use as an active port and ongoing maintenance dredging. Seabed habitat in the project area was either dominated by coarse sands or exposed hard substrate (rock and substrates of anthropogenic origin) beneath the bridges and jetty.

Benthic marine fauna of recreational and commercial significance, including river prawns and crabs, are resident or pass through the area in seasonal migrations. Hard substrates in the area may support populations of seahorses which are of conservation significance and, being strongly associated with a small area of habitat, could be affected by removal of hard substrates e.g. old piles and rocks. For other riverine developments, sea horses have been relocated from areas to be disturbed (RPS, 2021).

The Project has undertaken various scientific studies relating to fauna, including an underwater noise and vibration assessment. Due to the potential impacts from piling and other marine works, observations zones and exclusion/shut-down zones were established and are being observed by trained Marine Fauna Observers during piling works to minimise impacts on marine fauna. The Project is also in final stages of developing benthic habitat creation initiatives to be implemented in the project area and providing support to broader scientific research.

No significant habitat for terrestrial fauna occurs within the Project footprint, with no natural and little artificial habitat remaining for terrestrial fauna. Waterbirds may utilise the area, but there is no significant foraging or nesting habitat present.

5.3.4 Water Resources

The Swan River Estuary is a 'Conservation' category geomorphic wetland and is protected under the Swan and Canning Rivers Management Act 2006 (SCRM Act) and under the Development Control Area, specified in the SCRM Act, applies to areas upstream of the Fremantle Traffic Bridge. Conservation category wetlands are the highest priority wetlands, with management having the objective of preserving and protecting existing conservation values.

The Project area lies within a Proclaimed Groundwater Area as defined under the *Rights in Water and Irrigation Act 1914*. Groundwater throughout the Project area is likely to be saline due to saltwater intrusion to the surficial aquifer. However, this may still be suitable for construction purposes, but it is unlikely to be suitable for irrigation.

Consultation with Fremantle Ports, DBCA and Department of Water and Environmental Regulation (DWER) will continue through project development to ensure that construction impacts are mitigated and appropriate licenses are obtained.

A demand assessment of significant water use for the Project has also been undertaken to provide reasonable estimates or predictions of all key activities requiring water use over the life of the asset, including construction and operation. The Fremantle Bridges Alliance has undertaken an analysis of water reduction opportunities and developed a Water Reduction Strategy, with identification of opportunities to minimise or avoid water use during construction and operation:

Construction

- Use of rainwater tanks on site sheds to service site amenities for toilet flushing
- Use non-potable bore water for dust suppression, compaction and earthworks during construction.
- Use of river water for cooling concrete pours for the Tower construction

Operations

- Selection of drought tolerant native species: Planting palatka has been selected to reduce overall irrigation requirements for establishment period

Table 8 Water Metrics

WATER METRICS	TOTAL THIS PERIOD		TOTAL FOR PROJECT	
	kL	%	kL	%
Potable Water				
Standpipe / Scheme Water Purchased	9,247	45.5	9,247	45.5
Non-Potable Water				
Bore Water	4,160	20.5	4,160	20.5
Surface Water	6,912	34	6,912	34
Recycled / Reused	0	0	0	0
Total Water Used	20,319	100.0	20,319	100.0

5.3.5 Contaminated Sites

A Detailed Site Investigation was completed in December 2021. Key findings included:

- Poor quality fill was identified and will require management during construction to avoid risks to construction works, surrounding site users and the Swan River
- Isolated exceedances of contaminants in fill materials across small areas of the project footprint
- No significant groundwater contamination, and minimal evidence of acidification. Groundwater is generally neutral across the groundwater network and had significant acid buffering capacity (alkalinity) when compared to acidity concentrations
- Sandy soils in the vicinity of the groundwater interface are classified as Potential Acid Sulfate Soils (PASS), however contain adequate acid neutralising capacity (ANC) such that additional lime neutralisation will not be necessary during construction
- Soils associated with the Osborne Formation (~30 to >65 mbgl) are also PASS however contain negligible ANC and will require management if excavation volumes exceed 100m³.

Following the identification of potentially contaminated soils and PASS, a process for handling, management and remediation has been developed into the project's EMP and a stand-alone Acid Sulfate Soil Management Plan. Due to the constrained work area, off-site remediation has been utilised as the primary management measure in an effort to maximise the avoidance of disposal at landfills. To date, approximately 94% of excavated soils including PASS and contaminated historical fill has been remediated for future reuse, with only 6% of soils requiring landfill disposal and burial due to the nature of contaminants encountered.

5.3.6 Noise and Vibration

The Fremantle Traffic Bridge and the rail bridge are currently in operation, and there is an existing level of road traffic noise that affect adjacent noise sensitive receivers.

Construction noise has the potential to affect nearby noise sensitive receivers. Piling noise in particular was recognised to have a noticeable impact on nearby sensitive receivers and potential to affect the structural integrity of some buildings. A Construction Noise and Vibration Management Plan has been developed by acoustic specialists and is implemented throughout construction to minimise disruption on nearby receivers. Feedback from our local residents was that the actual noise experienced was less than they expected.

The State Heritage listed Fremantle Traffic Bridge and Public Transport Authority rail assets are recognized as crucial assets where public safety must be ensured throughout the construction program. Specific vibration and displacement monitoring programs and management procedures have been developed for these crucial assets in conjunction with the asset owners.

Underwater noise is also recognized as a significant risk requiring assessment and management to ensure construction activities do not cause harm to marine fauna species, human divers and swimmers. Identification of works that have the potential of generating significant or impactful underwater noise and modelling of the underwater noise attenuation has been undertaken and validated through aquatic noise monitoring during piling. Please refer to the Case Study that follows. Based on the impact assessment and predicted noise levels throughout the affected portions of the Swan River, an Underwater Noise Management Plan has also been developed and successfully implemented through the five-month piling program.

5.3.7 Carbon Emissions and Energy

Laing O'Rourke, a non-owner participant in the Alliance, has recently released ambitious targets related to carbon emissions and energy use:

- Achieve Net Zero Operational Carbon Emissions (Scope 1 and 2) by 2030
- Achieve Net Zero Scope 3 Emissions by 2050.

The Fremantle Bridges Alliance will leverage this sustainability strategy and contribute to its success through implementation of energy reduction initiatives and investigation of renewable energy use. The Project has undertaken preliminary energy modelling and identified opportunities for reductions and use of renewable energy. The following have been implemented to date:

- Purchase of Green Power certificates for site office electricity use across all sites
- Use of a hybrid SUV electric vehicle, electric flatbed truck and electric 250t crane
- Use of solar powered construction site facilities (solar caravans), fuel pods and lights
- Reducing emissions related to transport by rationalising on-site material movements, set up of a local precast yard, and sourcing imported materials locally where viable
- Reducing on-site plant and equipment emissions through use of B5 biodiesel in cranes and reduction in material movement.

5.3.8 Materials and Recycling

The Project is committed to sustainable materials management and resource efficiency through use of the Waste Hierarchy and application of circular economy principles. The Alliance has developed a Resource Efficiency Strategy and Action Plan for the project that clearly sets out the requirements, commitments, management, and approach to ensure resource efficiency to works delivery for the duration of the project.

Included are resource efficiency expectations for project delivery and operation and project-specific resource efficiency targets for each phase of the infrastructure life cycle, potential partnerships, strategic logistics and up-to-date regulatory approvals/permitting information. The plan identifies goals, targets, key actions, responsibilities, and applicable project lifecycle against opportunity areas for materials (inputs) and waste (outputs).

Resource efficiency objectives / goals for the Project are defined below, and resource efficiency opportunities are detailed in the plan:

1. Reuse & Recovery - To reduce consumption of natural resources by decreasing waste generation and increasing reuse and resource recovery (Avoidance, Reuse, Recycling, Recovery)
2. Materials Optimisation - To maximise the use of recycled products, whilst maintaining design life and performance, and minimise use of virgin material (Avoidance)
3. Waste Efficient Procurement - To minimise waste in production, delivery and use of resources (Avoidance)
4. Deconstruction - To design the asset with the ability for materials to retain their integrity and value at the end of the asset's service life (Avoidance)
5. Social or Economic Impacts - To maximise use of local resources and minimise social impacts of construction logistics
6. Circular Economy - To eliminate waste and circulate resources to allow nature regeneration

The above objectives and the targets noted throughout the opportunity areas are to contribute to the following overall material reduction goals:

- 15% reduction in materials life cycle impacts compared to the approved baseline
- Office Waste: 50% diversion from landfill
- C&D Waste: 85% diversion from landfill

The Project faces certain constraints in optimising resource use, influenced by both regional and local factors. Access to production facilities for innovative products is currently more developed in other parts of the country. To address this, mitigation strategies will focus on building partnerships with key suppliers to support broader market transformation and enhance local capabilities.

We are working in, near and over water, both surface and ground, which means limitations in the use of recycled products such as crushed recycled concrete (CRC) and recycled plastic.

In addition we are optimising our resource use through value engineering, Life Cycle Assessment, cut and fill analysis, partnerships with industry, maximising Supplementary Cementitious Materials (SCM) in concrete, sourcing low Global Warming Potential (GWP) reinforcement steel, sourcing virgin material locally, use of temporary materials in permanent infrastructure and investigating reuse of the existing timber on the bridge. Below are two examples of resource efficiency the Project is driving.

5.3.9 Low Carbon Reinforcement Steel

Steel is a carbon intensive material used on infrastructure projects and a significant contributor to total Scope 3 emissions. Findings from the Concept Design Life Cycle Assessment showed that approximately one third of our Scope 3 emissions on the project are attributable to reinforcement steel.

Value engineering in design has been driven by the desired outcome to reduce material use, leading to sustainability outcomes through reduction of greenhouse gas emissions and improving commercial outcomes. Some steel reduction examples include the reduction of piles for the four

bridge piers, reduction in the extent of retaining walls, reduction in pile caps to pylons and a reduction in the pylons. It is of note that some increase in reinforcement steel also occurred and were attributed to a decrease in the concrete component.

GWP values for reinforcement steel suppliers, a measure of embodied carbon in kgCO₂e/m³, for all of project reinforcement steel were assessed at tender stage, obtained from GWP values from publicly available Environmental Product Declarations (EPDs). Suppliers were measured against their GWP value performance for all mill locations and preferred suppliers have been selected.

Three quarters of the project needs for general reinforcement and precast reinforcement steel, in the order of 3,350 tonnes, are on track to being supplied from the NatSteel Mill, with a GWP value of 490, which is a 71% reduction in carbon when compared to a business-as-usual mill. NatSteel prides itself on having an energy efficient Electric Arc Furnace, a reduction of CO₂ emissions to below 0.5 tonnes per tonne of crude steel and using 100% ferroous scrap.

The Project will realise the following benefits with the use of low carbon steel:

- » Reduced greenhouse gas emissions associated with the construction of the project.
- » Leading change in market transformation and expectations of steel suppliers and Clients.
- » This initiative represents a significant reduction in total scope 3 emissions for the project, which will be quantified in the As-Built Life Cycle Assessment.

5.3.10 Low Carbon Concrete

Concrete is a carbon intensive material used on infrastructure projects and a significant contributor to total Scope 3 emissions during construction. Each cubic metre of concrete contains 200-450 kg of embodied CO₂ emissions from its production, with cement production being responsible for ~4% of carbon emissions globally. As part of the project Concept Design Life Cycle Assessment, findings showed that almost half of the Scope 3 emissions on the project are attributable to concrete.

Where reduction in concrete is not possible, there has been a focus to reduce the embodied carbon of concrete across the project. The cement content in concrete is responsible for the high embodied carbon emissions, but cement can be partially replaced with fly ash (up to 40%) or slag (up to 70%) to reduce embodied carbon. Constructing with lower carbon concrete is a key lever to reduce the projects overall emissions footprint. The project will use approximately 10,500m³ of concrete.

During the Invitation to Tender stage, concrete suppliers were asked to provide the GWP value, a measure of embodied carbon in kgCO₂e/m³, for all of project required concrete mixes, inclusive of precast. Suppliers were measured against their performance for all mixes, and a preferred supplier was selected.

Further refinement is occurring on the individual mixes through collaboration with the supplier and via site trials to achieve the lowest GWP levels possible. This is being achieved through the trialling of new mixes for all concrete use cases in the project pre-cast yard. To date, several mixes have successfully been amended to include higher levels of SCM's to lower the GWP values.

The Project will realise the following benefits with the use of low carbon concrete:

- » Reduced global warming potential associated with the construction of the project.
- » Leading change in market transformation and expectations of concrete suppliers.
- » This initiative represents a significant reduction in total scope 3 emissions for the project, which will be quantified in the As-Built Life Cycle Assessment.

5.4 Environmental Case Study – Piling Management

The project involves the construction of four temporary jetty structures to facilitate the construction of the new bridge. The project used a large 350kN hydraulic impact hammer typically used in offshore projects, to drive 76 temporary and permanent steel piles from 50 to 62 meters deep.

Underwater sound travels efficiently through the water column and is a crucial sensory tool for many marine organisms. Marine mammals, especially the Indo-Pacific bottlenose dolphin, as well as human divers and swimmers, are the primary sensitive receptors to consider during impact piling operations. The Swan River is home to a small resident community of around 24 Indo-Pacific bottlenose dolphins, plus juveniles and calves. Each dolphin has been studied over generations, with individual names, identifying marks and family history monitored by researchers and over 1,000 trained volunteers.

5.4.1 Pre-piling Works

An aquatic noise assessment was conducted to predict the underwater noise impacts from in-river piling on marine fauna and human divers/swimmers. To develop the 3D model, bathymetry and structures were mapped and towed camera transects from benthic habitat mapping were used to incorporate ground conditions into the model. Measured sound power levels of the piling hammers were then used in the model to predict underwater noise levels and sound propagation.

An Underwater Noise Management Plan was developed with advice from local marine ecologists, and in consultation with environmental regulators to manage underwater noise impacts on sensitive marine fauna, human divers and swimmers. Underwater noise monitoring was undertaken during early stages of piling to validate noise modelling predictions and confirm suitability of observation and shutdown zones. Local scientists were also hosted to take their own aquatic noise readings, furthering scientific research into the potential impacts and management of piling noise.

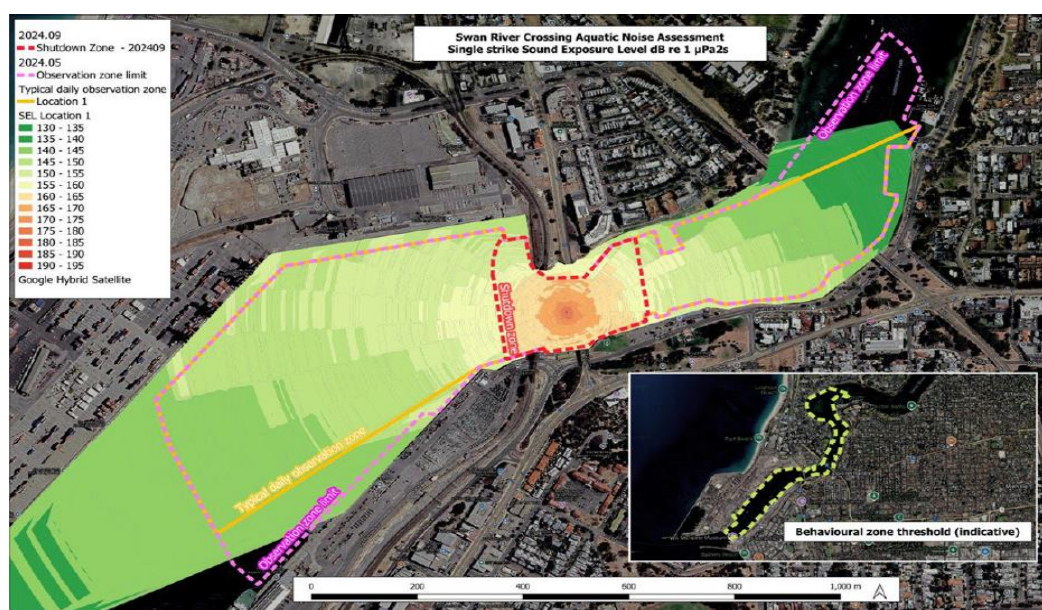


Figure 27 Modelled noise contour for piling location

5.4.2 Management and Mitigation Measures

Two safety zones were established around the piling location based on best-practice industry standards:

- Observation Zone: Monitored for the movement of marine mammals and human divers/swimmers/passive craft users to identify any approach to the shutdown zone.
- Shutdown Zone: Where the sighting of a marine mammal or human diver/swimmer/passive craft user would trigger piling activities cease if a marine mammal or human diver/swimmer is sighted.

Qualified marine mammal observers (MMO) were positioned at vantage points on both sides of the bridge. Who were responsible for monitoring safety zones, notifying piling rig operators when the shutdown zone was triggered, and recording marine fauna sightings and interactions with human divers/swimmers and passive craft users.

5.4.3 Recreational Users

Recreational users, including human divers, swimmers, kayakers and dogs, are affected by the piling noise and can experience adverse hearing effects between 800 meters to 1.6 kilometres from the piling location. Due to this, a section of the river was closed under a Temporary Notice to Mariners order from Monday to Saturday, 7am to 7pm. An extensive community engagement program was undertaken before the closures including public information sessions, public notices, signage and presentations to several user groups and clubs.

5.4.4 Outcomes

Throughout the five-month piling program, no complaints were received from the public. No incidences of marine fauna entering shut-down zones during piling occurred throughout the program.

6 Social

This Project has received a high level of interest from a variety of stakeholders and community members. Regular and ongoing stakeholder engagement with residents, businesses, road users, river users and pedestrian / cyclists is critical during the construction phase of the project. A summary of key social aspects and performance for the Project since the new design was released in January 2024 is detailed in the table below.

Table 9 Social Metrics

SOCIAL METRIC	UNIT	TOTAL FOR THIS PERIOD	TOTAL FOR THE PROJECT
Stakeholders engaged	#	5,461	6,255
Stakeholder enquiries received via CONNECT	#	302	378
Stakeholders engaged through communication material	#	109,359	159,856
Total Size of Project Workforce	#	1284	1284
Women in Workforce	%	16%	17%
Aboriginal Participation in Workforce	%	6.87%	6.31%
Lost Time Injury Frequency Rate (LTIFR)	#	0	0
Hours of Training Undertaken	hrs	1542	1542
Development Employees and Apprentices on the Project ^	#	47	63

6.1 Social Context

A brief overview of the community context has been sourced from 2016 Census data and strategic plans from the City of Fremantle, and this information has informed the development of relevant communications, engagement and messaging on the Project. It also assists with identifying opportunities for local involvement in the construction phase, as well as management of construction impacts from a health perspective.

6.1.1 Community Snapshot

Fremantle, which is approximately 18 kilometres southwest of the Perth CBD, is bounded by the Swan River and the Indian Ocean. Fremantle is widely regarded as Perth’s second city and is home to the state’s busiest port, which handles approximately 30 million tonnes of cargo per year.

Fremantle’s unique character is captured by its landscape, heritage, architecture, music, arts, culture, festivals, retail stores, markets, cafés and restaurants, which all contribute to its village-style atmosphere. Fremantle has developed a reputation for being gritty, eclectic, and quirky as well as creative, musical and artistic. This experience is reflected in the City’s four aspirational brand pillars: eclectic and quirky, culturally significant, vibrant: and welcoming and inclusive.



Figure 28 Fremantle Fishing Boat Harbour (City of Fremantle Strategic Community Plan 2024-2034)

6.1.2 Local Demographic

The project boundary is within the City of Fremantle, a historic working port town with a diverse socio-economic community.

The City of Fremantle is a predominantly residential area, with substantial maritime and industrial areas, including a major commercial port, and some commercial and tourist land use. The City encompasses a total land area of about 19 square kilometres, including significant river foreshore and coastline. The original inhabitants of the Fremantle area were the Noongar Aboriginal people.

In 2009, the City of Fremantle became WA's first carbon neutral city. The City prides itself on responsible social, economic and environmental management and in 2014, Fremantle became one of only two councils in Australia to achieve national One Planet certification for sustainability.

The City has a strong focus on arts and culture and owns and runs the iconic Fremantle Arts Centre and world-renowned festivals including Australia's oldest festival, the Fremantle Festival.

6.1.3 Demographic overview

According to the Australian Bureau of Statistics 2021 Census the Fremantle population consists of 31,930 people; 48.6% are male and 51.4% are female with the average age being 42 years old – this is slightly higher than the average age across the state (38 years).

The highest population age bracket is 35-39 years (7.5%) followed by 30-34 years (7.4%) and 55-59 years (7.2%).



Figure 29 Fremantle Biennale - drone show by artist Ilona McGuire over the Fremantle Traffic Bridge

6.1.4 Cultural diversity

There are 552 Aboriginal and/or Torres Strait Islanders living in the local government authority, with a median age of 28. 81% of Fremantle households only speak English at home; 3.2% Italian, with French, German and Spanish around 1%.

In Fremantle, Secular Beliefs and Other Spiritual Beliefs and No Religious Affiliation was the largest broad group religious group reported overall (59.3%).

6.1.5 Employment and livelihood

The average number of people per household is 2.2, with a median weekly household income of \$1,887. Participation in the labour force (aged 15 years and over) is 63.6%, which is close to the state average 63.9%. Almost 54% work full time, slightly lower than the state average of 57%.

Top responses for occupation are professionals and managers; totalling 52.5% - which is almost double the state's average 34.3%.

The level of highest educational attainment of a Bachelor Degree level and above is 39% (10,709 people) which is 15% higher than the average across the state (24%). Almost 58% drive to work (as driver or passenger). The personal median weekly income is \$969 – over \$100 more than the state average (\$848).

6.1.6 Economic prosperity

The following snapshot is from the City of Fremantle’s Economic Development Strategy 2015-2020.

- Fremantle is experiencing high levels of investment and renewal with planned private and public investment totalling more than \$1.3 billion.
- Emphasis on people, place management and local identity and character to enable Fremantle to differentiate itself and compete more effectively to attract people, businesses, and investment.
- Fremantle is primed for a residential-led recovery, with the strategy aiming to accelerate the availability of large parcels of land suitable for redevelopment.

Key points from this information relevant to the Project include providing safe and efficient transport for a growing population. Place management is a key consideration in the development of the new traffic bridge, particularly in terms of preserving the heritage of what is an iconic, historical river crossing point.

6.1.7 City of Fremantle’s strategic focus

In February 2023, the City of Fremantle launched ‘Let’s Talk, Freo!’ a three-month engagement program to support a review of their Strategic Community Plan, centred around six topics of: Creative City, Learning City, Living in your local area, Future of our City Centre, Climate Future and Jobs for the future. The engagement activities running from March to June 2023, include a mobile engagement van, parked at various locations through the city, range of workshops and events linked to the six topics, drop-in sessions to provide feedback and a final event to present the findings.

The following five key themes were identified as priorities through the ‘Let’s Talk, Freo!’ community engagement program and for the strategic focus area that flow from the City’s vision for the 2024 – 3034 Strategic Community Plan.

Figure 30 City of Fremantle Strategic Focus Areas (City of Fremantle Strategic Community Plan 2024 - 2034)

Liveable City

A liveable city that is vibrant, socially connected and desirable

Thriving City

A thriving city with a prosperous and innovative economy

Creative City

A creative city that is inspiring, diverse and dares to be different

Resilient City

A resilient city that plans for the future and is empowered to take action

Inclusive City

An inclusive city that welcomes, celebrates and cares for all people, cultures and abilities

Each key focus area to follow outlines core outcomes the City will seek to achieve over the term of this plan.

6.2 Community and Stakeholder Engagement

The Project is committed to building partnerships with the community, working with a wide range of identified stakeholders and communicating in a manner that is open, accountable, fair and flexible.

- Stakeholders are informed about a project.
- Stakeholders have the opportunity to provide input to a project.
- Stakeholder input is used in a project to guide decision-making.

The Fremantle Bridges Alliance has developed a Communications and Stakeholder Engagement Plan (CSEP) which identifies potential social, environmental and economic impacts and considers how engagement activities need to be incorporated. The documents identify the Project 'negotiables' and 'non-negotiables' and provide an Action Plan with targeted engagement activities for each key stakeholder. In achieving the engagement objectives, the Fremantle Bridges Alliance will ensure:

- Stakeholder satisfaction with the engagement process.
- Identify, address and resolve community and stakeholder issues.
- Positive reputation for Main Roads and its project management.
- Positive community relationships and social capacity during construction.

The Project has been under development since 2019. Over the course of the project, community and stakeholder engagement has been actively sought and input used to inform decisions relating to the alignment and design of the bridge/s. Three distinct programs of community and stakeholder consultation were delivered for the Eastern 2020, Western 2021 and Western 2022 alignments.

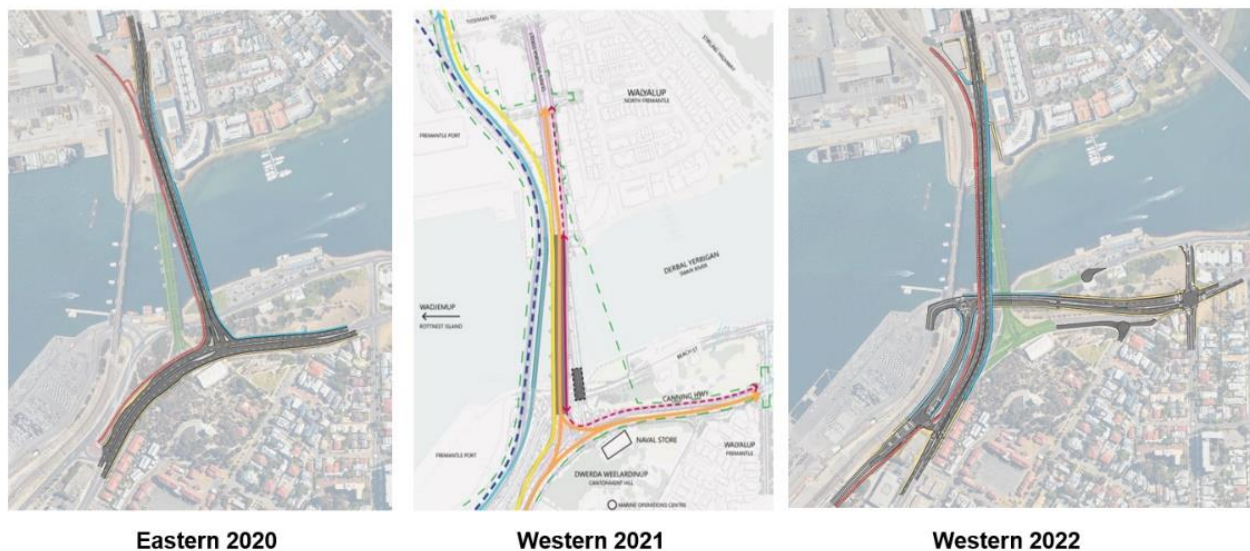


Figure 31 Explored alignments

Following these three alignment options, in 2023, the Alliance developed a design for the new Fremantle Traffic Bridge that delivers key objectives for the project whilst directly responding to community and stakeholder input.



Figure 32 2023 Alignment and design

The concept delivers:

- A new bridge/ road crossing over the river
- Safe and comfortable pedestrian and cycling connections over the Swan River
- Better navigational clearance with higher and wider spans to improve marine journeys and reduce risk of vessel impact on the bridge, as well as catering for sea level rise.
- Fewer piers and river intrusions respecting Aboriginal heritage.
- Improved amenity and sense of place for locals, wider community and tourists by maximising space for place making and heritage interpretation.
- Lasting benefits by considering social, environmental and economic aspects and opportunities.

The table below illustrates the influence of community and stakeholder feedback on the evolution of the design since 2019.

Table 10 Community and Stakeholder Feedback Summary

YEAR	ALIGNMENT	FEEDBACK	OUTCOME
2019	To be determined	More than 100 requirements/ constraints were identified in individual stakeholder meetings.	Progress development of a preferred alignment that balances requirements and constraints.
2020	Eastern alignment released	Community responded to eastern alignment with differing views around the preferred location of the bridges.	Broad support for project to progress to the next stage. Alliance to revisit the best location for the bridges, with due consideration given to heritage, movement, and place.
2021	Four alignment options released	Community feedback indicated a western alignment – to build the new bridges in between the existing road and rail bridge - was the preferred option. Key stakeholder feedback included a request for public space activation.	Western alignment progressed for development. Key stakeholders (including the City of Fremantle) request consideration of alternative options for the southern intersection that improve opportunities for public space activation.

2022	Canning Realignment	Concept responded to community and stakeholder feedback by delivering more space in front of the Naval Store, improved urban design outcomes, acceptable traffic performance and road and path connectivity. Concerns raised regarding traffic impacts on local roads, the Canning realignment closer to the Swan River and a perception that the project would significantly impact the limestone escarpment and vegetation within Beach Street Reserve. The City of Fremantle requests more information on the options explored is provided to the community for engagement, discussion and feedback and the Town of East Fremantle rejects the concept.	The final 2023 concept will replace the Fremantle Traffic Bridge on the existing alignment and responds to community and stakeholder feedback to minimise changes to the existing road network, reduce piers in the water in response to heritage and clearance issues, retain the southern limestone escarpment and public spaces and significantly improve walking and riding infrastructure across the river. It also removes the replication of the rail bridge to separate freight and passenger services.
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6.2.1 Project Consultation this Period

Since construction commenced in 2024, a dynamic and transparent approach to stakeholder engagement has resulted in a positive community sentiment. Monthly and fortnightly meetings with key stakeholders include:

- Fremantle Port Authority (FPA)
- Department of Biodiversity, Conservations and Attractions (DBCA).
- City of Fremantle
- Town of East Fremantle
- River Operations Working Group (FPA, Water Police, Department of Transport, Sea Rescue, Rottnest Express, Sealink)
- Communications Working Group (City of Fremantle, Town of East Fremantle, FPA, Public Transport Authority, Department of Transport).

Regular briefings with residents and community groups, businesses (north & south of the bridge) river users, cycling groups and Government agencies has been a critical focus of the team as we approach the closure of the Fremantle Traffic Bridge.

Following the announcement the road network modifications in May 2025, an extensive engagement program began with community and stakeholders to raise awareness about the bridge closure and encourage modal shift. A MySayTransport survey was released to help determine how people travel through the area and what transport options they would consider during the closure. The outcomes from this survey are under assessment and will be released to community and stakeholders later in the year.

Tactical Communications Plans were drafted to provide an overview of the engagement required to help manage impacts from the bridge closure on the wider community, including road users, pedestrians and cyclists; businesses and the educational sector (school communities) in close proximity to the Project. The aim was to start discussions with schools one year prior to the closure to explain the impacts, understand travel movements and encourage families and staff to change their travel patterns. A strong focus will be placed on encouraging users to sign up to the Project to receive the latest information.

State and Local Government agencies are working together to look at ways to reduce demand on the road network during the closure, particularly during the morning and afternoon peak periods. Key considerations include:

- Local bus routes and train service frequency.
- Parking assessment at Fremantle and North Fremantle Train Stations.
- Working with community and schools to develop active transport plans.
- Determine behaviour change opportunities.
- Working with the freight industry to determine opportunities outside of peak period operations.

A separate process is underway to develop a public awareness campaign to communicate the bridge closure and associated network changes. Starting conversations to raise general community awareness involves pop ups at various locations from May 2025 until bridge closure. The aim is to reach a wider audience and provide advance notice of the closure. The intent of these pop ups is to provide information on mitigation methods, including modifications to the road network and changes to intersections/accesses to prioritise key movements. This engagement will form part of an extensive advertising campaign and will include radio, newspaper, TV and social media adverts, which is anticipated to start three months prior to bridge closure.

A key message of the communications is that investigations into travel demand management are underway, Fremantle is still accessible via multiple routes and we will be encouraging users to seek alternative travel arrangements where possible (taking public transport, walking / cycling and carpooling).



Figure 33 Photos from Maritime Day at Fremantle Ports, Small Business Development Corporation Works, Pop Up Displays and Incident Response Workshops with emergency services.

6.2.2 Methods of Engagement

The Projects approach supports Main Roads in its vision to build partnerships with the community, work with a wide range of identified stakeholders and communicate in a manner that is open, accountable, fair and flexible.



Figure 34 Alliance Strategic Approach to Engagement (Key Stakeholders)

The Project has undertaken various methods of engagement with stakeholders and the community which include:

- Targeting briefings with key stakeholders, residents, businesses and special interest groups (Rivershores Place Apartments, Queen Victoria Street Business, Fremantle & East Fremantle Businesses, Fremantle Mens Shed, WestCycle, Department of Education, Yacht and Rowing Clubs)
- Monthly Project Updates
- Roadworks Update
- Social Media (Facebook, LinkedIn and Youtube)
- Pop up displays at various farmers markets, sporting events and beach areas
- Stand at Walyalup Civic Centre (City of Fremantle Council) for 8 weeks
- Letterbox drops
- Emails, texts and phone calls
- Site walks with community members and stakeholders
- Site tours with various groups including trainees, Engineers Australia and NAWIC

- Promoting local businesses internally and externally, and helping locals in an effort to be a good neighbour



Figure 35 Traffic Controller helping a path users cross the bridge safely, cinnamon scroll from a local business and project milestone celebration at a local venue

6.2.3 Addressing Community Concerns

The Main Roads Customer Information Centre (CIC) is widely advertised as the main contact for stakeholders and community members wanting to find out more information about the project (138 138 and email enquiries@mainroads.wa.gov.au, or via the Main Roads website). Contact cards and all project communications promote CIC to ensure community enquiries and concerns are logged via the appropriate channels.

Each contact is given a case number, and a record of interactions is kept. All enquiries and complaints are tracked in the CONNECT database system, including the type of interaction, commitments made, and actions promised. The below graph provides an overview of the number of cases per month since the Alliance was established in early 2021.



Figure 36 Project contact cards

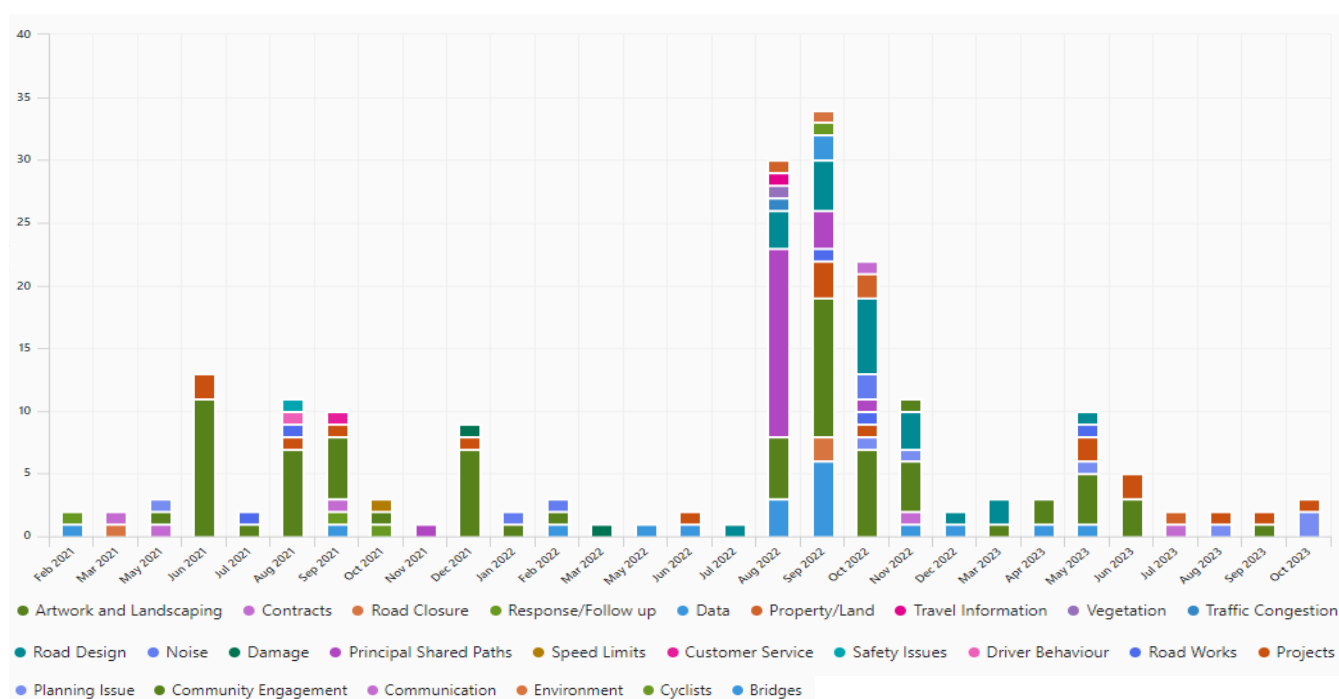


Figure 37 Cases logged by themes

6.3 Heritage of the Site

The site is on Whadjuk Noongar Boodja. Walyalup, which was named Fremantle by the British government after they colonised Western Australia in 1829, is a very important place in Noongar culture. It connects through songlines and stories to places to the South-West, the Kimberley, to the wheatbelt and interior, and across the whole continent.

The below Statement of Significance was prepared by the Heritage Council of Western Australia (HCWA) and summarises the heritage values of the Fremantle Traffic Bridge and Ferry Capstan Base. This statement was used as the basis for interpretation, policies and management of any change proposed to this cultural asset.

Fremantle Traffic Bridge (1939) & Ferry Capstan Base, comprising a four-lane vehicular and pedestrian, traffic bridge (1939), constructed of timber, concrete and steel, and a limestone capstan base (date unknown), has cultural heritage significance for the following reasons:

- *the place is a distinctive landmark, which collectively marks the crossing of the Swan River between Fremantle and North Fremantle and the transition from the Swan River to Fremantle Harbour;*
- *the Fremantle Traffic Bridge (1939) is located at a site which has been a river crossing point since 1866, when an earlier bridge was built during the convict era;*
- *the Fremantle Traffic Bridge (1939) is at the site of an 1898 bridge, associated with the development of Fremantle Harbour and the expansion of public works in Western Australia in the Gold Boom of the 1890s;*
- *the capstan base is rare as an uncommon structure demonstrating the function of hauling river vessels, which is no longer practised;*
- *the Fremantle Traffic Bridge (1939) demonstrates the continued use of timber in bridge building in Western Australia into the 1930s, when its cost was low, relative to other materials, and its qualities well understood; and,*
- *the Fremantle Traffic Bridge (1939) was designed by engineer E.W. (Ernie) Godfrey, who was in charge of the Bridge Section of Main Roads from 1928 until his retirement in 1957, and was responsible for the design of all the bridges built in Western Australia in this period, and construction of the major ones.*

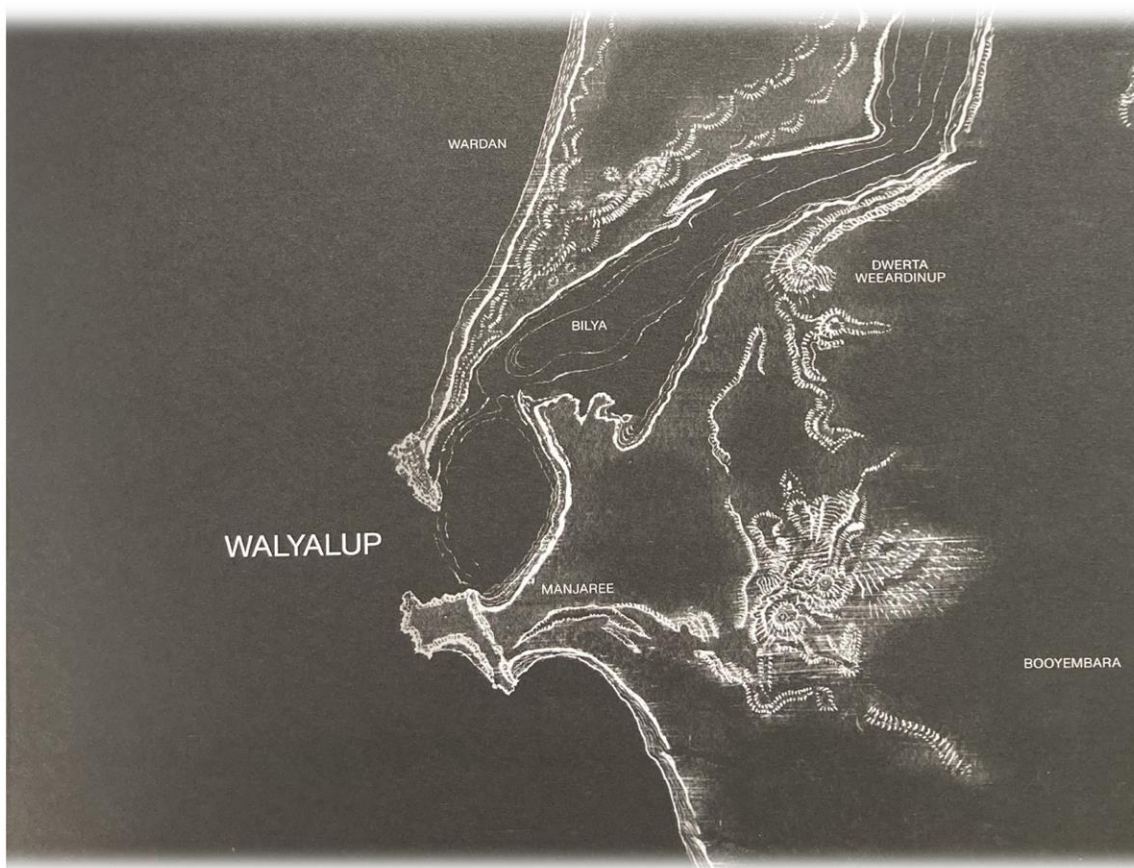


Figure 38 Pre-European Settlement (Kura Yeye Brrodawan, Sandra Harben 2021)

The Fremantle Traffic Bridge, built in 1939, is the fourth bridge at this site, continuing a tradition of crossings since 1866. It has been a vital link for both vehicles and pedestrians, with remnants of earlier bridges still visible. The bridge's timber structure and decorative elements highlight the use of timber in Western Australian bridge construction during the 1930s. It serves as a significant landmark, marking the transition between Fremantle Harbour and the Swan River, and holds historical and aesthetic value for the community.



Figure 39 Previous and Current Fremantle Traffic Bridge Crossings

6.3.1 Aboriginal Heritage

There are three registered sites that intersect the proposal area:

1. ID 3536 Swan River which is a mythological site of significance to the Noongar people. Any impacts to the river are generally considered to have an impact on the mythological site
2. ID 3419 Fremantle: Cantonment Hill which is a ceremonial, mythological and camp site

Main Roads was granted consent under s18 of the Aboriginal Heritage Act 1972 for the proposed bridge replacement and associated works.

The project ground disturbing works in site 3536 are summarised as Temporary Jetty Piling, Permanent Jetty Piling, Temporary Jetty Removal and River walls. In line with the condition of the consent two Whadjuk members, nominated by South West Aboriginal Land and Sea Council (SWALSC), were present to observe these ground disturbing works.

Impacts to site 3419 are not expected as part of project works.

The cultural narrative for the project was prepared by the Whadjuk Elders Advisory Group in 2024.

Kaya, kaya, kaya.

Walyalup Fremantle is located on **Whadjuk Noongar boodjar** and is home to **Midgegooroo** and his ancestors whose territory is known as **Beeliar**. **Midgegooroo's** territory begins at **Walyalup** Fremantle and encompasses the southern side of the **derbarl ngara** (river mouth). On the Northern side of the **derbarl ngara Yellagonga** and his ancestors claim the territory known as **Mooro**. **Mooro** begins at the **derbarl ngara** and expands east towards Midland and northwest toward the coast. **Noongar** people have occupied **Walyalup** Fremantle since time immemorial and continue to do so today.

The **derbarl ngara** is home to the **kwilena** (dolphin). The **kwilena** move in and out through the **derbarl ngara** to swim upstream along the **Derbarl Yerrigan** (Swan River). The **derbarl gnara** has relationships with dreaming stories such as the story of creation (**Waugyl Dreaming**), the story of the seven sisters, the dingo story, and the old man crocodile story that relates to Garden Island. The cultural narrative for this part of **Walyalup** Fremantle travels south, north, east, and west and is essential in connecting **Noongar** people to other Aboriginal groups across Western Australia.

The stories that emanate from the **derbarl gnara** are many, varied, and bound in the spirit of **Noongar** cultural lore and the practice of law. The cultural narrative is not one story, it is **boola baadap** (many stories), that maintain the foundations of **Whadjuk Noongar** culture, heritage, and people; since the **Nyitting** (Ice Age) you could say that "in the beginning" starts here, at **Walyalup** Fremantle.

Figure 40 Project Cultural Narrative (Source: Whadjuk Elders Advisory Group, 2024)

6.3.2 European Heritage

The Fremantle Traffic Bridge and ferry capstan base are listed on the Heritage Council of Western Australia's Register of Heritage Places (Figure 21). The stories and values associated with these European heritage sites have been recorded within the Heritage Interpretation Strategy, with input from community, key stakeholders, and heritage specialists.



Figure 41 Fremantle Traffic Bridge and Ferry Capstan

The Fremantle Bridges Alliance is continuing to engage with the community and the Heritage Council of WA (HCWA) to ensure that heritage values are celebrated and respectfully integrated within the Project's urban design and the bridge architectural features. A Heritage Interpretation Plan has been developed and approved by the Heritage Council WA via the development application through Western Australia Planning Commission.

6.4 Heritage Interpretation

The significant heritage of the site has been interpreted through an overall Architecture, Urban and Landscape (AUL) design vision:

A new bridge connecting people and places and providing the next chapter in the story of crossing of the river in this location.

The cultural context for the project is described in the Heritage Interpretation Strategy (HIS) and the Cultural Narrative, stories and experiences associated with the site are organised according to three overarching place themes - Country, Community & Connections.

The project Storylines coalesce the many specific stories of place into four site specific story treatments. They help make interpretations of place shared and legible. They situate the general place/heritage themes of Country, Connection & Community outlined in the Heritage Interpretation Strategy, the Aboriginal Design Themes documented in the AULDF and the cultural narrative:

'The stories that emanate from the derbarl gnara are many, varied, and bound in the spirit of Noongar cultural lore and the practice of law. The cultural narrative is not one story, it is boola baadap (many stories).'

Cultural Narrative 2024

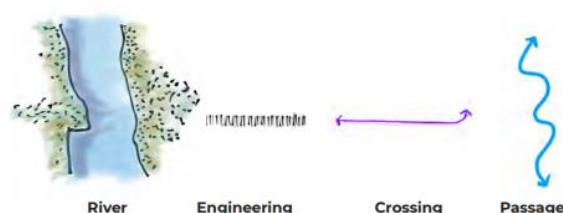


Figure 42 Storylines

River

The significance of the river landscape setting and river flow, culturally as a place associated with creation stories and spiritual tradition.



Engineering

The lineage of engineering tradition and innovation which is central to the history of crossing in this location, including the ferry capstan and five previous bridges.



Crossing

The significance of crossing from North of River to South and the gateway/entry into Fremantle/ Walyalup.



Passage

Passage along the river and transition from river to port/ocean.



The project Heritage Interpretation Plan has been finalised and outlines the storylines framework, project design actions, architectural lighting, signage/education and public art strategy.

6.4.1 Engagement and cultural learning

The Project has established Whadjuk Elders Reference Group to build upon the work done in 2020 to develop the Project's initial Heritage Interpretation Strategy. The Elders have shared their knowledge to ensure heritage aspects are celebrated within the design of the crossings and cultural protocols are embedded within the team. This has helped guide the development and implementation of the Heritage Interpretation Plan and Aboriginal Heritage Management Plan.

In 2024 a very special Cultural Awareness workshop facilitated by local Aboriginal business, Jalbi Australia was held at the project site office in July 2024. Under the guidance of Walyalup Elder Freda Ogilvie, a group of team members from the Alliance learnt about connection to Country, olfactory memories and native botanical scents. Together, they created a bespoke scent for the Alliance titled 'Walyalup Together'. Inspired by their Alliance values, the Project's cultural narrative, and Australian native plants, the scent was developed with feedback from all participants. The scent developed comprises of Lemon Ironbark, Honey Myrtle and Blue Cypress. These ingredients inspire focus, health and positivity. Jalbi Australia will now develop natural cleaning products for the Project using the scent including hand soaps, sanitiser and floor cleaners.

Before commencing construction works, the project held two smoking ceremonies in 2024. One at the projects precast yard in Hazelmere and the second in North Fremantle, close to the Fremantle Traffic Bridge. The Ceremony acknowledged the Ancestors and the land and the waters of country the project encompasses. It welcomed, cleansed and promoted the safety and wellbeing of visitors and workers by burning a small amount of local plants including Sheoak, Tuart and Peppermint leaves and twigs.



*Figure 43
Smoking
Ceremonies
and Cultural
Awareness
Workshops*

6.5 Road, River and Pedestrian/Cyclist Safety

The project strives to ensure the safety of stakeholders and community members during construction works. A Traffic Management Plan and Vessel Management Plan have been developed, to complement the projects Health and Safety Management Plan.

6.5.1 Beach Street Closure

Construction of the new bridge involves main stages of works, which required a full closure of Beach Street on the southern end of the bridge from August 2024 to end 2026 (estimated project completion). The closure provides:

- A safe environment for the wider community while large machinery is operating.
- Safe working environment for workers, with safe access for construction vehicles transporting materials and plant to site, include two cranes over 10 metres wide and weighing 320-480 tonnes.
- Creates space for temporary jetties to be constructed on the south-east and south-west of the existing bridge.

6.5.2 Piling Works

The first major phase of construction for the Fremantle Traffic Bridge involved in-river piling to construct the temporary jetties and main bridge piers. These works involved using vibratory and hammering piling methods to drive piles approximately 60 metres into the riverbed. The piling program was expected to run from August 2024 to August 2025.

To ensure members of the public are not exposed to high noise levels, the following restrictions were implemented during piling works (Monday to Saturday, 7am to 7pm):

- One lane was closed in each direction over the bridge for road users.
- The shared path on the bridge was closed to pedestrians and cyclists, with a detour via Stirling Highway.
- Recreational activities in / on the water were prohibited for swimmers, drivers and human powered watercrafts within a 1km radius and/or direct line of sight from piling works.
- Fencing was installed at locations on the foreshore (north and south) for public safety.
- Signage was installed at popular beach locations around the river advising the public of the piling works and expected impacts eg: no swimming during piling; swimming allowed on Sundays and Public Holidays. (Signage Strategy in draft).
- Residents in close proximity to the work were recommended limitations using outdoor spaces (balconies).

In-river piling was finished in April 2025, and the shared path and river restrictions were lifted.

6.5.3 Shared path closure

The project permanently closed the shared path on the traffic bridge in January 2025 due to space restrictions and construction works which resulted in high levels of noise and vibrations. The closure provides a safe environment for workers and bridge users. At project completion, two new paths will be open on the bridge – a 4m wide PSP on the western side and a 3m wide shared path on the eastern side.

6.5.4 Bridge Closure

The closure of the traffic bridge is anticipated in early 2026 based on the projects current timetable. A thorough analysis was undertaken to determine how to manage the road network during the closure and involved surveying over 100 intersections. Feedback from local schools, businesses and community groups was also considered and incorporated where possible.

In May, the project released a series of network changes to keep Stirling Highway moving during the closure. The modifications were released early to the community to encourage users to examine how and when they travel through the area. This includes consideration of the mode of travel, route choice, timings of travel, flexible working arrangements and carpooling.

Discussions with State and Local Government agencies has been ongoing to reduce the impacts of the closure on the traveling public and ensure essential services are able to operate. Key considerations include:

- Local bus routes and train service frequency.
- Parking assessment at Fremantle and North Fremantle Train Stations.
- Working with community and schools to develop active transport plans.
- Determine behaviour change opportunities.
- Working with freight industry to determine the possibility of outside of peak period operations.

6.6 Workforce Safety

The Project safety strategy is based on Rethinking Safety through Inclusion and Wellbeing. The program aims to:

1. To reduce or eliminate the number of safety incidents throughout the business.
2. To improve safety design to reduce risks in the workplace.
3. To support our peoples (staff, alliance partners and supply chain) long term health.
4. Enabling our people to care for their mental health.
5. Accelerating modernising of the construction industry.

The Inclusion and Wellbeing program ensures our approach to safety is physical and psychological – addressing the unique risk factors in construction. It also promotes a culture where everyone is included no matter what role they play. Everyone has a voice and should feel empowered to speak up and ‘call it out’ if something doesn’t feel right or could be done differently. It is based on three principles engineered safety, delivery excellence and human performance. Evidence has shown that when workplaces engage in the Inclusion and Wellbeing way of thinking and employ the associated practices, they achieve:

- 64% less safety incidents.
- 81% lower absenteeism.
- 66% improvement in wellbeing.

Workforce safety is managed on the Project via the Safety and Health Management Plan in conjunction with the Rail Safety Management plan.

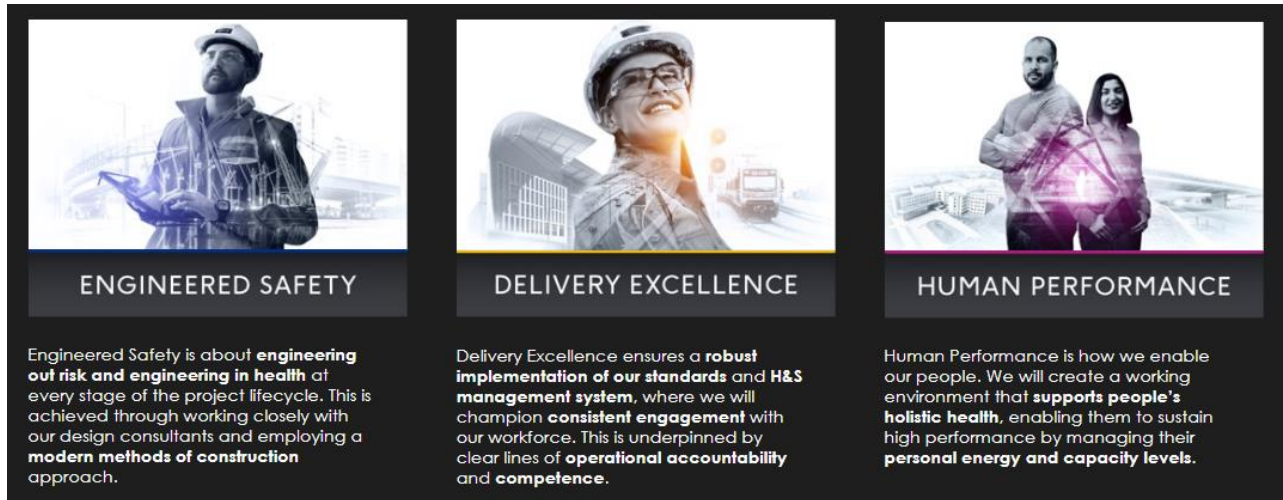


Figure 44 Rethinking Safety Through Inclusion + Wellbeing

6.7 Leaving a Lasting Legacy

The Project has established a committee to develop and oversee an Inclusion and Wellbeing program for all staff. The Committee has identified focus areas for workplace volunteering, with an emphasis on the local Fremantle area in FY25:

1. Local Community Groups (Friends of Cantonment Hill).
2. St Patrick's Community Support Centre donations (food and clothing).
3. Environment and Natural Resources (Ocean clean up and Surf Life Saving).



Figure 45 Volunteering and donations with St Patricks



Figure 466 Project volunteering with Friends of Cantonment Hill

6.7.1 Improving Local Footpaths

In response to community feedback regarding the existing footpath at the East Street and Canning Highway intersection, we've built a new 3-metre-wide shared path behind the existing bus stop. This significantly improves safety and accessibility for pedestrians and cyclists along Canning Highway.

Figure 746 New shared path behind bus stop on Canning Highway



6.8 Social Case Study – New Alliance Logo

Fremantle Bridges Alliance launched an additional Alliance logo and branding, masterfully crafted by the talented students from Maali Mia program at John Curtin College of the Arts.

Under the guidance of the project design team, local elder Freda Ogilvie and Karrda consultancy, the students developed concepts inspired by their own connection to the area along with the Alliance values and project's cultural narrative (developed by the projects Elder Reference Group).

The partnership involved students visiting the project site, meeting the team and Elder Reference Group Members as well as participating in the projects Smoking ceremony. The students confidently presented their patterns to the Alliance board in late 2024 and designs were then incorporated into the project.

Along with digital logos, building signage, wall stickers and pull up banners have been since been developed and printed by local Aboriginal businesses.

The team was so pleased to be able to find new ways of embedding Noongar culture into the project along with providing local students with the opportunity to create a real-life work example in design, exposing students to the Construction Industry and career pathways. During all group activities and site visits, the students demonstrated enthusiasm, engagement in the tasks and talent in the creation of amazing patterns and designs."

Engagement with the John Curtin Maali Mia students will continue until project completion, providing them with more opportunities to collaborate and participate in the iconic new Fremantle Traffic Bridge project.



Figure 47 Development and use of new Alliance logo

6.9 Diversity & Inclusion Case Study – Aboriginal Employment

The Project presents an opportunity to develop meaningful employment pathways for local Aboriginal people.

To support our employment targets the project has created a range of initiatives to support Aboriginal employment and training across the project. The initiatives include:

- » Targeting Aboriginal businesses to work on the project that have Aboriginal employment pathways
- » Supporting sub-contractors to connect to local jobseekers and Aboriginal employment service providers
- » Working collaboratively with the client, subcontractor and regulatory authorities to develop a half day rate and arrangement for heritage monitoring works, supporting more flexible and part time options on the project
- » A CareerTrackers internship has been organised for the project with an Aboriginal engineering intern being engaged for a winter internship, transitioning into a part time employee on the project in FY 2026
- » A 12-month rigging traineeship program, where participants work on site and complete a Certificate III in Rigging. The Rigging Traineeship Program has grown from two to five participants, with four being Aboriginal young people. All are progressing well toward completing their Certificate III in Rigging by mid-2025.



Figure 48 Rigging Traineeship Program

7 Glossary

A glossary of terms used throughout this document is detailed in Table .

Table 11 Glossary of Terms

Term	Description	Link to Further Information
Material; Materiality	Relevant topics are those that may reasonably be considered important for reflecting the organisation's economic, environmental, and social impacts, or influencing the decisions of stakeholders.	Global Reporting
National Greenhouse Accounts Factors 2024	The National Greenhouse Accounts (NGA) Factors has been prepared by the Department of Industry, Science, Energy and Resources and is designed for use by companies and individuals to estimate greenhouse gas emissions. The NGA Factors is not published for the purposes of reporting under the <i>National Greenhouse and Energy Reporting Act 2007</i> (the NGER Act). While drawing on the National Greenhouse and Energy Reporting (Measurement) Determination 2008, the methods described in the NGA Factors have a general application to the estimation of a broader range of greenhouse emissions inventories.	Australian National Greenhouse Account Factors
Roads to Reuse	The Roads to Reuse program (RtR) is a State Government initiative administered by the Waste Authority. Its objective is to encourage State Government organisations, local governments, regional councils, and the private sector to use recycled C&D products in civil applications, such as road construction. It does this by supporting the supply of recycled C&D products to market that meet a product specification, to protect human health and the environment.	Waste Authority
Scope 1 Emissions	Scope 1 greenhouse gas emissions are the emissions released to the atmosphere as a direct result of an activity, or series of activities at a facility level. Scope 1 emissions are sometimes referred to as direct emissions.	Clean Energy Regulator
Scope 2 Emissions	Scope 2 greenhouse gas emissions are the emissions released to the atmosphere from the indirect consumption of an energy commodity. Scope 2 emissions from one facility are part of the scope 1 emissions from another facility.	
Scope 3 Emissions	Scope 3 emissions are indirect greenhouse gas emissions other than scope 2 emissions that are generated in the wider economy. They occur as a consequence of the activities of a facility, but from sources not owned or controlled by that facility's business. Some examples are extraction and production of purchased materials, transportation of purchased fuels, use of sold products and services, and flying on a commercial airline by a person from another business.	
Sustainable Development Goals (SDGs)	The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership.	United Nations Sustainable Development Goals 2030

8 Appendices

Appendix	Title
Appendix 1	List of Project Stakeholders

Appendix 1 – List of project stakeholders

Stakeholder	Relevance to Project
Federal Government	Providing 50% funding
State Government	Providing 50% funding
State Government Agencies 1 Public Transport Authority 2 Department of Transport and Major Infrastructure 3 Department of Planning, Lands and Heritage 4 Heritage Council WA 5 Office of the Government Architect 6 Westport 7 Future of Fremantle 8 Fremantle Port Authority 9 Department of Biodiversity, Conservation and Attractions 10 Swan River Trust (via DBCA) 11 Department of Water and Environmental Regulation 12 Environmental Protection Authority 13 Service Providers (Water, Gas, Telecommunications)	Responsible for various elements of project Endorsement in line with existing and future planning requirements Approvals (i.e. DPLH) Cost implications (services relocation if required)
Other Emergency Services 14 St John Ambulance 15 Department of Fire and Emergency Services (DFES) 16 WA Police	Emergency vehicle operations may be affected by construction of project
Federal Local Members	Federal Government funding
State Local Members	State Government funding
South West Aboriginal Land and Sea Council	Heritage, movement and place
Whadjuk Working Group / Project Aboriginal Advisory Committee	Heritage, movement and place
Local Government 17 City of Fremantle 18 Town of East Fremantle 19 City of Melville	Collaboration and engagement with local government authorities required around design development and communications
Freight and Logistics Council of WA WA Road Transport Association	Heavy vehicles impact: construction and final design
Inner Harbour Community Liaison Group	Port community reference group
Supply Chain Forum	Port forum for North Quay Tenants
HSE Inner Harbour Forum	Port forum for Inner Harbour
Fremantle Chamber of Commerce	Local business group
Cycling groups: 20 Westcycle 21 Department of Transport (Urban Mobility)	Interest in PSP design Construction impacts on existing routes
Communications Working Group: 22 City of Fremantle 23 Town of East Fremantle 24 Public Transport Authority	Members of projects working group Identify emerging issues, align key messages and communications, and

Stakeholder	Relevance to Project
25 Fremantle Port Authority 26 Department of Transport and Major Infrastructure (Marine & Urban Mobility)	stakeholder planning.
River Operations Working Group: 27 Fremantle Port Authority 28 Department of Transport Marine 29 Water Police 30 Sea Rescue 31 DBCA River Operations 32 DEFES Water Operations 33 Ferry Operators (Sealink, Rottnest Express)	Members of projects working group Focus on operations aspects to manage river closures and impacts.
Water Operations 34 Yacht Clubs, Boating Clubs, Kayak Clubs 35 Boating WA 36 Boating Industry Association of WA 37 Recreational boating community 38 Recfishwest (recreational fishers)	Access/ construction impacts
Businesses (construction related) 39 Beach Street & Co 40 Jetty Bar 41 Mortgage Choice 42 Swan Hotel 43 North Fremantle businesses (Queen Victoria Street) 44 Rottnest Swim 45 Port to Pub	Opportunities for involvement in construction
Sporting groups/ schools/ churches etc.	Opportunities to contribute to urban landscape and design
Local resident organisations 46 North Fremantle Community Association 47 Friends of Hampton and Ord 48 Friends of Cantonment Hill	Impacts during construction Operational impacts after construction (noise/ amenity)
Fremantle Society	Community Interest group
Local landowners 49 Landowners and residents along Queen Victoria Street 50 Landowners and residents within locality	Impacted during construction
Environmental Groups 51 Curtin University (dolphin monitoring) 52 Other groups via Fremantle Ports	Management of potential environmental impacts
Tourism 53 Tourism WA 54 Marine Tourism (via DoT) 55 Apache Charters	Construction impacts
Wider community	Commuting during construction Place – recreational space
Road users	Commuting during construction and associated delays