



# **Tonkin Gap Project and Associated Works: Project Annual Sustainability Report 2021/2022**

Prepared by Tonkin Gap Alliance

This annual report covers the period from 1/07/2021 to 30/06/2022. This is the second annual report to be prepared for the project. Previous annual sustainability reports include [2020-21]

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## 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
ASC NEMP	Australian Site Contamination National Environment Protection Measures
ASSMP	Acid Sulfate Soils Management Plan
CCF	Civil Contractors Federation
CCMP	Construction Contamination Management Plan
CCNH	Climate Change and Natural Hazard
CEMP	Construction Environment Management Plan
CNVMP	Construction Noise and Vibration Management Plan
CRC	Crushed recycled concrete
CSEP	Community and Stakeholder Engagement Plan
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
FTE	Full-time employee
GHG	Green House Gas
GRI	Global Reporting Initiative
ha	Hectare(s)
IAP2	International Association for Public Participation
IS	Infrastructure Sustainability
ISC	Infrastructure Sustainability Council
ITS	Intelligent Transport Systems
km	Kilometre(s)
KPI	Key Performance Indicator
KRA	Key Result Area
LGA	Local government area
MEL	Morley-Ellenbrook Line
Main Roads	Main Roads Western Australia
NMP	Noise Management Plan
OGA	Open Graded Asphalt
PSP	Principle Shared Path
PTA	Public Transport Authority
RAP	Reclaimed Asphalt Pavement
RCP	Representative Concentration Pathway
RES	Resource Efficiency Strategy
SDG	United Nations Sustainable Development Goal
SP	Sustainable procurement
SuMP	Sustainability Management Plan
tCO <sub>2</sub> e	Tonnes of carbon dioxide equivalent
TEC	Threatened Ecological Community
TOAG	Traditional Owner Advisory Group

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# 1 About this Report

## 1.1 Purpose

This report has been prepared for the Tonkin Gap Project and Associated Works (herein 'the Project'). This report was compiled by the Tonkin Gap Alliance on behalf of Main Roads Western Australia (herein after 'Main Roads'). This report will accompany the Main Roads Annual Sustainability Report and will ultimately be integrated into the Main Roads Annual Report. The report content is prepared in accordance with Global Reporting Initiatives (GRI) principles and summarises the sustainability initiatives and potential environmental, social, and economic impacts of the Project. It is intended to meet the annual reporting requirements of Main Roads and provide greater transparency to community and stakeholders on the sustainability objectives and progress of the Project. Material topics reported in this report have been determined through a materiality process that aligns with the United Nations Sustainable Development Goals (SDGs) and adheres to requirements under the Infrastructure Sustainability Council (ISC) rating framework.

## 1.2 Sustainability Statement

The Project is considered a key component of the ongoing transformation of Tonkin Highway, delivering a high-standard north-south transport link from Muchea to Mundijong. It is expected to provide improved connectivity and access for communities throughout the Perth metropolitan region, with improvements for road users and cycling/pedestrian users. Sustainability is a top priority and reflected through Project Key Result Areas (KRAs) beyond the undertaking of an IS Design and As Built Rating submission. Project KRA's include focus on workforce wellbeing and culture, environmental management, industry sustainability and Aboriginal participation. The Project has applied an integrated management system to deliver on the material issues identified in this report, driving the identification and implementation of key sustainability opportunities.

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*"The Alliance is committed to delivering an asset that meets the expectations of the community and stakeholders, with a focus on sustainable outcomes and innovative technologies and construction methodologies wherever possible. The alignment of project processes with sustainability objectives has encouraged consideration of sustainability within all areas of the Project, from design and construction, to procurement, environmental management and stakeholder engagement." – Peter Hopfmueller, Alliance Director*

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## 1.3 Highlights



### Energy Reduction

The Project is committed to a 5% reduction in energy use across the life cycle of the asset (this includes construction and operation). The energy model prepared by TGA demonstrates a 5% reduction, equating to a saving of 1,462t CO<sub>2</sub>-e.



### Resource Efficiency

The Project has imported approximately 33,000 tonnes of crushed recycled concrete from a local supplier, which replaces virgin crushed limestone as pavement subbase. A total of 122,000 tonnes of recycled materials have been imported to the Project site to date.



### Vegetation Clearing Reductions

Through the design and construction processes the Project was able to reduce clearing of native and non-native vegetation in areas around the Swan River, northern dive structure and at some drainage basins around Broun Avenue and Dunstone Road - a total of 3.2 ha.



### Aboriginal Participation

TGA has engaged with Nudge Foundation to provide support and mentoring to Aboriginal employees working on the Project. To date, six people have been involved in this program and the Project is tracking at 8.3% Aboriginal participation.



### Innovation

The Project has claimed 5 innovations under the IS Framework for the Design submission, with 4 of these being Australian firsts (pending verification from ISC). This includes trials with using various recycled materials in retaining blocks.



### Community Engagement

Innovative and proactive engagement methods adopted with our 3,000 engaged community members including our Talkin' Tonkin video series (10 videos to date), interactive events and site tours (11 in this financial year).

## 2 Project Overview

The Tonkin Gap Project and Associated Works is part of an infrastructure package announced in 2019 and is located approximately eight kilometres east of Perth, along Tonkin Highway. Connecting Gateway WA and NorthLink WA, this section of Tonkin Highway forms part of a vital freight and commuter access route known as the Perth to Darwin National Highway. Insufficient capacity to meet current demand at this location has created a 'bottleneck' that constrains the full realisation of the benefits from recent investments in Tonkin Highway and planned future investments to upgrade intersections and extend Tonkin Highway to the south. Congestion issues, combined with the inadequacy of current cycling and pedestrian connections, are having a negative impact on local amenity. Furthermore, the high proportion of merge, diverge and weave movements exacerbated by congestion are safety concerns and may lead to an increase in vehicle crashes.

The Project is being fast tracked by Main Roads to help the WA Government drive economic recovery from the effects of COVID-19. The Project commenced detailed design in June 2020, with construction activities kicking off in November 2020. Detailed design was nearing completion through the first half of 2021, with construction expected to be complete in 2023.

Further information is available on the [Project website](#).

### 2.1 Locality and Scope

The Project is located approximately eight kilometres east of Perth, along Tonkin Highway between Collier Road, Bayswater and Dunreath Drive, Redcliffe (Figure 1). The Project aims to improve traffic flow, safety, and enhance facilities for cyclists and pedestrians. The scope of the Tonkin Gap section includes: new bridges at Dunstone Road, Guildford Road, Railway Parade and over the Derbarl Yerrigan (Swan River); increasing the number of lanes on Tonkin Hwy; the provision of noise walls and a new Principal Shared Path (PSP).

The Associated Works portion will deliver rail-enabling works for the METRONET Morley-Ellenbrook Line (MEL) along Tonkin Highway, which has also commenced construction works in 2021 (Figure 2). Associated Works will include underpasses and dive structures, to enable trains to enter and travel along the median of Tonkin Highway then exit in Malaga. Traffic and bus bridges will be built at Broun Avenue to provide access to the future Morley Station. These works will help reduce congestion impacts on Tonkin Highway when the main railway construction begins.

The Project intersects with three local government areas (LGAs); the City of Bayswater, the City of Swan and the City of Belmont.

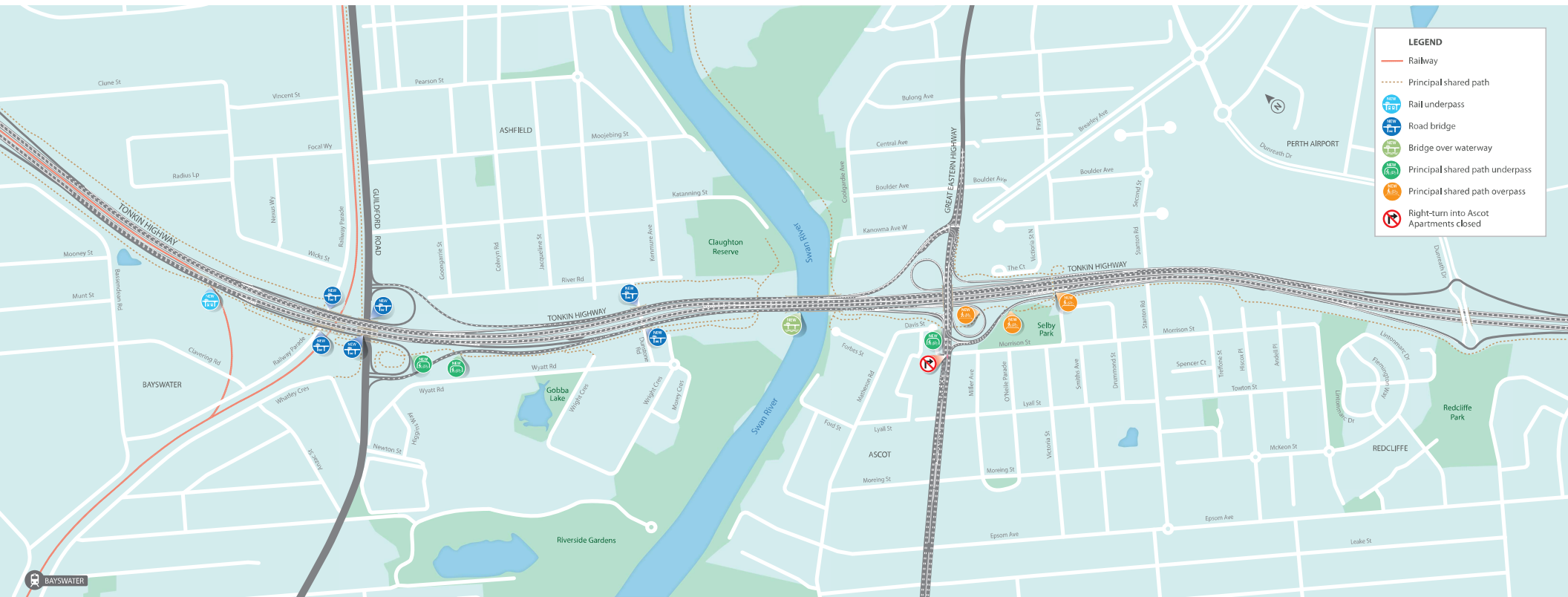
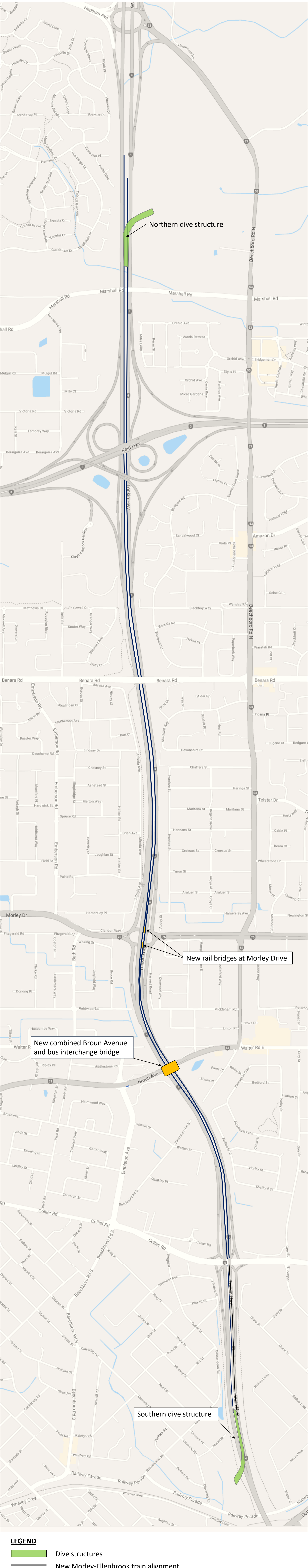


Figure 1 Project Location and Scope

# TONKIN GAP Associated Works



## LEGEND

- Dive structures
- New Morley-Ellenbrook train alignment
- New Bridge Structures

Figure 2 Tonkin Gap and Associated Works

## 2.2 Value and Funding

The Tonkin Gap portion of the Project is jointly funded by the Australian (\$232 million) and Western Australia (WA) Government (\$58 million).

## 2.3 Delivery Partners

The Project design and construction is being delivered by the Tonkin Gap Alliance (TGA) which is made up of five non-owner partners (NOPs); Georgiou, BMD, WA Limestone, GHD and BG&E. The owner participants include both Main Roads Western Australia (Main Roads) and the Public Transport Authority (PTA), due to the enabling works being completed for the MEL Project. The Project's supply chain involves numerous subcontractors delivering packages of work, with a focus on local spend and supply, Aboriginal owned businesses and small and medium-sized enterprises (SMEs).

## 2.4 Project Timeline

The Alliance was formed prior to the Project contract being awarded in June 2020. Design work started immediately with various sustainability focused workshops held through the second half of 2020 and in the early months of 2021. Completion of design packages was achieved over many months, concluding around August 2021, with exception of the landscaping package. This is generally reliant on other aspects reaching completion before final landscaping adaptations can be made. Traffic modelling data used in the tender phase required substantial update as it was reflective of COVID-19 impacts, and therefore not representative of actual traffic numbers. This, along with changes proposed by the PTA in certain aspects of the MEL section of the Project, contributed to reasonable design delays for the Project. Figure 3 shows a timeline of the significant sustainability milestones to date.

The IS Design Rating submission was subsequently delayed as a result of changes to the design through the later stages, which impacted the ability to progress certain modelling requirements for energy and materials as these were dependent on the final (100%) design being reached. At the time of submitting this report, the Project is awaiting comments on the IS Design submission from the ISC independent verifiers and have therefore not yet been awarded a final Design score.

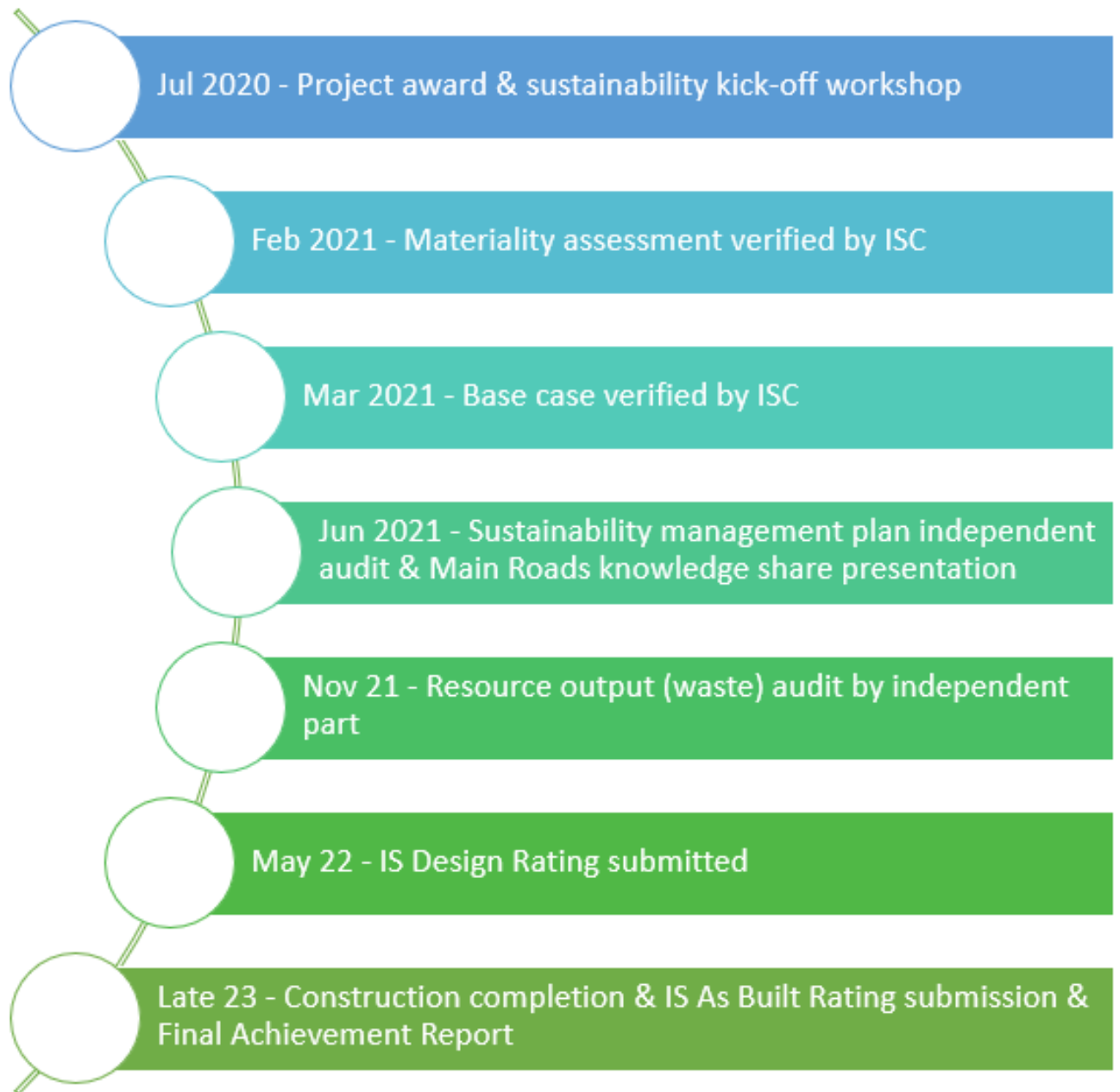


Figure 3 Project Sustainability Timeline Infographic

### 2.4.1 Construction Milestones

Since construction kicked off in early 2021, significant milestones have been achieved by the Project in each of the construction zones, namely the Tonkin Highway corridor and MEL enabling works. Some of these milestones are shared below.



The first pedestrian footbridge at Selby Park was installed in April 2022. This is part of the upgraded principal shared path on the west side of the Tonkin Highway.



The new bridge over the Swan River was successfully launched over 10 months and multiple launching events. The launch bridge landed on the northern side of the Derbarl Yerrigan in May 2022.



The deconstruction of the existing Broun Avenue bridge was completed in April 2022 (Figure 4) and Stage 1 of the beam install for the new Broun Avenue was completed in January 2022.



Completion of piling and diaphragm wall construction for both the Southern (September 2021) and Northern (March 2022) dive structures.



Tonkin Highway Superstage implementation – north and southbound traffic switches completed August and September 2021.



All 92 tee-roff beams used to construct various bridges across the Project have been fabricated, with about 20% remaining to be delivered. More than 3,800 m<sup>3</sup> of concrete and 950 tonnes of reinforced steel has been used to make the beams.



Precast fabrication of bridge barriers, parapets and noise walls approximately 50% complete.



All 60 tee-roff bridge beams have been installed for the Guildford/Railway bridge (Figure 5).

Figure 4 Significant Construction Milestones in FY



Figure 5 Broun Avenue Bridge deconstruction – April 2022

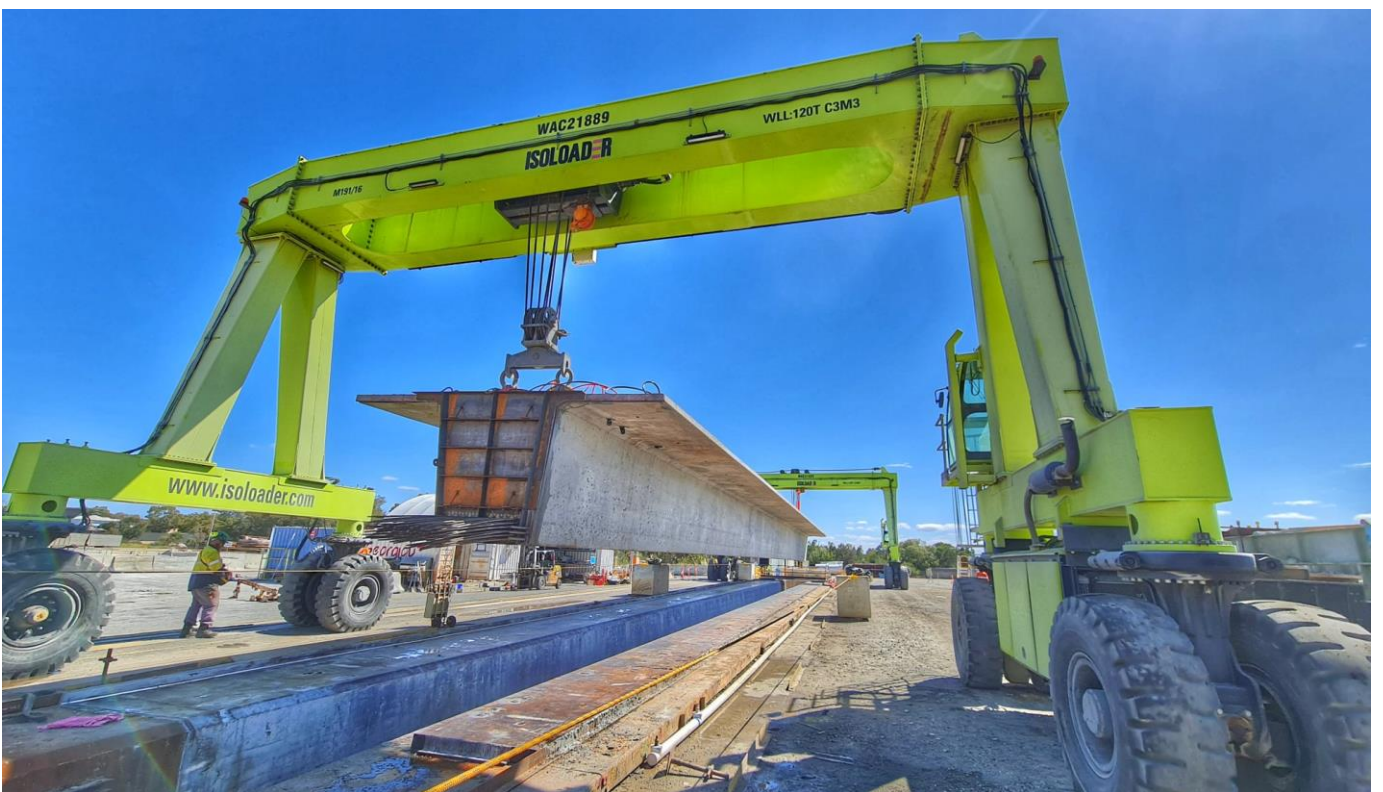


Figure 6 Tee-roff bridge beam lift



## 3 Governance

### 3.1 Approach to Sustainability

#### 3.1.1 Sustainability Policy

TGA has developed a Sustainability Policy to guide the governance of the Project during design and construction. The [Sustainability Policy](#) has been endorsed by the Alliance Director and is available on the Project website.

#### 3.1.2 Sustainability Management

Sustainability on the Project is managed in accordance with the TGA's Sustainability Management Plan (SuMP) and is championed by TGA's environment and sustainability team. The TGA Environment and Sustainability Manager works to ensure sustainability is discussed at the senior management team level, including the TGA board. The TGA team is supported by a dedicated and experienced Sustainability Coordinator to help drive sustainable outcomes. There are three Infrastructure Sustainability Accredited Professionals in the environment and sustainability team who have varying levels of experience in infrastructure sustainability working on the Project. The SuMP sets the framework for sustainability integration during the design and construction phases to achieve sustainable outcomes.

To ensure ongoing integration and consideration of sustainability aspects through the construction phase, regular meetings between the sustainability team and construction leads, commercial team, stakeholder engagement team. The sustainability 'wins' achieved to date are documented throughout this report, with key highlights described in Section 1.3.

#### 3.1.3 Infrastructure Sustainability





TGA is committed to achieving positive sustainability outcomes across the Project through application of the ISC IS Rating Tool. The framework addresses a broad range of sustainability aspects on infrastructure projects across a range of credits, each with several requirements for which points are awarded. The Project is using V2.0 of the IS framework, also adapting credit requirements from the more recently released V2.1 tool. At the time of this report, TGA has successfully completed the Design submission to ISC independent verifiers and are awaiting a verified Design Rating score. The final submission will be submitted to ISC as the Project reaches practical completion, namely the end of construction, which is anticipated to be in 2023. The Project is on track to achieve the minimum required score of 40 in the As Built (as-constructed) submission, which would translate to a Silver rating.






Various tools and frameworks have been developed to support the submission of the IS rating in achieving improved outcomes, including those used for modelling water and energy across the life cycle of the Project.





### 3.2 Material Sustainability Issues






TGA has used the United Nations (UN) Sustainable Development Goals (SDG) to guide identification of the material sustainability issues related to significant economic, social and environmental impacts. In early workshops with an internal multidisciplinary team, priority themes were identified and developed into the Projects sustainability framework, with key themes represented by 'Focus Areas'. These were further fleshed out into various Project objectives, in relation to the Focus Area, with targets eventually set for each objective. These were later presented to stakeholders for feedback in various forums including community open days, distributed surveys and targeted stakeholder meeting and working groups. Table 1 provides an overview of the material sustainability issues – referred to as focus areas and objectives, mapped against the relevant SDGs. The positive and negative impacts the Project may also have against each SDG is presented in Appendix 1.

Table 1 Project Focus Areas and Objectives

Focus Area	Objectives	Relevant SDG	Relevant IS Credit
Enhanced Urban Design and Place-making	<p><b>Enhance the Swan River crossing and surrounding area</b> The Swan River is an iconic feature in the Perth landscape and is a significant aspect of Indigenous and Perth heritage. The Swan River and its surrounds provides beneficial use to a variety of users. There are many stakeholders that will need to be consulted as part of the design and construction of the Redcliffe Bridge.</p>		Con-2 Urban and Landscape Design Context
	<p><b>Maximise connectivity for multi-mode transport</b> The design of Tonkin Gap and Associated Works must meet the needs of different transport users including road (passenger and freight), rail, cycling and pedestrians. It is essential for the upgraded bridge and alignment to consider and address all these needs in the final design.</p>	 	Con-2 Urban and Landscape Design Context Ecn-1 Options Assessment
	<p><b>Preserve and enhance ecological values</b> Preserving and enhancing ecological value is an important aspect of the Project. This is significantly associated with the ecological value that the Swan River has for terrestrial and aquatic fauna and flora.</p>		Con-2 Urban and Landscape Design Context Eco-1 Ecological Assessment and Risk Management

Focus Area	Objectives	Relevant SDG	Relevant IS Credit
	<p><b>Preserve and enhance heritage values</b> Preserving and enhancing the Indigenous, natural and European heritage values is an important aspect of the Project. This is mainly attributed to the Swan River and surrounding precinct.</p>		<p><i>Con-2</i> Urban and Landscape Design Context <i>Her-1</i> Heritage</p>
<p>Management and Mitigation of Impacts to Water</p>	<p><b>Optimise the design and groundwater interface</b> The design and groundwater interface represents a significant challenge for the Project due to existing contamination, presence of acid sulfate soils, the quantity of water required to be dewatered during construction, and the ongoing impact of groundwater on buried assets.</p>	  	<p><i>Env-1</i> Receiving Water Quality</p>
	<p><b>Reduce impacts relating to groundwater contamination and acid sulfate soils</b> Groundwater contamination and acid sulfate represent challenge in various locations along the alignment.</p>		<p><i>Rso-2</i> Contamination and Remediation <i>Rso-3</i> Management of Acid Sulfate Soils <i>Wat-2</i> Utilising Appropriate Water Sources</p>
	<p><b>Minimise impacts and improve discharge quality to surface water</b> The Swan River has the potential to be significantly impacted by the Project. As such minimising impacts and improving long term water discharge into the Swan River through sensitive urban water design is a key sub-focus area.</p>		<p><i>Env-1</i> Receiving Water Quality</p>
<p>Efficient resource use and sourcing</p>	<p><b>Optimised material selection and quantity</b> Infrastructure projects require significant quantities of materials to deliver. Appropriate selection and design optimisation can markedly contribute to minimise impacts to the environment and society.</p>		<p><i>Rso-1</i> Resource Efficiency Strategy and Management <i>Rso-4</i> Resource Recovery</p>
	<p><b>Reduce energy requirements and emissions</b> Infrastructure projects contribute a significant portion to Australia’s and the world greenhouse gas emissions. Designing and delivering an energy efficient project is essential to minimising global warming and reducing depletion of finite resources.</p>		<p><i>Ene-1</i> Energy Efficiency</p>

Focus Area	Objectives	Relevant SDG	Relevant IS Credit
	<p><b>Reduce water requirements</b> While a road project during operations does not consume significant quantities of water compared to other types of infrastructure, water consumption during construction is considerable. Minimisation through construction methodology is important to reducing the use of this precious resource in our drying climate.</p>		<p><i>Wat-1</i> Avoiding Water use</p>
	<p><b>Reduce waste and maximise onsite reuse and recycling</b> Responsible stewardship of waste generated onsite is essential to improving environment and community outcomes.</p>		<p><i>Rso-4</i> Resource Recovery</p>
	<p><b>Integration of offsite recycled products and materials</b> The project has opportunity to reduce use of virgin material through enhancing the integration of recycled material.</p>		<p><i>Rso-1</i> Resource Efficiency Strategy and Management</p>
Industry Prosperity	<p><b>Improved workforce diversity and wellbeing</b> Enhancing workforce diversity has significant benefits to the wellbeing of the Project workforce and of our community.</p>		<p><i>Wfs-2</i> Workforce Culture and Wellbeing <i>Wfs-3</i> Diversity and Inclusion</p>
	<p><b>Develop capability and capacity in subcontractors</b> An opportunity to diversify and enhance businesses, particularly for large projects such as Tonkin Gap and Associated Works, is beneficial to improving resilience in the industry.</p>		<p><i>Wfs-1</i> Jobs, Skills and Workforce Planning</p>

Focus Area	Objectives	Relevant SDG	Relevant IS Credit
	<p><b>Increased Aboriginal Participation</b>                      Aboriginal participation in the workforce is low compared to other community groups, and due to the size and nature of the projects, there is opportunity to enhance outcomes in this area.</p>	  	<p><i>Wfs-1</i> Jobs, Skills and Workforce Planning  <i>Wfs-3</i> Diversity and Inclusion</p>
<p>Consultation and Partnership</p>	<p><b>Effective community engagement</b>                      Working with the community and meeting reasonable expectations during construction and operation are an important part of delivery of Tonkin Gap and Associated Works.</p> <p><b>Improved outcomes for the Swan River and other key precincts through consultation</b>                      Working with stakeholders and the community through targeted information and consultation events is a key priority for Tonkin Gap Project and Associated Works.</p> <p><b>Effective decision making through collaboration with METRONET</b>                      The linkage between the Associated Works Project and the MEL Project makes consultation with METRONET during design and construction an important aspect of the projects.</p>	 	<p><i>Sta-1</i> Stakeholder Engagement Strategy  <i>Sta-2</i> Stakeholder Engagement Strategy Implementation</p>

### 3.3 Sustainability Targets

Using the sustainability framework developed in the early stages of the Alliance forming, Sustainability Targets were formed for design, construction and operation to drive sustainability outcomes through the duration of the Project. Targets for the construction phase are detailed in

Table 2, with a comment on the status of achievement, either 'Complete', 'On track', 'In progress' or 'At risk'. A large majority of these are ongoing through construction and have therefore not been indicated as 'Complete', however the full target list is provided in Appendix 2, providing more detailed updates on the status of achieving these targets. As described above, the targets have been linked within the Sustainability Framework to Focus Areas and Project objectives for sustainability.

Table 2 TGA Construction Targets for Sustainability

Focus Area	Target	Status
Enhanced urban design and place making	Implement at least two opportunities to enhance the Swan River precinct identified during consultation with key external stakeholders.	On track
	Implement at least one opportunity to improve user connectivity for each mode of transport identified for the project.	Complete
	Implement at least one environmental enhancement opportunity, with a stretch target for two opportunities.	On track
Management and mitigation of impacts to water	Implement the three (3) adopted mitigation strategies for minimising the risk and challenges of the design and groundwater interface identified during design	Complete
	Implement the prepared Acid Sulfate Soil Management Plan	On track
	Implement the prepared Site Contamination Management Plan	On track
	Implement the identified methods and management measures to minimise impacts on the Swan River water quality or use	On track
	Achieve no more than two (2) Class 2 incidents and zero (0) Class 1 incidents, as defined by the TGA Environmental Management Plan	On track
	Implement monitoring of the Swan River and achieve the water quality criteria as specified in the management plan approved under the Swan and Canning Rivers Management Act 2006	On track

Focus Area	Target	Status
Efficient resource use and sourcing	Achieve at least a 5% reduction in materials used on the project as measured by the IS Materials Calculator (i.e. based on environmental impacts)	On track
	Divert at least 85% of clean/inert excavation spoil from landfill and reuse at least 50% onsite	On track
	Divert at least 60% of office resource outputs from landfill	At risk (improving)
	Divert at least 70% of other inert resource outputs from landfill	On track
	Re-use/retain at least 65% of contaminated soil on site (excluding asbestos), and dispose of no greater than 10% to landfill	On track
	Re-use/retain at least 50% of acid sulfate soils on site, and dispose of no greater than 15% to landfill	On track
	Implement at least two (2) opportunities to replace use of virgin materials, with a stretch target for four (4) opportunities	Complete
Industry prosperity	Achieve 75% satisfaction on the cultural and wellness survey of team cohesion	On track
	Attract and retain at least 10% of new entrants into the workforce (new employees with less than 5 years' experience)	On track
	Achieve at least 10% of the workforce representing women	On track
	Fundraise for 1 event supporting people living with disabilities, such as City to Surf for Activ (host a team etc.)	In progress
	Celebrate 1 event during Pride Month or throughout the year	In progress
	Develop a Flexible Working Arrangements Policy	Complete
	Investigate engagement through the Infrastructure Ready Program	At risk
	Celebrate 1 event for Harmony Week	Complete

Focus Area	Target	Status
	Prepare at least three discrete packages of work to enable to WA Limestone to achieve Main Roads prequalification level R2, and two other small subcontractors have intent to submit for B1/R1.	On track
	Engage at least 30 Aboriginal FTEs for the entire project duration	At risk
	Award at least \$10m of contracts to Aboriginal businesses	On track
	Provide at least 1 mentor to Aboriginal employees for project duration	On track
	Establish a Project Working Group and implement at least two (2) initiatives related to Aboriginal participation	On track
	An Aboriginal Coordinator was appointed for the project and was available for at least 20%-30% of the project	On track
Consultation and partnership	Maintain communication channels and maintain dust mitigation strategies and monitoring	On track
	Maintain communication channels and maintain noise mitigation strategies and monitoring	On track
	Maintain communication channels and maintain vibration mitigation strategies and monitoring	On track
	Complete stakeholder satisfaction surveys every 6 months and achieve at least a 60% rate for stakeholder satisfaction	On track
	Complete community perception surveys every 6 months and achieve at least a 50% rate for community sentiment	On track
	Stakeholder input influences more than one (1) priority project negotiable (as defined in the CSEP)	Complete
	Maintain consultation channels with key external stakeholders during implementation of opportunities for Swan River precinct	On track
	Complete bi-monthly meetings with METRONET to establish progress and obtain feedback for integration with the project	On track



### 3.4 Climate Change Assessments

A Climate Change and Natural Hazard (CCNH) risk assessment was undertaken involving representatives from the TGA design, environment and community teams, as well as key stakeholders from Main Roads, PTA, the impacted LGAs and Perth Airport. The risk assessment used the Representative Concentration Pathway (RCP) 8.5 modelled scenario to quantify climate predictions for the years 2030, 2050 and 2090. RCP scenarios were adopted from the Intergovernmental Panel on Climate Change (IPCC) and simulate both future energy technologies and emissions. The pathways produce emissions scenarios that are then used by scientists to run complex climate models that simulate how the climate might change in the future. The Project adopted RCP 8.5 as it is the more conservative approach with the intention to protect the constructed project physically and its users throughout its 100-year design life.

#### 3.4.1 Climate change projections

The following key projections are attributed to the Southern and South-Western Flatlands West sub-cluster, which represents the south-west area of WA (Climate Change in Australia, 2021):

- Average temperatures will continue to increase in all seasons (very high confidence).
- Decreasing winter rainfall (high confidence), spring rainfall also projected to decrease (high confidence).
- More hot days and warm spells (very high confidence).
- Increased intensity of extreme rainfall events (high confidence).
- A harsher fire-weather climate (high confidence).

#### 3.4.2 Identified risks and adaptations

Two high priority risks facing the Project relating to increases in extreme weather, including increased frequency and intensity of bushfires and flooding, were identified. To minimise risk of aquaplaning from rainfall events, the geometry of the road and pavement type was assessed and enhanced Open Graded Asphalt (OGA) pavement with subsurface voids was incorporated into the design. This prolongs the performance of the pavement surface with respect to minimising water film depths. Risks associated with bushfire events were mitigated through review of landscaping species selection and mulching in fire prone areas. This includes maximising the use of groundcovers and trees in suitable areas, providing more fire-retardant plant in revegetation mixes and application of larger particle mulch. Mitigation actions have been incorporated into the relevant design reports and landscaping framework to be implemented as appropriate during construction. Implementation is being monitored as part of closing out the climate change risks in the risk register.

### 3.5 Technology and Innovation

The Project has endeavoured to pursue opportunities to include innovative construction methodologies and materials by incorporating new technologies, improving the outcomes of the Project. Ongoing engagement with industry and other Main Roads and PTA projects allows for the sharing of sustainability knowledge, lessons learnt and drive enhanced outcomes in innovative technologies. Innovative initiatives are captured as part of the Project's opportunities assessment process and documented in the Risk and Opportunities Register, where implementation plans are identified and carried out.

Collaboration between subcontractors, suppliers and non-owner partners have facilitated the implementation of opportunities. This includes changes to design and construction methodologies to remove requirement for a temporary pier in the Derbarl Yerrigan, trialling use of recycled content in retaining wall blocks and use of lower carbon concrete. These innovations were identified through the opportunities assessment process and through ideas generated from suppliers or external

parties. Further detail is provided in an example below.

### 3.6 Innovation Case Study

The scope of the Project includes the construction of a new section of Redcliffe bridge, adjacent to the existing bridge, to carry Tonkin Highway northbound over the Derbarl Yerrigan. Initially, a temporary pier was proposed to be located in the centre of the bridge, providing support for the incremental launching of the precast segments to construct the bridge. The piling and construction of the temporary pier was expected to cause significant temporary and permanent disturbance to the riverbed.

Through the Value Engineering process, TGA identified alternatives to the construction of the temporary pier in the middle of the river, which included undertaking a multicriteria assessment, considering the social, environmental and local economic aspects of the base case (temporary pier in the middle of the river) and a new engineering solution to remove the need for a temporary pier. The latter was determined to support significantly improved outcomes across all aspects of the assessment criteria, and therefore the design and construction methodology was reworked. Associated impacts are shown in Figure 7.

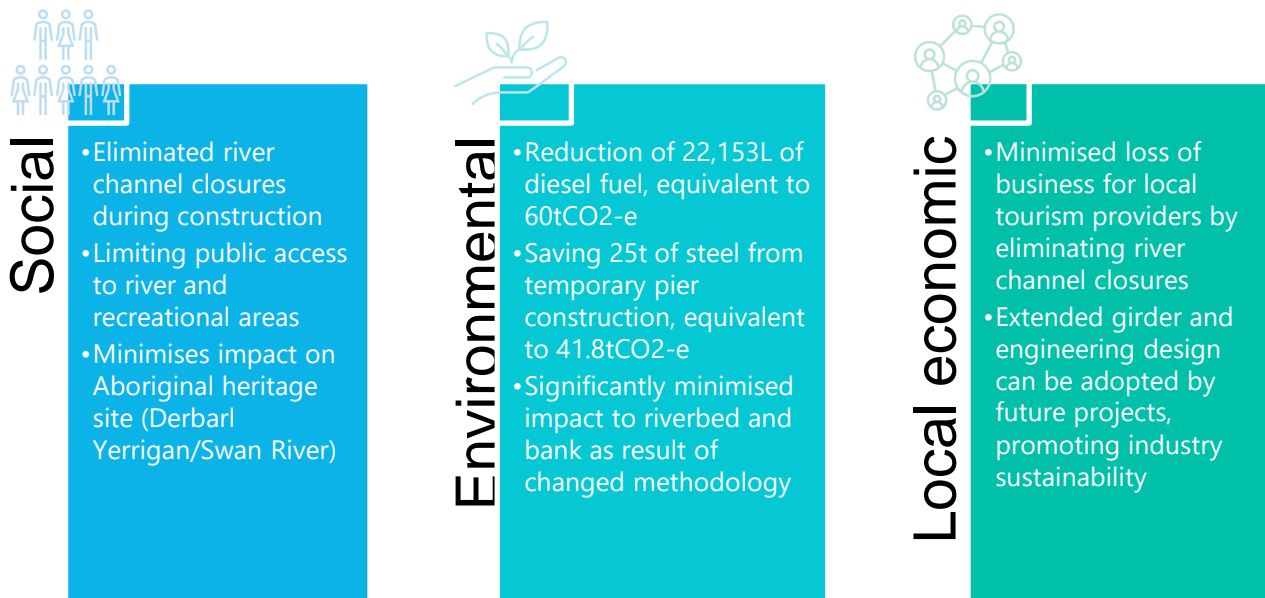


Figure 7 Social, environmental and local economic impacts associated with this innovation

Through a collaborative effort, an existing 22 metre launch girder was secured for the Project. This girder was attached to the end of the original 31 metre project girder sourced from subcontractor Freyssinet to generate the required total length of 53 metres (Figure 9). The length of this extended girder allowed the Project to launch across the entire width of the Derbarl Yerrigan, eliminating the need for a temporary pier in the riverbed. This is the longest girder used for an incrementally launched bridge in Australia.



Figure 8 Drone view of completed Derbarl Yerrigan bridge launch (from the northern side)



Figure 9 First launch from the southern side of the river with extended girder

## 4 Economic

### 4.1 Key Economic Context

Industry prosperity is a material issue for the Project due to its significant size and its capacity to impact local economies. The Tonkin Highway is at the centre of several major road projects to improve connectivity and network operations in the region, with the road carrying more than 120,000 vehicles daily. Connecting the Gateway WA and NorthLink WA projects, this section of Tonkin Highway forms part of a vital freight and commuter access route for WA. Insufficient capacity to meet current demand at this location has created a 'bottleneck' that constrains the full realisation of the benefits from recent investments in Tonkin Highway and planned future investments to upgrade intersections and extend Tonkin Highway to the south.

The Project will transform Tonkin Highway to deliver a high standard, north-south transport link from Muchea to Mundijong. The upgrades are expected to save road users up to six minutes of travel time during morning peak and up to 11 minutes during afternoon peak. The Project has been fast-tracked as a part of the State Government's \$5.8 billion COVID-19 WA Recovery Plan. The Plan prioritises major road and rail projects across the state to connect suburbs, reduce congestion, support local jobs and bolster economic recovery.

The road safety improvements that will result from the construction of the Project include ameliorating the impacts of congestion that have contributed to the intersection of Tonkin Highway and Collier Road being rated as the worst in the state for vehicle crash frequency and cost between 2011-2015. This cost, totalling \$15.8 million for the period, will be significantly reduced with the road development. Additionally, the \$194.2 million cost of congestion and the \$19.6 million cost to the environment through air pollution and emissions are expected to be reduced when the Project is completed.

The surrounding land use is predominantly residential, however there are large areas of commercial/industrial land along Tonkin Highway north of Reid Highway, between Broun Avenue and Guildford Road. These commercial estates are characterised by auto services and associated businesses with a broad range of other businesses including construction, materials engineering and resource processing facilities. The Perth International Airport is also located close to the works along Great Eastern Highway and Tonkin Highway.

#### 4.1.1 Economic parameters

Economic parameters are used to assess the progress of the Project through the construction phase. A summary of economic performance and aspects for the Project are detailed in Table 3.

*Table 3 Summary of Economic Aspects*

ECONOMIC ASPECT	UNIT	TOTAL THIS PERIOD	TOTAL FOR PROJECT
Funding Received	\$	237,924,727	340,049,308
Indigenous Enterprises	#	19	25
Disability Enterprises	#	0	0
Suppliers Engaged	#	115	253
Buy Local Spend	\$	138 M	170 M

## 4.2 Key Economic Outcomes

Extensive consultation continues to be undertaken with local businesses and industries to provide support during the construction phase and maximise benefits to these stakeholders during the operation of the asset. These stakeholders are noted among the full list in Appendix 3. Impacts to businesses along Great Eastern Highway and off Tonkin Highway will be felt during construction as a result of road closures and detours, as well as occasional noisy or night related works. This will be managed by the Project team through direct consultation and optimisation of the construction timeline.

The Project is expected to create more than 3,000 jobs throughout the construction phase, which is anticipated to be completed over three years. Projects like Tonkin Gap have been flagged as crucial by the State and Federal governments to support the WA economy. This job creation is also targeting young workers entering the workforce and maximising engagement and participation of local Aboriginal workers and businesses. This is further detailed in Section 6.7 and 6.11.

The key economic outcomes for the Project include:

- Improving travel times and the productivity of one of Perth's major freight routes.
- Reducing congestion and the high proportion of merge, diverge and weave movements that are leading to an increase in concern for the safety of asset users.
- Improving current cycling and pedestrian connections to increase local amenity.
- Providing infrastructure to support the delivery of METRONET's Morley-Ellenbrook Line.



*Figure 10 Broun Ave Bridge deconstruction tour with Premier Mark McGowan, Transport Minister Rita Saffioti, Health Minister Amber-Jade Sanderson, Water Minister Dave Kelly and Main Roads and TGA representatives.*

### 4.3 Sustainable Procurement and Buy Local

TGA’s procurement processes are mediated by the Project Sustainable Procurement Policy, the Commercial Management Plan and the Industry Sustainability Plan. Several of the Project sustainability targets are related to Industry Sustainability and Sustainable Procurement. Each plan and policy align with the State Government’s industry sustainability and participation strategies. These include the WA Buy Local Policy, WA Industry Participation Strategy (WAIPS) and the Aboriginal Procurement Policy (APP). The Buy Local Policy in particular focusses on small and medium sized enterprises (SMEs), which make up at least 97% of WA businesses, and TGA aims to procure WA based goods and services as a first priority.

The targets for Industry Sustainability are included in the overall [Sustainability Targets](#) for the Project. The Project team is committed to ensuring all aspects of sustainability are considered in the procurement process and the [Sustainable Procurement Policy](#) is available on the Main Roads Project website. Progress against various economic parameters is presented in Table 3 above and further detail in Appendix 2.

In the initial stages of the Alliance forming, TGA partnered with the Civil Contractors Federation (CCF) to engage with the wider market in preparation for the procurement of packages on the Project. This was done over two separate sessions, one which was targeted at CCF signatories and one targeted at Aboriginal businesses. The sessions communicated the Project commitment to sustainable procurement, procurement and tender evaluation processes and types of packages.

#### 4.3.1 Sustainability procurement process

The sustainable procurement (SP) process follows the basic criteria outlined in the IS framework, from early engagement and notification of suppliers, through to ongoing contract management. A simplified version of this is summarised in the graphic below.

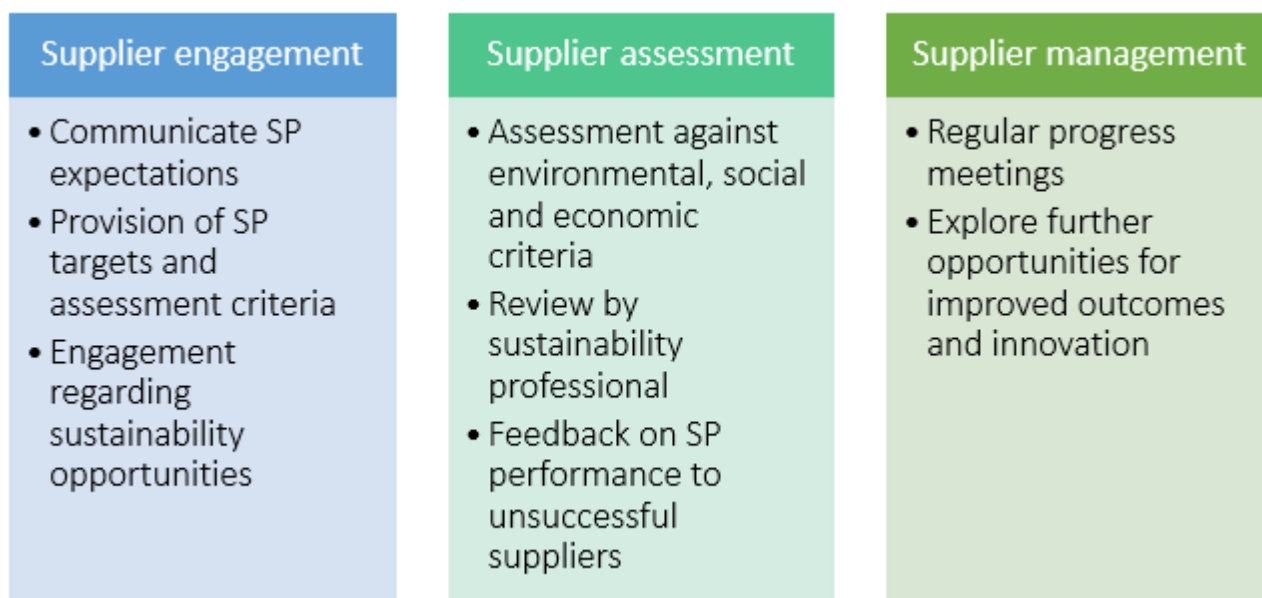


Figure 11 Simplified sustainable procurement process

### 4.4 Sustainable Transport

The widening of Tonkin Highway will significantly reduce the congestion and stop and start motions currently experienced along this portion of the road network. This is expected to reduce carbon emissions emitted from idling vehicles. The Project will also provide improved principal shared path (PSP) and cycling connections, encouraging the use of active transport modes.

The Project has undertaken a permeability self-assessment to define expected improvements in connectivity and placemaking. The assessment sought to define a baseline of the existing network and quantify improvements that would result from the construction of the Project. The assessment took into consideration walking and cycling connectivity, journey time reliability, access to cycleways, integration of culture and heritage and the provision and improvement of public spaces and stop and rest areas.

The Project is improving upon baseline permeability through:

- Reconnection of nature walks in Claughton Reserve and upgraded paths.
- Upgrading the shared paths from east and west sides of Great Eastern Highway, linking to the new upgraded Victoria Street footbridge to provide safe access across Tonkin Highway.
- Provision of a pedestrian underpass and shared path between Railway Parade and Stanton Road.
- Provision of rest stops on shared path networks and cycling hub at Guildford Road.
- Optimising of connection points for walk and cycle crossings along Tonkin Highway.
- Reactivation of Derbarl Yerrigan foreshore.
- Interpretive heritage trail.

Future proofing of the Project has been considered in the provision of these aspects of sustainable transport and additionally through the Associated Works package which is providing key infrastructure and services to METRONET's Morley-Ellenbrook Line. The Morley-Ellenbrook Line will provide an alternative travel option in Perth's highest car usage corridor, anticipating an increase in public transport use among Perth's population. Provision of alternative transport options are expected to contribute to a reduction in vehicle emissions.

## 4.5 Economic Case Study – Aboriginal Participation

To better understand how we can increase opportunities and engagement for Aboriginal business on TGA and future projects, TGA's Aboriginal Engagement Coordinator developed a process to follow up with Aboriginal businesses who were invited to tender for various packages but did not submit a quote. Out of 106 invitations, 33 bids have been received (31% response rate) and 13 packages have been awarded to Aboriginal businesses (12% award rate). The aim of this process was to understand why the business did not provide a quote or if they did provide a quote, why they chose not to engage further.

After reviewing several instances where these scenarios occurred and liaising with the businesses directly for feedback, the following reasons were identified:

- Scope capability - several of the entities did not provide a quote due to the scope of works not being within their capabilities (occurred on 19 occasions).
- Communication - communication was lacking between TGA and tenderers and some entities felt it too difficult to proceed, choosing to opt out (occurred on two occasions).
- Timeframes - one particular entity had provided a price, however after the three month waiting period, the entity outlined that the process did not meet their timeframes and this resulted in them not having the capacity to take it on in the end, so chose to opt out.
- Lack of engagement - another business advised that it felt 'pointless' putting in a bid when they receive little feedback during and after the tendering phase and minimal engagement.

This feedback brings an opportunity to shape the procurement and tendering process in a more engaging and collaborative way on the remainder of packages for TGA and on future projects to maximise engagement, capability and the successful delivery of works for Aboriginal businesses.

The results have been passed onto the Alliance Partners and Director of Aboriginal Engagement at Main Roads so it can be applied on other projects.



## 5 Environmental

### 5.1 At a glance

A summary of environmental performance and parameters for the Project is detailed in Table 4 to provide a snapshot of progress to date. Further detail is provided through the following sections. A summary of resource inputs and outputs (waste) is provided in Table 5, with further information in Section 5.7.

Table 4 Summary of Environmental Aspects

ENVIRONMENTAL ASPECTS	UNIT	TOTAL THIS PERIOD	TOTAL FOR PROJECT
Native Vegetation Cleared	ha	3.2	5.96
Native Vegetation Retained (due to design)	ha	0	3.1
Revegetation/rehabilitation Undertaken	ha	0	0
Number of Trees Cleared	#	~76	~246
Number of Trees Retained (due to design)	#	43	43
Total Water Consumption	kL	144,180	189,157
Total Non-Potable Water Consumption	kL	140,295	181,658
Total Potable Water Consumption	kL	3,885	7,499
Non-Potable Water Replacement	%	97	96
Total Green House Gas emissions <sup>^</sup>	t CO <sub>2</sub> .e	4,273	5,346
Total Energy Consumption	GJ	59,677	73,663
Renewable Energy Mix	%	0	0

<sup>^</sup> Inclusive of Scope 1, 2 & 3 emissions

Table 5 Resource and Waste Summary

RESOURCE INPUTS AND GENERATED WASTE	UNIT	TOTAL THIS PERIOD	TOTAL FOR THE PROJECT
<b>Resource Inputs (Materials)</b>			
Total Quantity of Virgin Materials Used	t	399,596	581,688
Total Quantity of Recycled Materials Used	t	27,362	123,088
Total Quantity of Reused Materials Used Onsite	t	401,923	480,532
Percentage of Recycled Material Used	%	3	11
<b>Resource Outputs (Wastes)</b>			
Waste Sent to Landfill	t	1,045	2,320
Waste Diverted from Landfill	t	46,277	53,415
Total Waste Generated by Project	t	47,322	55,735
Waste Diversion Rate	%	98	96

## 5.2 Environmental Context

The Project is located in a highly urbanised area of Perth, made up of both residential and industrial areas. Some undisturbed land with significant environmental features, such as the Threatened Ecological Community (Figure 12), is present to the north of the Project area (see Appendix 3 for further detail). The Project also crosses the Derbarl Yerrigan which, despite past bank modification, supports riverine flora and fauna.

In terms of green spaces, the Project area encompasses a range, from remnant native vegetation to areas of high disturbance. Small sections of native vegetation were present adjacent to the existing Tonkin Highway near Dunreath Drive, Belmont; around the Broun Avenue, Morley interchange; and on the shoreline of the Derbarl Yerrigan. The largest section of native vegetation, in the northern section of the Project area, is where TGA will construct the dive structure for the rail line to run underneath the road and continue east of Tonkin Highway (Figure 12). These native vegetation areas have been approved for clearing under the *Environmental Protection Act 1986* and associated regulations, some with offset requirements. Other vegetation present within the Project includes weeds, non-native species and roadside revegetation species native to WA.

The Project area includes spaces of significant disturbance and some instances of ground contamination. This includes inert waste that has been illegally dumped and contamination from historical industrial use. These are managed by TGA and reviewed by an independent Contaminated Sites Auditor.



*Figure 12 Aerial photo of the northern dive construction looking north, showing the threatened ecological community to the north and east of the construction site, with Tonkin Highway to the west.*

### 5.3 Environmental Management

Based on the Tonkin Gap Alliance values and commitment to Zero Harm, TGA is aiming to provide the best practice engineering solutions using sustainable environmental management principles and practices.

A Project specific Environmental Management Plan (EMP) provides a framework for the management of all environmental aspects of the Project. The primary purpose of the EMP is to describe the management systems and procedures, which will be adhered to in achieving Project environmental objectives and goals. The EMP is the overarching reference for environmental management throughout the construction phase and prescribes all applicable procedures, processes and practices to be undertaken by TGA and their subcontractors. The EMP outlines processes to manage environmental risks, minimise impacts on the surrounding environment and ensure compliance with regulatory requirements and other obligations throughout project delivery.

The Project EMP, its sub-plans and procedures are applicable to all project works, staff, and subcontractors. Sub-plans include the Flora Management Plan to ensure no risks to ecosystem health occur due to construction related effects on native flora. Mature trees, trees of significance and remnant vegetation as well as potential Black Cockatoo habitat trees have been retained as far as practicable within the approved Project Site boundary.

The key environmental legislation impacting the Project include:

#### Commonwealth Government

- *Aboriginal and Torres Strait Island Heritage Protection Act 1984*
- *Aboriginal and Torres Strait Island Heritage Protection Regulations 1984*
- *Environment Protection and Biodiversity Conservation Act 1999*
- *Environmental Protection and Biodiversity Conservation Regulations 2000*
- *National Environmental Protection Council Act 1994*
- *National Greenhouse and Energy Reporting Act 2007*

#### State Government

- *Aboriginal Heritage Act 1972*
- *Biodiversity Conservation Act 2016*
- *Biodiversity Conservation Regulations 2018*
- *Contaminated Sites Act 2003*
- *Environmental Protection Act 1986*
- *Environmental Protection Regulations 1987*
- *Environmental Protection (Noise Regulations) 1997*
- *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*
- *Environmental Protection (Controlled Waste) Regulations 2004*
- *Environmental Protection (Unauthorised Discharges) Regulations 2004*
- *Heritage Act 2018*
- *Rights in Water and Irrigation Act 1914*
- *Swan and Canning Rivers Management Act 2006*

Compliance with legislative requirements detailed in environmental approvals is monitored regularly and to date, there have been no non-conformances. The environmental approvals and allowance are summarised in Table 6.

Table 6 Environmental Allowances, Approvals and Permits

ENVIRONMENTAL ALLOWANCE TYPE	UNIT	PROJECT ALLOWANCE
Clearing Permit Allowance (CPS5242/5)	ha	14.9
Clearing Permit Allowance (CPS 8939/1)	ha	1.23
Clearing Permit Allowance (CPS 818/15)	ha	0.74
Water Abstraction Licence (5C for construction water)	kL	441,738
Water Abstraction Licence (5C for dewatering)	kL	1,659,401

## 5.4 Water Management

Water is a material aspect of the Project, due to the intersection with the Derbarl Yerrigan and groundwater sources, and as a significant requirement, for use during construction. Requirements for water during the construction phase include use for dust suppression, material compaction and optimisation, site office use, piling and other construction activities. Water use is monitored and reported on monthly through bore meter readings and invoices from suppliers. A model for construction and operational water use demonstrated a reduction of 6% compared to the determined baseline. This model considered the various end uses of water and any modelled reductions from implementation of initiatives. A water sourcing assessment was undertaken which identified several opportunities to reduce or improve the efficiency of water use.

Key water saving initiatives that have been implemented include:

- The use of dewatering effluent for construction purposes such as dust suppression and compaction works.
- The internal clearing permit process reduced the occurrence of early or unnecessary clearing of vegetation, in turn reducing the need for dust suppression reducing water requirements.
- Re-infiltration of dewatering effluent wherever possible to reduce the net loss to the aquifer system and limit the potential offsite impacts due to groundwater drawdown (e.g. Figure 13).
- The use of dewatering effluent as spray field, during summer periods or due to vegetation distress due to drawdown.
- Construction methodology change for piling at the southern dive to reduce water required for bentonite required for the construction of diaphragm walls.

To mitigate the impact on groundwater, a water quality monitoring program has been implemented. This program was created in accordance with the Swan River Construction EMP, Acid Sulfate Soils (ASS) and Dewatering Management Plans, and licence conditions for groundwater abstraction under the *Rights in Water Irrigation Act 1917*. Appendix 2 details TGA's progress towards targets related to minimising impacts on the Derbarl Yerrigan water quality and groundwater interface.

Initial modelling of water usage for the Project construction phase was done for the IS submission and this base line is used to monitor monthly usage against. This is demonstrating that monitored usage is on track with the modelled numbers to date.



Figure 13 Main infiltration basin located at the northern dive structure

Table 7 Water Parameters

WATER PARAMETER	TOTAL THIS PERIOD		TOTAL FOR PROJECT	
	kL	%	kL	%
<b>Potable Water</b>				
Standpipe / Scheme Water Purchased	3,885	3%	7,499	4%
<b>Non-Potable Water</b>				
Bore Water	140,295	97%	181,658	96%
Surface Water	0	0	0	0
Recycled / Wastewater	0	0	0	0
<b>Total Water Used</b>	<b>144,180</b>	<b>100.0</b>	<b>189,157</b>	<b>100.0</b>

The Project has the potential to adversely impact the Derbarl Yerrigan However, through careful planning and environmental management, impacts should be minimised. Some of the actions the Project team has taken to achieve this include:

- Removed the need for a temporary pile within the river during the installation of the bridge.
- Use of 'coffer dams' which have sheet piled walls to stop sand and other material from the works area entering the river.
- Regular monitoring of water quality surrounding site works.
- Regular implementation and revision of the area Erosion and Sediment Control plan.

## 5.5 Vegetation

### 5.5.1 Clearing

Due to the highly urbanised location of the Project, the local community highly values the vegetation in or around the Project, particularly at the Derbarl Yerrigan foreshore and recreational areas. In response, the Project team aimed to minimise clearing. The Project team developed an internal clearing permit, in accordance with the EMP and relevant external approvals. The design, construction, and environment teams would do a walkthrough of areas to identify opportunities to retain vegetation, ensure clearing lines were easily identifiable to prevent confusion and, if required, organise fauna relocation prior to clearing.

A mitigation hierarchy has been implemented to minimise the clearing footprint:

- **Avoid** impacts on native vegetation.
- **Minimise** the duration, intensity and/or extent of impacts on native vegetation.
- **Rehabilitate** or restore the ecosystem that have been degraded or negatively impacted at the site of clearing.
- **Offset** to compensate for any significant residual adverse impacts that cannot be otherwise avoided, minimise or rehabilitated, in order to achieve no loss.

### 5.5.2 Revegetation/Rehabilitation

Across the Project, a total area of 29.1 ha will be revegetated. This is expected to commence during winter 2022 and progress throughout the Project as construction in work areas is completed. A mix of understory and canopy species have been selected for revegetation and landscaping works to meet the following criteria:

- Have provenance to the probable remnant vegetation complexes and existing Derbarl Yerrigan foreshore vegetation.
- Black cockatoo foraging and nesting habitat species.
- Additional species selected that have provenance to the Swan Coastal Plain.
- WA native landscape species selected for feature planting, with selection of species from Wildflower Capital Initiative.
- Select species, in consultation with Traditional Owner Working Group, that provide a connection to local Aboriginal use of the land surrounding the Project area.

### 5.5.3 Dieback

Dieback is a threatening process for biodiversity of south-west WA. The potential risks of transport of dieback through contaminated plants, equipment and materials and control measures have been implemented as per the EMP and managed by the Project through the Weed and Dieback Sub-plan.

There is known dieback to the north of the Project, where clearing has been undertaken for the construction of the northern dive structure (Figure 13). Risks associated with the clearing of affected vegetation is identified in the TGA Clearing Permits and has been mitigated through several control measures including:

- Visual checks of all high-risk vehicles, plant and equipment entering site for evidence of loose soil, mud and pest flora seed, recorded on the Pre-Site Acceptance Checklist.
- Plant and equipment used in clearing and grubbing operations have been cleaned down prior to leaving site.
- Separation of weed infested vegetation and topsoil from 'clean' material. and been taken to an appropriate landfill facility for disposal.
- Movement of machines and vehicles restricted to designated tracks and clearing areas.
- Material used on site has come from cut-to-fill on site which has been assessed as dieback uninterpretable and imported fill has been sourced from reputable quarries obtained from depths greater than where dieback or weeds would be present.
- On-going record keeping of weed and dieback inspections.



Figure 14 Vegetation cleared at the northern dive structure (impacted by dieback)

## 5.6 Carbon Emissions and Energy

The reduction of energy and carbon emissions is considered a priority objective for TGA, identified in Table 1 and is tied into the “*Efficient resource use and sourcing*” focus area. The Project will contribute significant carbon emissions during the full lifecycle of the asset, with the construction phase making up a portion of this. The main sources of emissions during construction include:

- Emissions required to produce and deliver construction materials (embodied energy).
- Fuel use by construction plant, vehicles, and equipment.
- Electricity consumption at offices and on-site temporary lighting.

For operations, the attributable modelled sources include lighting and traffic signals, pavement maintenance and asset user emissions (vehicles using the road). The energy model prepared for the Design submission considered Scope 1, 2 and 3 emissions and energy consumption across the construction and operation phases. This model demonstrated at least a 5% overall reduction in emissions as a result of changes that occurred through the value engineering process and implementation of other energy reduction opportunities.

Management is undertaken in accordance with the Carbon Emissions and Energy sub-plan within the Project’s EMP. Monitoring during construction is ongoing for electricity and fuel use, involving the tracking of subcontractor fuel use and onsite refuelling.

Renewable energy options have been considered, including solar powered site offices and purchase of GreenPower, but no significant opportunities have been adopted. Temporary solar lighting towers will be used during construction wherever possible, depending on availability.

The following initiatives have been implemented to reduce energy use during construction and operation:

- LED lighting on Redcliffe Bridge and on the PSP (>4.8% reduction).
- Minimised clearing areas at the northern dive, several drainage basins and around the Derbarl Yerrigan (6.2% reduction).

- Changes in design and construction methodology, contributing to reduced fuel burn from plant and equipment, and the material required for construction (4.4% reduction). Examples include:
  - Removal of temporary pier in the river (Redcliffe Bridge), reducing fuel from plant and materials required for construction.
  - Mechanically Stabilised Earth walls at Broun Ave, opting to use limestone blocks over precast concrete, reducing install hours and fuel burn.
- Change from diaphragm walls to secant pile walls at the southern dive, reducing install hours and fuel burn.
- Alternative permanent pre-cast barrier system trialled on sections of the Project, reducing install hours and fuel burn.

The energy use of the Project to date, inclusive of the design and construction phase, is detailed in Table 8.

Table 8 Energy Parameters

ENERGY PARAMETERS	TOTAL THIS PERIOD			TOTAL FOR PROJECT		
	LITRES	KWH	% OF TOTAL USE	LITRES	KWH	% OF TOTAL USE
Unleaded (on and off road)	6,126	-	0.35%	7,433	-	0.35%
Diesel Used (on and off road)	1,522,246	-	98%	1,863,604	-	97.76%
Liquefied Petroleum Gas (LPG)	0	-	0	0	-	0
Biodiesel	0	0	0	0	0	0
Hydrogen	0	0	0	0	0	0
Oil	0	0	0	0	0	0
Other	0	0	0	0	0	0
Purchased Electricity from Grid	-	297,084	1.65%	-	409,730	1.89%
Green Power Mix	-	-	0	-	-	0
Generated from Renewable Energy Onsite and Used Onsite	-	0	0	-	0	0
<b>Total Energy Used</b>	-	297,084	<b>100.0</b>	-	409,730	<b>100.0</b>

Note: Energy in gigajoules (GJ) is calculated using the conversion values detailed in the [National Greenhouse Account Factors](#).

## 5.7 Materials and Recycling

Material use and resource efficiency is an issue for the Project due to the high quantities of construction materials required. The Project Resource Efficiency Strategy (RES) objectives align with the wider regional strategy of the East Metropolitan Regional Council (EMRC, 2016) and the WA Waste Avoidance and Resource Recovery Strategy (Waste Authority, 2020). The RES includes resource specific targets (see Table 2) and management actions detailed within the action plan. The Project internally tracks resource inputs and outputs for monthly reporting to Main Roads and to measure modelled and actual impacts.

The Project will use significant volumes of materials including concrete, sand and fill material, steel, crushed limestone and aggregate. Major outputs for the Project include demolition waste, steel, contaminated soil, asphalt and general waste (refer to Table 9-Table 11 below for a detailed breakdown). The Project has adopted initiatives that reflect best practice applications to reduce the quantity of virgin materials used, remove outputs from waste streams and recycle materials where



possible. These initiatives contain combinations of circular economy, industrial ecology, industrial symbiosis, cleaner production and resource recovery concepts.

The Project aims to maximise the use of recycled materials wherever possible, either by reusing on-site resources or importing recycled materials from other projects or suppliers. There are some restrictions with regards to using recycled materials, namely materials must meet certain specifications or receive exemption, and there may be locations where recycled materials are not suitable to be used, such as in wetland areas due to potential contaminant leaching. Recycled materials imported to date include road base, crushed concrete, asphalt and sand. The Project continues to import crushed recycled concrete from a local *Roads to Reuse* supplier, who is also contracted to remove various waste products from the site, including concrete, road base and other aggregates. While it is not guaranteed that TGA are importing their own waste concrete, the alignment with circular procurement processes exists.

The following initiatives have been adopted onto the Project:

- Repurposing of Victoria Street footbridge on another Project, rather than sending for recycling.
- Import of crushed recycled concrete from local supplier, approximately 30,000 tonnes to date.
- Cut to fill optimisation with approximately 100% reuse of suitable excavated material on site.
- Import of 87,600 tonnes recycled embankment material from the Roe Highway/ Kalamunda Road Upgrade Project.
- 100% onsite treatment and reuse of ASS material.

Table 9 Imported Raw/Traditional Materials for the Project

IMPORTED RAW/TRADITIONAL MATERIALS			
MATERIAL	UNIT	TOTAL THIS PERIOD	TOTAL FOR PROJECT
Aggregate	t	3,857.8	4,035.2
Aluminium	t	0	0
Asphalt	t	26,051.35	26,051.35
Ballast	t	0	0
Bedding Aggregate	t	118.36	118.36
Bitumen	t	70	70
Bitumen Cutter (kerosene)	t	9.2	9.2
Bitumen Cutter (diesel)	t	1	1
Cement	t	587.8	587.8
Cement Additives	t	0	0
Cement Stabilised Backfill	t	88.52	196.52
Clay	t	0	0
Concrete	t	59,316	71,253
Crushed Dust (including Cracker Dust)	t	0	45
Crushed Limestone	t	142,490.9	164,899.6

IMPORTED RAW/TRADITIONAL MATERIALS			
MATERIAL	UNIT	TOTAL THIS PERIOD	TOTAL FOR PROJECT
Crushed Rock	t	51,640	62,143
Emulsion Based Prime (e.g. Ecoprime)	t	0	0
Ferricrete	t	0	0
Geofabric Polymers	t	0	0
Glass (including Glass Beads)	t	0	0
Gravel	t	0	0
Laterite	t	0	0
Lime	t	0	0
Lime Additives	t	0	0
Mechanically Stabilised Earth Backfill	t	0	0
Mulch	t	0	0
Paint (Waterborne, Thermoplastic, Cold Applied Plastics)	t	2	2
Perspex	t	0	0
Plastic	t	0	0
Precast Concrete	t	20,441	20,500
Sand	t	52,455	108,206
Steel	t	13,808	14,805
Synthetic Binders	t	0	0
Topsoil	t	0	0
Other – Limestone blocks	t	12,324	12,324

Table 10 Imported Recycled Materials for the Project

IMPORTED RECYCLED MATERIALS			
MATERIALS	UNIT	TOTAL THIS PERIOD	TOTAL FOR PROJECT
Crumb Rubber	t	0	0
Crushed Recycled Concrete	t	26,160	34,299
Crushed Recycled Glass	t	0	0
Eco-blocks	t	0	0
Geopolymer Concrete	t	0	0
Low Carbon Concrete	t	0	136.8

IMPORTED RECYCLED MATERIALS			
MATERIALS	UNIT	TOTAL THIS PERIOD	TOTAL FOR PROJECT
Mulch and Soil Conditioner (not including Food Organic and Garden Organics (FOGO))	t	0	0
Mulch (FOGO)	t	0	0
Soil Conditioner (FOGO)	t	0	0
Reclaimed Asphalt Pavement	t	1,202	1,202
Recycled Aggregate	t	0	0
Recycled Aluminium	t	0	0
Recycled Clay	t	0	0
Recycled Granular Material	t	0	0
Recycled HDPE Plastic Pipes	t	0	0
Recycled Mineral Sand	t	0	0
Recycled Sand (as per the definition in the Contractor Monthly Reporting form)	t	0	87,586
Supplementary Cementitious Materials – slag	t	0	0
Supplementary Cementitious – fly ash	t	0	0
Supplementary Cementitious – silica fume	t	0	0
Supplementary Cementitious – other	t	0	0
Topsoil	t	0	0
Warm Mix Asphalt	t	0	0
Other	t	0	0

Table 11 Materials Reused on the Project

MATERIALS REUSED WITHIN THE PROJECT SITE			
MATERIAL	UNIT	TOTAL THIS PERIOD	TOTAL FOR PROJECT
Aggregate	t	0	0
Asphalt (RAP)	t	0	0
Clay	t	0	0
General Fill	t	0	0
Granular Material	t	0	0
Limestone	t	0	0
Mulch	t	0	0

MATERIALS REUSED WITHIN THE PROJECT SITE			
MATERIAL	UNIT	TOTAL THIS PERIOD	TOTAL FOR PROJECT
Overburden	t	0	0
Road Base	t	0	525
Sand	t	295,767	373,354
Spoil (treated ASS)	t	106,155	107,178
Topsoil	t	0	0
Other	t	0	0

## 5.8 Noise and Vibration

As construction noise is considered a nuisance for nearby residents, it is considered a material topic for the Project and managed in accordance with the Construction Noise, Vibration and Dust Management Plan (CNVMP). The plan includes mitigation measures in place for construction, project specific targets and the monitoring management.

CNVMPs are developed for each of the relevant LGAs to cover the construction activities which are scheduled to occur outside normal construction hours (7am to 7pm Monday to Saturday), predominantly for safety reasons and minimising disruptions to the road network. Separate Noise Management Plan (NMP) approval is developed as required, such as where construction works using noisy equipment is scheduled to occur close to residences during out of hours periods or at the specific request of the approving authority.

The environmental and stakeholder engagement teams work together to mitigate impacts to residents and the environment when noise and vibration occurs. Residents are provided with notification of upcoming construction works that may cause noise and vibratory disturbances via letter drops to impacted areas, email, social media pages and the Main Roads website.

TGA has a community contact and complaints process to ensure complaints regarding environmental noise and vibrations emission are recorded and investigated. The team responds to complaints by confirming noise level limits, using monitoring equipment, and then continuing to monitor activities to ensure noise and vibrations emitted are within accepted levels. Anticipated noise and vibrations expected during operation of the asset is mitigated through inclusion of noise walls in locations where noise would have exceeded acceptable levels for human comfort, determined through modelling.

## 5.9 Air Quality

Measures to mitigate impacts from other emission sources, including dust, are managed through the Project EMP. Air quality, including dust, is considered a material issue for the Project given the proximity to sensitive receptors including residents.

During construction, the key management measures for minimising and controlling dust across the project site include:

- Existing vegetation to be retained wherever possible and cleared only when necessary.
- Cleared areas, topsoil and spoil stockpiles areas not being worked for extended periods of time will be temporarily covered or stabilised with a more permanent suppressant, such as chemical,

hydromulch or landscape treatments, particularly during the Christmas/New Year break. Stockpiles within the vicinity of sensitive receptors, such as residents, are also chemically stabilised to minimise dust lift.

- Dust control with water carts as required including minimal overspray.
- All vehicles hauling materials within the site will be adequately covered or wetted down, other than dump trucks.
- A speed limit will be clearly signposted and erected close to the access point advising of a 10 km/h speed limit within the site.
- Incorporating mulch and chemical sealant compounds to assist with dust suppression.
- Street sweeping if required.

Dust monitoring occurs on site through a number of directional dust deposition gauges as well as two DustTraks either side of the southern dive structure construction area (Figure 15). The DustTraks provide live dust data and deposition gauges provide observations of dust coming off the site. Ongoing checks are carried out to ensure no work activities are causing environmental nuisance or harm through excessive dust. Dust/emission levels are assessed visually, and mitigation are assessed as being necessary whenever dust generation has been visually identified (e.g. dust evident on nearby vegetation or properties).



Figure 15 *DustTrak on the eastern side of southern dive structure*

## 5.10 Light Spill

Temporary lighting is used during nightworks for safety reasons, and light spill will be controlled as much as possible through lighting tower positioning and construction methodology (Figure 16). Temporary lighting is to be directed towards construction works, away from private properties and vegetation/fauna habitat where possible to prevent excessive light spill. Ongoing checks along with horizontal light spill measurements are carried out to ensure no light spill is causing environmental nuisance.



Figure 16 Light tower used during nightworks

### 5.11 Contamination

The Project includes a contaminated site which was historically used for the manufacturing and storage of superphosphate fertilizer and small volumes of associated chemicals from 1920 to 1933. By-products and residue produced at the site (including pyritic cinders) were disposed of and buried across the former site area. Following the cessation of manufacturing operations, contaminated site investigations identified elevated heavy metal concentrations in the soil, particularly along the western boundary and north of the former superphosphate bins (current eastern boundary of the Tonkin Highway).

The site, located north of Railway Parade, is where the first dive structure (southern dive structure) is being constructed to enable the new rail line to travel under the existing road and into the median to continue its journey north.

Remediation works have been undertaken for the land adjacent to the road to help clean up this historical issue. Contamination investigations to date, including those done by TGA, have further shown the extent of this pre-existing contamination, with some pockets of this cinders material within the Project footprint. As a result, as these pockets of cinders materials have been found during the excavation works, they have been quarantined and assessed for treatment and reuse. This material is stockpiled separately to acid sulfate soils, then treated with lime to be reused as fill material across the Project (Figure 17).



Figure 17 Coffee rocks and cinders stockpiled before liming treatment

## 5.12 Acid Sulfate Soils

The Project site includes areas where Acid Sulfate Soils (ASS) naturally exist in the substrate under the surface. When exposed to air, this can increase the acidity of the soils and any water present. Across the Project area, the ASS risk profile ranges from 'moderate to low', with pockets of 'high to moderate'. TGA has an ASS Management Plan developed in consultation with relevant Australian Site Contamination National Environment Protection Measures (ASC NEPM) and Department of Water and Environmental Regulation to mitigate this risk during the numerous excavations across the Project site, the most significant of these being the northern and southern dive structures.

Separate complementary Construction Contamination Management Plan (CCMP) and Acid Sulfate Soil and Dewatering Management Plans (ASSDMP) were prepared to inform and guide the Project team during excavation/disturbance of natural ground for the dive structures. The northern dive is located north of Marshall Road in Malaga and the southern dive is north of Railway Parade in Bayswater (Figure 18).



*Figure 18 Bulk excavation at the northern dive structure*

### 5.13 Environmental Case Study – Working with DBCA

The Project team has been working closely with the Department of Biodiversity, Conservation and Attractions (DBCA) for the construction of widening of Redcliffe Bridge over the Derbarl Yerrigan. During the approval process, the Project team was able to remove the requirement for a temporary pier in the Derbarl Yerrigan by increasing the size of the launch nose, reducing our impact on both the river and those who use the waterway.

While the higher risk works were being undertaken, particularly on the coffer dams within the river, DBCA would participate in regular site visits. These visits also provided the opportunity for TGA and DBCA to work through the site constraints in relation to design queries, particularly in regards to the reactivation of land areas under the bridge.

One of these design areas included lighting along the bridge over the Derbarl Yerrigan. Light pollution can alter the intensities, colours and frequencies to which aquatic organisms are typically exposed, which can create disturbance to migration and fauna/organism relationships, impacting on the ecosystem balance in the Derbarl Yerrigan. As a result of DBCA's involvement in lighting design for the bridge, LED lights will be utilised and these will reduce the amount of light spill towards the river. DBCA have also contributed to the ongoing development of the interpretation nodes by the river for the heritage trail and scar trees.



Figure 19 Water quality monitoring in the Swan River



## 6 Social

### 6.1 At a glance

Social parameters are used to assess the progress of the Project through the construction phase. A summary of key social aspects and performance for the Project is detailed in Table 12. Some social aspects are reflected in targets, for which progress is detailed in Appendix 2.

Table 12 Summary of Social Aspects

SOCIAL ASPECT	UNIT	TOTAL FOR THIS PERIOD	TOTAL FOR THE PROJECT
Stakeholders engaged	#	3000+	3000+
Stakeholder enquiries received	#	547	1199
Heritage sites in project vicinity*	#	2	2
Length of Principal Shared Path (Addition/Refurbished)**	km	0	3.86
Women in Workforce	%	11.87	10.53
Indigenous People in Workforce	%	32.96 FTE 9.2%	25.9 FTE 8.28%
Total Recordable Injury Frequency Rate (TRIFR)	#	4.49	4.49
Hours of Training Undertaken	hrs	5170	7750
Development Employees and Apprentices on the Project	#	19	19

\*Project vicinity is defined as 50 metres from the project boundary.

\*\*None constructed to date so total represents design length

### 6.2 Social Context

Consultation and partnership are material issues for the Project and engagement with the community and other stakeholders is key to the success of the Tonkin Gap Project. The Project area intersects three local government areas, being the cities of Belmont, Bayswater and Swan.

The City of Belmont is located 6km from Perth's central business district and has 11km of Derbarl Yerrigan frontage. The City is home to 44,000 people and is expected to grow to 65,659 by 2041. The City is a mix of residential, commercial, and light industrial properties and includes part of the Perth Airport. The City of Belmont connects to the City of Bayswater via the Redcliffe Bridge on Tonkin Highway across the Derbarl Yerrigan.

Known as the "Garden City", the City of Bayswater, located 8km northeast of Perth, covers 35 sq/km and has 10km of Derbarl Yerrigan foreshore. Parks and conservation areas within the City support abundant bird and other wildlife while key recreational and other facilities, business destinations, shopping and schools are established.

The City of Swan is a thriving hub of demographic and economic growth with some 159,000 residents living across 42 suburbs (City of Swan, 2016) The City has 74,200 employed residents and more than 10,000 actively trading businesses. A small portion of the most northern section of the Project intersects with the City of Swan.

Table 13 Social context statistics

Aspect	City of Belmont <sup>1</sup>	City of Bayswater	City of Swan
Size (sqkm)	40	35	1,044
Population	44,000	72,000	159,000
% born overseas	40%	45% <sup>2</sup>	33%
% non-English language at home	30%	Unknown	21%
Employment	91%	93%	92%
Indigenous population %	2.5%	1.6%	0.03%

A new financial impact index released in June 2020 stated that the City of Belmont was one of the 10 worst hit suburbs financially due to COVID-19 (Taylor Fry, 2020). Several suburbs within the City of Bayswater were also similarly impacted.

The Project is on Whadjuk Noongar Country and intersects with the Derbarl Yerrigan, a site of significance in local Aboriginal culture (Figure 20).



Figure 20 Redcliffe Bridge linking the cities of Bayswater and Belmont via Tonkin Highway (over the Derbarl Yerrigan)

<sup>1</sup> 2016 Census QuickStats: Belmont (WA) ([abs.gov.au](http://abs.gov.au))

<sup>2</sup> 2016 Census QuickStats: Bayswater (C) ([abs.gov.au](http://abs.gov.au))

### 6.2.1 Social Outcomes

The Project is expected to generate substantial social outcomes for community and various stakeholders, providing local employment opportunities, improving efficiency and connectivity for vehicles and pedestrians/cyclists and enhancing recreational areas. Over the past year these activities have included:

- Planning a heritage trail for the project
- Planning for the activation of public space under Redcliffe Bridge
- Seeking advice from the Project's Whadjuk Working Group
- Engaged with local school children via a construction careers day (Redcliffe Primary School)
- Creation of jobs
- Curtin University engineering students did a site tour
- Planning for Aboriginal artwork to feature on the Project
- Designing the upgrade of Pedestrian Shared Paths in consultation with local governments and the community

### 6.2.2 Priority Issues

Through review of Local Community Strategic Plans, common themes were identified for the ongoing community development in the LGAs intersecting with the Project. These have been summarised in a word cloud below based on priorities identified by community members and outlined as emerging themes in the plans (CoBe, 2020; CoBa, 2021; CoS, 2021).



Figure 21 LGA priority issue word cloud

## 6.3 Community and Stakeholder Engagement

The Project identified a comprehensive list of community stakeholders with relevance to the Project (Appendix 5). Community and stakeholder engagement is delivered in accordance with TGA's Community and Stakeholder Engagement Plan (CSEP), which was developed based off engagement commenced by Main Roads during the project development phase. TGA has prioritised the delivery of targeted and inclusive engagement to ensure the views of all demographics are represented in relation to the Project.

This has resulted in the development of several working groups to provide input on various aspects of the design and delivery. These groups are consulted on a range of issues that relate to the terms of reference and may include pedestrian and shared path design and detours, Selby Park impacts and design, environmental and ecological impacts and revegetation, and Aboriginal employment, procurement and heritage elements.

Engagement with the Whadjuk community has taken place through the establishment of a Traditional Owner Advisory Group (TOAG). The TOAG has provided advice and oversight of TGAs progress towards Aboriginal participation targets while also providing input into detailed engagement for relevant aspects of the Project, such as the activation of community spaces under Redcliffe Bridge and the heritage trail.

This dynamic and transparent approach to stakeholder engagement has resulted in positive responses to stakeholder and community sentiment surveys, which permitted the Project team to achieve its Sustainability targets for effective community engagement for the design phase of the Project. We are also on track to meet construction-related targets for community engagement.

The TGA team manage issues using the following approach:

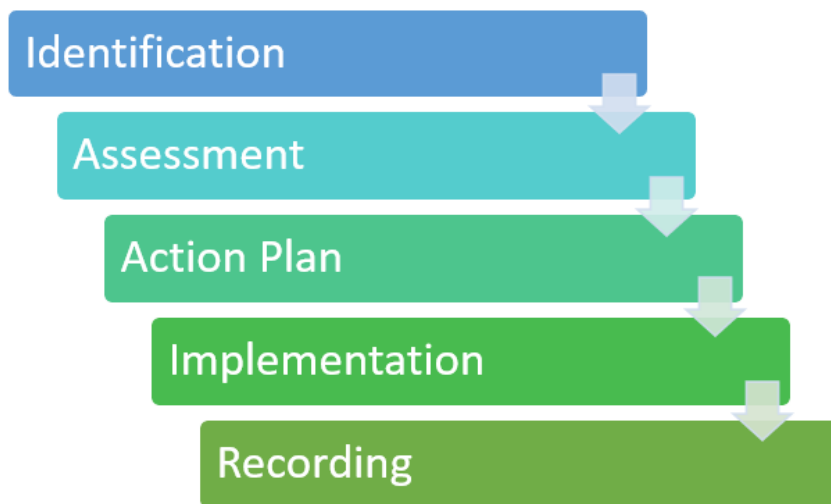


Figure 22 TGA issues management approach

### 6.3.1 Methods of Engagement

Through assessing stakeholder profiles, anticipated project impacts and key issues associated with the construction program, the TGA community and stakeholder engagement team has designed a project-specific engagement program tailored to the interests of our stakeholder groups and program of work.

TGA attempts to maximise opportunities for stakeholders to provide input and have a genuine role to influence design and Project outcomes. This is done through the identification of Project negotiables and working with the relevant technical teams.

TGA shared the designs at 15%, 85% and 100% (design stages) at Open House events to ensure that community had the chance to provide feedback and suggestions. At Open House events we allow the public to talk and ask questions of the subject matter experts from the project team.

Our approach overlays the reactive and process-driven functions necessary for good quality project stakeholder engagement with a detailed program of proactive profiling opportunities which strengthen relationships and build a positive project profile. Our programs are IAP2 compliant, and we deliver methods of engagement which can be found across most aspects of the IAP2 Participation Spectrum. Examples of where these methods sit in the spectrum are provided in the overview of our planning and delivery approach below (Figure 23).



Figure 23 IAP2 Stakeholder Engagement Delivery Approach

Methods of engagement for our project include:

- Targeted consultation with special interest groups including:
  - Selby Park, Environmental, Great Eastern Highway businesses, Ascot residents, Derbarl Yerrigan recreational users, PSP users and industry bodies, Cherry Court residents, Whadjuk Traditional Owners and Local Government Authorities
- Community Open House events and drop in sessions
- Monthly construction updates - sent via EDM and letterbox drop
- Social media (Facebook posts, LinkedIn posts, Youtube videos)
- Face-to-face engagement with individual residents
- West Australian advertisements
- Email
- Letterbox drops
- Text updates when doing major works, for example Broun Avenue deconstruction
- Community, client and stakeholder perception surveys
- Redcliffe Primary School careers days
- Site tours
- Site walks
- Talkin' Tonkin video series

TGA has taken a fairly unique approach to engagement, engaging extensively through social media platforms and site tours for community and stakeholders. The Talkin' Tonkin series in particular is a campaign telling the story of the Project through individuals working on the Project, providing a more personal insight into the delivery of the program. The community team have also championed more than 11 site tours for different groups of community members, residents and key stakeholders to provide insights into program progress and foster relationships between our stakeholders and the TGA workforce.

### 6.3.2 Negotiables and Non-negotiables

Negotiables are elements of the Project where stakeholders are able to influence outcomes. The non-negotiable elements that cannot be influenced by stakeholders includes engineering and design requirements listed as part of the Project scope. The negotiables have been communicated to stakeholders through numerous engagement methods, with opportunity provided to have input into various aspects of the design and construction of the Project. Negotiables identified in the CSEP are highlighted in Figure 24.



Figure 24 Project identified negotiables

Issues related to negotiables that have been raised by community members and other stakeholders are recorded in the Community Influence Register, and some examples of where input/consultation has led to changes in design or outcomes are noted below:

- Noise walls included on Redcliffe Bridge
- Change in design to retain vegetation
- Victoria Street footbridge design reviewed by working group
- Noise wall locations added due to community or stakeholder influence
- Basin location design changed to retain vegetation
- Community input into underbridge development design
- Pedestrian Shared Path access points amended due to community input
- Community and stakeholder input into Selby Park design
- Traditional Owner input into underpass artwork
- Provision of proposed cycling detours to WestCycle and community for review

### 6.3.3 Engagement Outcomes

A key outcome of community engagement was design changes to include noise walls on Redcliffe Bridge. Initial designs of Redcliffe Bridge did not include noise walls and community concerns were raised regarding the impacts this may have to amenity and ecology in the area. Subsequently, the Project team made design updates to include the noise walls at the approval of Minister for Transport. This resulted in positive community sentiment for the Project and addressed the concerns of residents regarding traffic noise.

## 6.4 Community Satisfaction and Amenity

Reputation has been identified as one of eight key result areas for the project. Two of the four KPIs in the reputation KRA are the responsibility of the community and stakeholder engagement team. Community satisfaction for the project currently sits at 91%. This is the average of perception surveys undertaken by independent survey company, Painted Dog.

Community feedback is an important part of our strategy, and is encouraged through face-to-face consultation, email, phone call and surveys. Relationships were developed early during the planning stages with key stakeholders, including local government, government agencies, residents, industry, business, service providers and Traditional Owners, as well as highly impacted community members. These stakeholders were provided with a direct line of contact with the Project community team.

The Project uses the Main Roads CONNECT system to record community interactions. An example of when we have addressed concerns from community include receiving dust complaints and we relay this onto the construction team, who then implement dust mitigation strategies to address the dust.

The Project has aimed to improve local amenity through the integration of active and sustainable transport infrastructure into the Project design. This is reflected in the Project [Sustainability targets](#) which include objectives to maximise connectivity for multi-mode transport. As described above, the opportunity to improve the existing amenity within the recreational area under the Redcliffe Bridge has been investigated by the Project team with extensive engagement undertaken with various groups. Suggestions from stakeholders and the community have included a bike track, native vegetation planting, artwork and shared path facilities. Further consultation is currently underway with local government, stakeholders, and the community ahead of the final design being released in mid to late 2022.

The [Sustainable Transport](#) section of this report addresses the permeability assessment undertaken for the Project. In addition to those opportunities pursued in relation to connectivity, the Project also aims to improve community amenity. These include the provision of increased rest stops along the shared path network, new and improved underpasses and pedestrian bridges, and the realignment of pedestrian crossings along Tonkin Highway to optimise accessibility to local primary schools and for users of Selby Park. The Project is also pursuing an Interpretive Heritage trail that will provide educational signage and artwork to reflect local Aboriginal and European heritage.

## 6.5 Heritage

### 6.5.1 Aboriginal Heritage

TGA recognises the Whadjuk community as the Traditional Owners of the land and their cultural and spiritual connection to the land grants them an entitlement to be actively engaged in the Project. Through multiple heritage surveys and consultation, two sites of cultural significance have been identified within the Project area. Approval to disturb areas of significance was obtained by Main Roads in 2019 for the two sites:

- Derbarl Yerrigan (Swan River ID 3536)
- River gum trees with cultural scar (ID 37868) (Figure 24)

TGA aims to avoid, minimise and reduce our negative impacts to Aboriginal heritage sites wherever practicable, in line with Main Roads' commitment to recognising Aboriginal heritage. The management of cultural heritage is delivered in accordance with the Project Cultural Heritage Management Sub-plan. In addition to this management the entire Project team is educated about

the sites and their significance through Project inductions. TGA also requires the presence of heritage monitors, appointed by the South West Aboriginal Land and Sea Council, during any works that may disturb the sites.

### 6.5.2 European Heritage

One site of European heritage significance, listed on the City of Bayswater Heritage List, was the Brady's Plasterworks. The Project required demolition of the building located on Railway Parade, to facilitate the construction of the southern dive structure. Prior to demolition an archival record was produced at the request of Department of Planning, Lands and Heritage in order to preserve information about this cultural site. The Heritage Council determined that, while the place may have some cultural heritage value, it is unlikely to have the cultural significance required to meet the conditions for entry into the State Register, under Section 38 of the *Heritage Act 2018*.



Figure 25 River gum trees with cultural scars on the southern bank of the Derbarl Yerrigan

### 6.5.3 Interpretive Heritage Trail

Infrastructure projects that pass through Aboriginal and European heritage sites have the benefit of being able to create a greater awareness and connection with our history among visitors and residents. It allows for a greater appreciation and understanding of the history in that area, giving community a sense of pride and shared cultural heritage of the area. It can also deter anti-social behaviour including graffiti and damage to property.

An opportunity was identified through the design phase to include an interpretive heritage trail within the Project. This would link with the already established heritage trail that was completed as part of the Northlink and Gateway WA projects and focus on Aboriginal and European heritage.

In addition to enhancing heritage, we also aim to avoid, minimise and reduce our negative impacts to Aboriginal heritage sites wherever practicable, in line with Main Roads' commitment to recognising Aboriginal Heritage.



To start collecting stories from the area, the Project engaged an Anthropologist to interview local Aboriginal families in the area. In consultation with the TOAG and other relevant stakeholders, TGA will incorporate artwork and interpretive signage at various locations around the Derbarl Yerrigan and heading north towards Guildford Road. The heritage trail will include an interpretive node at the scar trees, interpretive signage based on stories told by local families, a yarnning circle, local species planting response and artwork at the Great Eastern Highway underpass and the two Guildford Road underpasses.

## 6.6 Road Safety

To improve the connectivity and safety of all road users utilising Tonkin Highway between Collier Road and Dunreath Road, the design has focused on achieving a network that will allow for greater anticipation of other driver movements. This involves creating a network that has sufficient sight distance around curves via the reduction in barrier heights, increased shoulder widths and the improvement in signage legibility to provide sufficient notice regarding highway exits and entry points. Due to the gap in infrastructure resulting from the adjacent Northlink and Gateway developments, the lane configuration has also been amended to reduce merge movements at the tie-in locations. This reduces the risk of rear-end crashes from start-stop movements that often occur during heavy traffic. Where merge movements are still required, minor signage and adequate merge lengths are provided to increase driver decision time and notice for oncoming vehicles.

Based on consultations with the community, an importance has been placed in improving the Crime Prevention through Environmental Design (CPTED) to ensure that the newly developed infrastructure will not cause detrimental impacts to the community. Emphasis on maintaining a visible corridor for PSPs and shared paths was achieved through adequate lighting and assessment of sight distance from the highway/road where a noise wall overlap exists. Where the path network was not visible, noise wall extents were re-positioned to remove any dead-zones, hence reducing crime areas. Furthermore, noise assessments were undertaken to improve the livelihood of the community with wall heights further assessed to ensure that impacted properties were not visible from the adjacent road/path network.

Movements of cyclists and pedestrians were also paramount in the Project objectives, in particular the movements between the east and west sides of the Highway. In the existing condition, it has been assessed that the current path network is disconnected with insufficient path width to cater for both cyclists and pedestrians. Associated risks include increased cyclist-pedestrian accidents as the east-west path network is frequently used by school children, elderly people and those with disabilities to access either side of the highway and does not have sufficient path width to cater for bidirectional movements. To minimise the risk of conflict, a 4 metre wide PSP with forgiving grades and fall protection was provided to cater for the elderly and disabled communities. At intersections, movement of heavy vehicles were also assessed to ensure that vehicles were not encroaching on the shared path. Consequently, the new path network will run parallel to Tonkin Highway to improve connectivity between schools, housing, shopping centres.

It is crucial for Tonkin Highway to be maintained to ensure operational performance in the long term. Consequently, importance has been placed on the safety of maintenance personnel and the reduction of accidents associated with insufficient notice to oncoming vehicles and working widths. To minimise the risk of accidents, ITS infrastructure has been designed to ensure oncoming vehicles are aware of ongoing maintenance works. Furthermore, larger verge widths and pull-over areas have been designated to ensure that maintenance personnel can safely offboard the maintenance vehicle and undertake works.

## 6.7 Diversity & Inclusion

TGA is committed to developing and maintaining a positive, supportive and inclusive organisational culture throughout the construction phase. Workforce sustainability and employee development is a key component of this and contributes to ensuring appropriate workforce capacity and capability. TGA has therefore developed comprehensive programs to develop and support our team. The Employee Development Plan encompasses our culture, well-being programs and actions to promote diversity and inclusion in our workplace. TGA has also engaged external organisations to deliver training sessions for the entire Project team on topics of inclusion, diversity and cultural awareness.

The sustainability framework includes objectives to improve workforce diversity and well-being, and increase Aboriginal and female participation. Additionally, targets aimed at recruiting and retaining new entrants in the industry will see targeted programs and mentoring provided to team members with less than 5 years in the industry. The Project targets for inclusion and diversity include the following (see Table 12 and Appendix 2 for tracking against these targets):

- 10% of the workforce representing women.
- Engage 30 Aboriginal FTEs for the duration of the Project.
- 10% of the workforce to representing new entrants to workforce.

The Project team has developed a culture and well-being survey that is undertaken at 6-month intervals to gauge an understanding of the workforce's sentiment towards the Project team and its culture. Two surveys have been undertaken to date and have received overwhelmingly positive feedback, with a large majority of the team satisfied working as part of TGA. Feedback received has been reviewed and developed into an action plan for continued improvement, which includes additional training for new engineers, upskilling blue collar workers and working arrangement flexibility.

## 6.8 Traffic Management & Community Safety

Traffic Management is a significant component of the Project works. With such a large and diverse array of works to be completed, it is important that the traffic management is diligently planned, designed, implemented and managed.

A brief snapshot of statistics for the TGA sites are listed below to provide context for how the traffic has been managed to date, and will be managed moving forward.

- Works encompass Tonkin Hwy north and southbound between Dunreath Drive to the south, and Hepburn Avenue to the north - approx. 12.5km in length.
- Works also require impact on: Reid Highway, Morley Drive, Collier Road, Guildford Road, Railway Parade, Dunstone Road, Great Eastern Highway and Dunreath Drive. This is inclusive of all respective on and off ramps for the crossroads.
- Tonkin Highway north and southbound carry 122,000 vehicles per day, with 14% of these vehicles being classed as heavy vehicles.
- Great Eastern Highway across Tonkin Highway carries approx. 45,000 vehicles per day, with 10% being classed as heavy vehicles.
- Guildford Road under Tonkin Highway carries approx. 40,000 vehicles per day.
- TGA has installed approx. 27km of temporary worksite traffic barriers across the project.
- TGA has installed over 40km of temporary line marking/temporary line marking tape on the project to date.

At the commencement of the project, TGA, in conjunction with the Main Roads operations team,

agreed upon a methodology of tracking travel time through numerous nodes of the project. This was completed using the traffic volumes mentioned above and various existing Main Roads Infrastructure such as Anonymous Bluetooth detection for vehicles travelling between existing, pre-determined areas of the project footprint. Tracking travel time is used to gauge how the project has impacted traffic flow through the site in comparison to a 'baseline' travel time taken prior to any works beginning. A performance spectrum matrix developed for the project by Main Roads is below:

Table 14 Performance spectrum matrix developed by Main Roads

Good	ACOS	Poor	Very Poor
Travel time increase between 10% and 20%	Travel time increase by 20%	Travel time increase between 20% and 30%	Travel time increase greater than 30%

Main Roads has provided the TGA traffic team with access to their live metrics dashboard. This provides live data for travel time for all the available travel time nodes for the project. This data shows that between 1<sup>st</sup> October 2020 and 8<sup>th</sup> July 2022, there was an increase of less than 14 seconds travel time across the entire project. Per the performance spectrum matrix above, this attracts a rating of *Very Good* due to an increase of just 5.64%.

During the works, emphasis is placed on effective communication of all works to members of public who are potentially impacted by traffic changes or other construction activities. Therefore, all changes to the traffic environment are communicated via the TGA community team. The community team has a wide array of means to effectively communicate changes to the public, as described in earlier sections of this report.

In conjunction with the above, the traffic team also utilises the following means to effectively communicate messages to the travelling public through the site:

- Use of Variable Message Board advertising
- Use of Main Roads Gantry Variable Message Signage
- Installation of hard signage at important areas, such as principle shared path facilities

Effective communication of traffic management changes means that the travelling public are aware in advance of any possible works which may impact their regular travel patterns or behaviours and ensures that it provides an opportunity for them to alter their travel behaviour or at least be aware.

In relation to ensuring the safety of both the travelling public and workers on the project, TGA has adopted a policy of using temporary crash barriers at all locations where there is the potential for interface between workers and vehicles. This is especially critical on the Tonkin Highway section which experiences high volumes of traffic and high speeds. Use of temporary barriers is the safest method of protecting workers and public alike during the works. TGA primarily utilises steel barriers as they can be pinned to the pavement, but also concrete barriers where this is not possible.

The Project has also implemented a reduced speed limit of 80 km/h for Tonkin Hwy through the works area and a new lane configuration to improve safety and reduce crash risk. Reduced speeds accommodate for the installation of barrier systems, modified road layouts and the access/egress of construction vehicles through the site. The new lane configuration of two through lanes at all times with dedicated lanes for off/on ramps reduces merging congestion and allows the travelling public to become accustomed to a standardised road layout regardless of travel direction. Travel time figures indicate this methodology has been effective.

## 6.9 Workforce Safety

The overall safety of our employee is a key responsibility of the leadership on TGA. About one million exposure hours were undertaken on the Project for the financial year and a focus on both leading and lagging indicator through a doffed strategic approach produced significant improvement towards the second half of the year. The implementation of the Safety Strategy plan populated at the beginning of 2022, provided systematic program to encourage change and improvement.

The provision of expectation and targeted approach of leaders in the field along with significant focus on risk-based activities provided a reduction in the overall injury and incident rate on the project, finishing the year with a reduction of greater than 50% to a level of Total Recordable Injury Frequency Rate (TRIFR) of 4.49.

The aligned focus of key performance lead indicator such as behaviour-based observation and in field inspections provided the structure and framework to increase hazard identification and risk mitigation to above agreed expectations. The enabling of the Independent Certifier audit schedule meant that accountability around results was ensured, and an improvement process was enacted.

## 6.10 Legacy Commitments

Legacy initiatives can be social, environmental or economic in nature and have the biggest impact when they either solve an identified issue or implement an opportunity as identified by the local community or an environmental need. The TGA Legacy Framework outlines the legacy initiatives being pursued to create lasting benefits for the community and environment, documenting the expected benefits, implementation plan and any relevant monitoring actions. Some of these legacy commitments have been discussed throughout this report, including Aboriginal participation (Section 6.7) and the interpretative heritage trail (Section 6.5.3).

### 6.10.1 Derbarl Yerrigan Foreshore Reactivation

The enhancement of the Derbarl Yerrigan foreshore and crossing at the base of the Redcliffe Bridge has been identified as a priority due to the community benefits implicated by its development. As a popular recreational area, the site holds a high level of community significance for its users and reactivation of this area will provide long term community benefit. The current revision of this plan is shown in Figure 25, however is still in development with stakeholders. Extensive consultation has been undertaken and is continuing to finalise the design for this area. Aspects that have been suggested through consultation include a pump track, fishing platform, nature walks and shared path facilities.

### 6.10.2 Redcliffe Bridge Noise Walls

Inclusion of noise walls on the Redcliffe Bridge were not part of the initial Project scope for two primary reasons. Firstly, noise modelling of operation emissions indicated noise levels would not be above State Planning Policy 5.4 maximums, and therefore a noise wall along the bridge was not deemed necessary. Secondly, initial investigations determined it was not possible to retrofit standard noise walls on the existing Redcliffe Bridge whilst maintaining structural integrity. Concerns were expressed by residents early during community consultation about the potential added disturbance from bridge traffic noise. Following extensive community and stakeholder engagement, further investigation into retrofitting noise walls was undertaken and the walls were incorporated into the

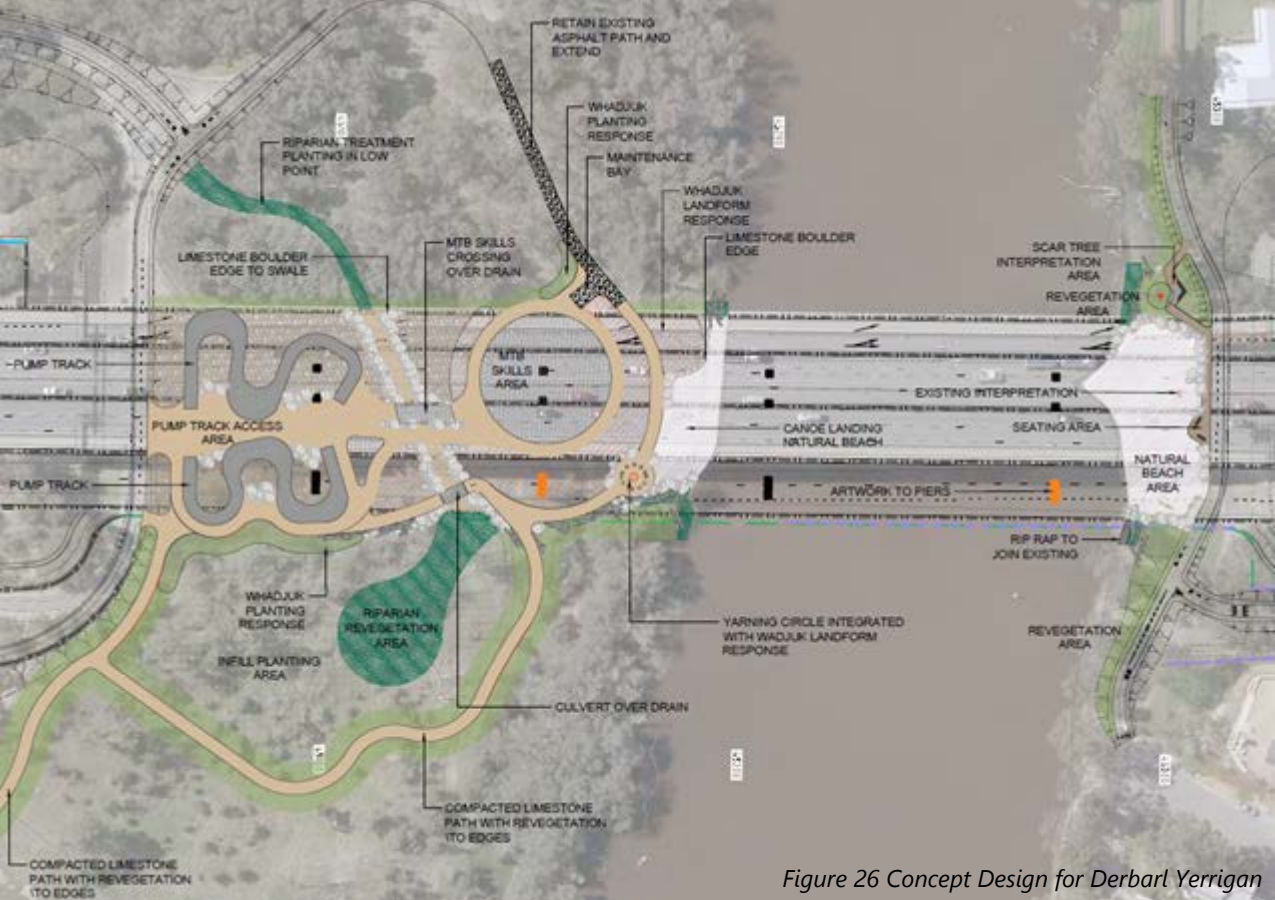


Figure 26 Concept Design for Derbarl Yerrigan

design to be constructed during the next year.

### **6.10.3 PSP Connection and Cycling Hub**

As part of construction, TGA will be upgrading the walking and cycling network along Tonkin Highway and Great Eastern Highway, and completing sections of the PSP from Railway Parade to Stanton Road along Tonkin Highway. Improved connectivity to existing community infrastructure and facilities, which has been identified as a priority within each of the LGA Local Community Strategic Plans, will be constructed. To support engagement in active transport, a cycling hub will be located at the intersection of the Midland and Tonkin Hwy PSP networks, providing a shade, amenity and a bike repair station. This concept was identified by the Project team as an opportunity and consultation with cycling and other interest groups was undertaken to further develop the idea.

## **6.11 Workforce Development**

Workforce sustainability is fundamental to the success of the Project. The Employee Development Plan was prepared to support programs and strategies in staff management, recruitment and onboarding, training, culture and wellbeing, diversity and inclusion. All workforce related targets are detailed in Appendix 2.

Training opportunities will be based around the requirements of the Government Training and Management guidelines, as well as structured training in the form of traineeships and apprenticeships offered directly through TGA and subcontractors. TGA has aligned with the training rates outlined in the Priority Start Policy and has set a target for numbers of trainees and apprentices on the Project to be 6% of total workforce hours. Graduate programs are also available through each Alliance partner, designed to assist achievement of competencies for professional formation, and provide opportunities for continued professional development. Mentoring programs are in place to support young professionals, including an internal mentor/mentee program with TGA employees from various disciplines, and external programs including the Construction Contractors Federation (CCF) Women in Construction mentoring program.

Many employees working on the Project will be absent from their parent companies for extended periods of time, meaning they may miss opportunities to set development goals and review their performance with their managers. To aid in goal setting, facilitating growth and the development of professional careers as well as driving better Project outcomes, TGA introduced professional development plans for all Alliance employees. The plans are an opportunity for employees and their managers to review their performance and identify any areas for improvement. The plans also provide an opportunity for employees to reflect on their professional development goals to be pursued beyond their time working on the Project. The plan was developed by reviewing the best practices from all constructor partners and is reflective of the Project core values.

## **6.12 Social Case Study – Redcliffe Primary School Engagement**

As part of the TGA's proactive engagement, Redcliffe Primary School Year 5 and 6 students were provided with an insight into the many construction career opportunities available to them through a careers day facilitated by the Project team. This formed part of the ongoing delivery of STEM education at the school.

TGA's focus goes beyond delivering the infrastructure. The students were made aware of the consideration of developing and diversifying our workforce, impacts on the local environment, and stakeholder and community engagement, and the variety of jobs that exist underneath the broader construction umbrella. The team worked with the students to explain the work they were doing along Tonkin Highway in front of the school. This event was a great opportunity for students to be exposed

to industry professionals and learn more about the qualifications required for their jobs, what subjects they studied and what their day-to-day work involved. As these students move into high school, the insights gained from the day may inspire future decisions around classes and career opportunities.

The students participated in hands on activities to learn about engineering and design, community engagement, Aboriginal participation, surveying, geotechnical engineering, human resources, environmental management, sustainability and traffic management (Figure 27).

This event was not only important to provide opportunities to the school's students, but it also gave the Project team the chance to engage with the local school and community.



Figure 27 TGA Structural Engineer with Redcliffe Primary School students

## 7 Reference List

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## 8 Glossary

A glossary of terms used throughout this document is detailed in Table 15.

Table 15 Glossary of Terms

Term	Description	Link to Further Information
<b>Material; Materiality</b>	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.	<a href="#">Global Reporting</a>
<b>National Greenhouse Accounts Factors</b>	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.	<a href="#">Australian National Greenhouse Account Factors</a>  <i>Ensure the most recent year copy is referred to.</i>
<b>Roads to Reuse</b>	The Roads to Reuse program 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.	<a href="#">Waste Authority</a>
<b>Scope 1 Emissions</b>	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.	<a href="#">Clean Energy Regulator</a>
<b>Scope 2 Emissions</b>	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.	
<b>Scope 3 Emissions</b>	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.	
<b>Sustainable Development Goals (SDGs)</b>	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.	<a href="#">United Nations Sustainable Development Goals 2030</a>

## 9 Appendices

Appendix	Title
<b>Appendix 1</b>	UN SDG Mapping for Positive and Negative Impacts
<b>Appendix 2</b>	Project Sustainability Targets
<b>Appendix 3</b>	List of Project Stakeholders
<b>Appendix 4</b>	List of Protected Areas
<b>Appendix 5</b>	Protected/Conservation Significant Flora and Fauna Species and Habitat

## Appendix 1 – UN SDG Mapping for Positive and Negative Impacts



## Appendix 2 – Project Sustainability Targets

### Sustainability Targets in Design & Construction



Focus Area	Objectives	Project Stage	Target	Progress	Progress	
<b>Enhanced Urban Design and Place Making</b>	Enhance the Swan River Crossing and surrounding area	Design	Investigate opportunities to enhance the Swan River precinct identified in consultation with key external stakeholders	Complete	<i>Significant external engagement has been undertaken and is ongoing with revisions of the concept design presented to various groups through early 2022.</i>	
		Construction	Implement at least two (2) opportunities to enhance the Swan River precinct identified during consultation with key external stakeholders	On track	Engagement in ongoing. May meetings with CoBe and CoBa presented the revised concept design.	
	Maximise connectivity for multi mode transport	Design	Investigate the needs of all users and transport modes to identify opportunities to improve user connectivity and adopt at least one (1) per mode of transport	Complete	<i>Opportunities such as inclusion of bike hub, bike channels, kayak access under the bridge and improved connectivity for pedestrians are being incorporated into the urban design plan.</i>	
		Construction	Implement at least one (1) opportunity to improve user connectivity for each mode of transport identified for the project	On track	Opportunities as above, these items will be incorporated into the urban design framework.	
	Preserve and enhance ecological values	Design	Investigate at least one (1) environmental enhancement opportunity	Complete	<i>Ecological enhancement opportunities were identified and documented in the project opportunities register. Some of the investigated opportunities include:</i> <ul style="list-style-type: none"> <li>● capturing some sediment and gross pollutants that typically discharge into the river through vegetated drains and swales</li> <li>● remediation of the cinders contamination at the southern dive structure site</li> </ul>	
		Construction	Implement at least one (1) environmental enhancement opportunity, with a stretch target for two (2) opportunities	On track	As per above comment. The vegetated drains and swales are likely to be implemented, and the remediation plan is yet to be finalised.	
	Preserve and enhance heritage values	Design	Investigate at least one (1) heritage enhancement opportunity and adopt one (1) opportunity	Complete	<i>The project intends to adopt the interpretive heritage trail and include artwork across the project to reflect Aboriginal cultural heritage - the trail is expected to include Indigenous and non-Indigenous heritage values and information about the local area.</i>	
		Construction	Implement at least one (1) adopted heritage enhancement opportunity/project	On track	Budget for heritage trail approved in May 2022. Design will be finalised by TGA and some 'inform' sessions will be held with LGAs and DBCA. Final sign off from Traditional Owner Working Group will also be sought.	
	<b>Management and Mitigation of Impacts to Water</b>	Optimise the design and groundwater interface	Design	Investigate opportunities for minimising the risk and challenges of the design and groundwater interface and adopt at least three (3) opportunities	On track	Due to changes with the Design Groundwater Level in early stages of design, the rail alignment and that of the dive structures was amended in order to minimise challenges with this interface. Additionally design considerations made regarding concrete mixes as a result of GW contamination.
			Construction	Implement the three (3) adopted mitigation strategies for minimising the risk and challenges of the design and groundwater interface identified during design	On track	Opportunities identified and implemented for Northern and Southern dive structures - initiatives to be captured in design reports. Other changes include raising of the rail design.
			Optimise the design to minimise disturbance of acid sulfate soils and groundwater/soil contamination	Complete	<i>Similarly to opportunities above, raising the road and dive structures has been implemented to minimise interaction with groundwater and subsequently potential for ASS.</i>	

Focus Area	Objectives	Project Stage	Target	Progress	Progress	
	Minimising the impacts of groundwater contamination and acid sulfate soils	Design	Prepare an Acid Sulfate Soils Management Plan (ASSMP) with the aim of meeting the <i>Treatment and management of soil and water in Acid Sulfate Soil landscapes</i> guidelines (DWER 2015)	Complete	<ul style="list-style-type: none"> <li>●Alignment Acid Sulfate Soil Management Plan (TGA-MPL-040)</li> <li>●Acid Sulfate Soil &amp; Dewatering Management Plan (Northern Dive) (TGA-MPL-054)</li> <li>●Construction Contamination Management Plan (Southern Dive) (TGA-MPL-041)</li> </ul>	
			Prepare a Site Contamination Management Plan (SCMP) with the aim of meeting the <i>Contaminated Sites Guidelines</i> (DWER 2014).	Complete	CCMP prepared for Lot 2 Railway Parade and Portion Tonkin Hwy Reserve, where existing contamination is present. AbMP prepared for site wide. <ul style="list-style-type: none"> <li>●Construction Contamination Management Plan (TGA-MPL-041)</li> <li>●Asbestos Management Plan (TGA-MPL-036)</li> </ul>	
		Construction	Implement the prepared ASSMP	On track	Plans in use, implementation recorded in management plan commitments register	
			Implement the prepared SCMP	On track	Plans in use, implementation recorded in management plan commitments register	
	Minimise impacts and improve discharge quality to surface water	Design	Investigate methods and management measures to minimise unplanned or unexpected impacts on the Swan River water quality or use	Complete	<i>Construction Environmental Management Plan (CEMP) (TGA-MPL-035) outlining measures to minimise impacts has been reviewed and approved by DBCA.</i>	
		Construction	Implement the identified methods and management measures to minimise impacts on the Swan River water quality or use	On track	Mitigation measures introduced in construction: <ul style="list-style-type: none"> <li>- Use of coffer dams and silt curtains during piling activities as per erosion and sediment sub-plan</li> <li>- Water testing undertaken daily</li> </ul>	
			Achieve no more than two (2) Class 2 incidents and zero (0) Class 1 incidents, as defined by the TGA Environmental Management Plan	On track	No Class 1 incidents recorded to date. One Class 2 incident recorded when sediment was discharged into adjacent land.	
			Implement monitoring of the Swan River and achieve the water quality criteria as specified in the management plan approved under the <i>Swan and Canning Rivers Management Act 2006</i> .	On track	Water sampling and other measures detailed in the Swan River Construction Management Plan is underway during construction	
	Efficient Resource Use and Sourcing	Optimise material selection and quantity	Design	Investigate opportunities to reduce the use of material and adopt at least two (2), with a stretch target for four (4) opportunities for material reduction/use of recycled products	Complete	<i>Opportunities to use recycled materials and reduce overall material use identified in the resource efficiency workshop and documented in opportunities register. Adopted items include:</i> <ul style="list-style-type: none"> <li>●removal of the temporary pier in Swan River (reduced materials from constructing pier)</li> <li>●use of recycled material as subbase under PDA</li> <li>●use of lower carbon concrete mixes from Holcim</li> <li>●In situ barrier with recycled aggregate</li> </ul>
			Construction	Achieve at least a 5% reduction in materials used on the project as measured by the IS Materials Calculator (i.e. based on environmental impacts)	On track	The design submission is being submitted with a claimed 12% reduction in materials (IS points) and 17% tCO2-e. At As Built (PC) the project will reevaluate this saving, it is anticipated the saving will be increased.
Reduce energy requirements and emissions		Design	Investigate energy efficiency opportunities and implement at least three (3)	Complete	<i>Opportunities identified to reduce energy use on the project include:</i> <ul style="list-style-type: none"> <li>●LED lighting for some components (Redcliffe Bridge and some underpasses)</li> <li>●Removal of temporary pier for construction of bridge 1858</li> <li>●Use of lower carbon concrete</li> <li>●Specify age and technical requirements of fleet</li> <li>●Reusing pavement material as subbase under FDA</li> </ul>	
		Construction	Achieve at least a 5% reduction in energy used or emissions (Scope 1 and 2) created during project lifetime (construction and operation)	On track	Modelling for the design submission has demonstrated a reduction of 4% for Scope 1 and 2 emissions, based on current designs/implementation. Changes to lighting (LED path lighting) will contribute to reducing this further and other opportunities may be realised during construction.	

Focus Area	Objectives	Project Stage	Target	Progress	Progress	
	Reduce water requirements	Design	Investigate opportunities to improve water efficiency and adopt at least three (3)	Complete	<i>Some opportunities identified and documented in Opportunity Register. Opportunities include reuse of dewatering effluent, changes to construction methodology and hydromulching.</i>	
		Construction	Achieve at least a 5% reduction in total water used on the project (construction and operation)	On track	Modelling for design submission has demonstrated a 6% reduction in water use for construction and operation. Other opportunities may be realised during construction to reduce this even further.	
	Reduce waste and maximise onsite reuse and recycling	Design	Investigate waste minimisation and recycling opportunities on the project and adopt at least three (3)	Complete	<i>Waste minimisation opportunities being investigated for the office and onsite, including the reuse of various demolished materials, elimination of temporary works, office waste segregation and the removal of single use waste from office and crib rooms.</i>	
			Construction	Divert at least 85% of clean/inert excavation spoil from landfill and reuse at least 50% onsite	On track	Spoil diversion from landfill at 100%. Note: ISC define spoil to include cut to fill
		Divert at least 60% of office resource outputs from landfill		At risk	Tracking against office waste improved in May with review of data - up to 32% diversion from landfill. Audit of Instant Waste scheduled for June so will discuss this with them at this time.	
		Divert at least 70% of other inert resource outputs from landfill		On track	Inert construction resources are at 99% diversion from landfill with 4% onsite reuse.	
		Re-use/retain at least 65% of contaminated soil on site, and dispose of not greater than 10% to landfill (excludes asbestos).		On track	To date, the only identified contamination has been asbestos (Lot 2 etc.) so tracking well against this target.	
		Re-use/retain at least 50% of acid sulfate soils on site, and dispose of not greater than 15% to landfill	On track	ASS material reuse onsite is at 99% and 100% diversion from landfill.		
	Integration of offsite recycled products and materials	Design	Investigate opportunities to replace the use of virgin materials and adopt at least two (2), with a stretch target for four (4) opportunities	Complete	<i>Opportunities to integrate offsite recycled materials identified in the resource efficiency workshop including use of Roe/Kal material and import of crushed recycled concrete.</i>	
		Construction	Implement at least two (2) opportunities, with a stretch target for four (4) opportunities	Complete	<i>Material sourced from Roe/Kal project. Some crushed recycled concrete has been imported to date. Other opportunities will continue to be investigated and implemented as appropriate</i>	
	Industry prosperity	Improve workforce diversity and wellbeing	Design	Achieve 75% satisfaction on the cultural and wellness survey of team cohesion	Complete	<i>First survey conducted in late March 2021, achieved a 75% response rate and had a satisfaction rate of over 75% which aligns with the scale of "4".</i>
				Achieve 75% satisfaction on the cultural and wellness survey of team cohesion	On track	First survey conducted in late March 2021, achieved a 75% response rate and 87% satisfaction rate. Second survey in Nov 2021, achieved 81% satisfaction rate. Third survey is currently underway.
			Attract and retain at least 10% of new entrants into the workforce (new employees with less than 5 years' experience)	On track	Early 2022 reporting showed 21% of employees are employees with less than 5 years' experience.	
			Fundraise for 1 event supporting people living with disabilities such as City to Surf for Activ (host a team etc.)	Not yet commenced	To be reconsidered in 2023. 2021 & 2022 CTS events have been cancelled due to COVID-19 restrictions and safety risks.	
			Celebrate 1 event during Pride Month or throughout the year	On track	Toolbox in November was themed for pride and information was shared on Workplace for all staff.	

Focus Area	Objectives	Project Stage	Target	Progress	Progress	
		Construction	Develop a Flexible Working Arrangements Policy	Complete	<i>Flexible Arrangement Working Policy was prepared in early 2021 and is in use.</i>	
			Investigate engagement through the Infrastructure Ready Program	Not yet commenced	Unlikely to engage with the Infrastructure Ready program due to where Project was in timeline when the program was introduced. Other programs are in place to support people returning to work and engagement of young people in the workforce.	
			Celebrate 1 event for Harmony Week	On track	Harmony week themed toolbox undertaken in March	
			Achieve at least 10% of the workforce representing women	On track	Female participation number is at 11%.	
	Develop capability and capacity in small subcontractors	Construction	Prepare at least three discrete packages of work to enable to WA Limestone to achieve a Main Roads prequalification level R2, and two other small subcontractors have intent to submit for B1/R1.	On track	GRC have been certified as pre-qualification level B1. WAL pre-qual is ongoing, with weekly meetings held to support progress.	
	Increase Aboriginal participation	Construction	Design	Investigate and establish business baseline for engaging Aboriginal businesses during construction	Complete	<i>Not achieved.</i>
			Engage at least 30 FTEs for the entire project duration	In progress	Measured in Monthly contractor reporting, average FTE's for Project at 25.9, representing 8.3% of the workforce.	
			Award at least \$10M of contracts to Aboriginal businesses	On track	Measured in Monthly contractor reporting, contracts committed: \$14.1m and current spend is \$7.8m.	
			Provide at least 1 mentor to Aboriginal employees for project duration	On track	Nudge has been engaged as organisational training support and mentorship provider for Aboriginal employees working on the project. May not meet 'project duration' but will be in place for remainder of construction.	
			Establish a Project Working Group and implement at least two (2) initiatives	Complete	<i>Project Working Group is considered informal and made up of members of senior management team. Initiatives to date include incentivising/disincentivising achievement against Aboriginal participation targets, and engagement of Nudge as training and mentorship providers to support Aboriginal workers on the project.</i>	
An Aboriginal Coordinator was appointed for the project and was available for at least 20%-30% of the project	At risk	An Aboriginal Coordinator has been appointed for the project and is involved on a casual basis, providing support and working with Nudge Foundation. Risk of not meeting the 20-30% target.				
Consultation and Partnership			Communicate to external stakeholders and the community the proposed dust mitigation strategies and monitoring	Complete	<i>Community notices relating to upcoming works include commentary on potential dust impacts and how they will be managed by the project.</i>	
			Communicate to external stakeholders and the community the proposed noise mitigation strategies and monitoring	Complete	<i>Community notices relating to upcoming works include commentary on potential noise impacts and how they will be managed by the project</i>	
			Communicate to external stakeholders and the community the proposed vibration mitigation strategies and monitoring	Complete	<i>Community notices relating to upcoming works include commentary on potential vibration impacts and how they will be managed by the project</i>	

Focus Area	Objectives	Project Stage	Target	Progress	Progress
	Effective community engagement	Design	Complete stakeholder satisfaction surveys every 6 months and achieve at least a 60% rate for community satisfaction	Complete	First stakeholder survey conducted in late 2020 with average satisfaction rate of 84% achieved. A client survey (PTA, MRWA) has also been undertaken, providing good feedback to the Alliance. Client survey in May 2021 - 85% for community management; Client survey in November 2021 - 86% for community management.
			Complete community perception surveys every 6 months and achieve at least a 50% rate for community sentiment	Complete	First survey conducted in late 2020 by an external organisation, and scheduled to occur 6-monthly. Community survey (external) - November 2020 - 91% positive sentiment; Community survey (external) - July 2021 - 93% positive sentiment.
			Identify and implement targeted stakeholder engagement activities	Complete	<i>Activities outlined in the CSES are being undertaken. This can be evidenced by the outcome of the CSE audit, undertaken in May 2021, and the DRAFT implementation report, which is updated on a monthly basis.</i>
			Stakeholder input influences more than one (1) priority project negotiable (as defined in the CSEP)	Complete	<i>Various examples of stakeholder input for project negotiables identified and being tracked in register. Priority negotiables are regularly reviewed as the project progresses and construction focuses in different areas. Implemented examples include the inclusion of noise walls on Redcliffe bridge</i>
		Construction	Maintain communication channels and maintain dust mitigation strategies and monitoring	On track	Community notices relating to upcoming works include commentary on potential dust impacts and how they will be managed by the project.
			Maintain communication channels and maintain noise mitigation strategies and monitoring	On track	Community notices relating to upcoming works include commentary on potential noise impacts and how they will be managed by the project. Out of hours noise plans also submitted to LGAs for approval. Notices sent out to impacted residents for expected noisy works.
			Maintain communication channels and maintain vibration mitigation strategies and monitoring	On track	Community notices relating to upcoming works include commentary on potential vibration impacts and how they will be managed by the project
			Complete stakeholder satisfaction surveys every 6 months and achieve at least a 60% rate for stakeholder satisfaction	On track	Stakeholder survey conducted showing average satisfaction rate of 84%. A client survey (PTA, MRWA) has also been undertaken, providing a satisfaction rate of 71%.
			Complete community perception surveys every 6 months and achieve at least a 50% rate for community sentiment	On track	Surveys conducted by an external organisation, and to occur 6-monthly ongoing. The final consultation report demonstrating 75% of community surveyed has positive sentiment towards project.
			Stakeholder input influences more than one (1) priority project negotiable (as defined in the CSEP)	Complete	<i>Influence on Project negotiables being tracked and recorded. One example is the Noise Walls on Redcliffe Bridge however there are many other initiatives being pursued</i>
	Improve outcomes for the Swan River and other key precincts through consultation	Design	Consult with key external stakeholders to identify opportunities	On track	Ongoing engagement with external stakeholders has contributed to identification of various opportunities and these will be further developed as construction progresses - further engagement will also be undertaken with proposed working group.
		Construction	Maintain consultation channels with key external stakeholders during implementation of opportunities	On track	As per above comment.



Focus Area	Objectives	Project Stage	Target	Progress	Progress
	Effective decision making through collaboration with Metronet	Design	Complete monthly meetings with Metronet to establish progress and obtain feedback for intergration with the project	Complete	<p>Regular consultation occurring between TGA and MEL design teams involves:</p> <ul style="list-style-type: none"> <li>• Weekly SEM dashboard updates</li> <li>• SID workshops carried out with PTA</li> <li>• Discussions with PTA for deviation applications to cover non-conformances</li> <li>• Ad-hoc technical sessions to discuss PTA review comments</li> <li>• Tracking engagement with interface register (MEL and TGA)</li> <li>• Regular TGA/MEL meetings to discuss interface and coordination</li> </ul>
		Construction	Complete bi-monthly meetings with Metronet to establish progress and obtain feedback for integration with the project	On track	<p>Regular consultation occurring between TGA and MEL design teams involves:</p> <ul style="list-style-type: none"> <li>• Weekly SEM dashboard updates</li> <li>• SID workshops carried out with PTA</li> <li>• Discussions with PTA for deviation applications to cover non-conformances</li> <li>• Ad-hoc technical sessions to discuss PTA review comments</li> <li>• Tracking engagement with interface register (MEL and TGA)</li> <li>• Regular TGA/MEL meetings to discuss interface and coordination</li> </ul>

### Appendix 3 – Project Stakeholders

STAKEHOLDER GROUP	SPECIFIC STAKEHOLDERS
Government	<p>Federal</p> <ul style="list-style-type: none"> <li>• Federal Minister for Population, Cities and Urban Infrastructure</li> <li>• Member for Swan</li> <li>• Member for Perth</li> <li>• Shadow Minister for Infrastructure, Transport and Regional Development</li> </ul> <p>State</p> <ul style="list-style-type: none"> <li>• WA Premier</li> <li>• Minister for Transport and Planning</li> <li>• Member for Belmont</li> <li>• Member for Maylands</li> <li>• Member for Bassendean</li> <li>• Minister for Finance, Aboriginal Affairs, and Lands</li> <li>• Minister for Police, Road Safety</li> </ul> <p>Local</p> <ul style="list-style-type: none"> <li>• City of Belmont Mayor</li> <li>• City of Bayswater Mayor</li> <li>• City of Swan Mayor</li> </ul>
Government Departments and Agencies	<p>Federal</p> <ul style="list-style-type: none"> <li>• Infrastructure Australia</li> <li>• Treasury</li> <li>• Department of Infrastructure and Regional Development</li> <li>• Department of Agriculture, Water and Environment</li> <li>• Australian Communications and Media Authority</li> </ul> <p>State</p> <ul style="list-style-type: none"> <li>• Department of Transport</li> <li>• METRONET</li> <li>• Public Transport Authority</li> <li>• Transperth</li> <li>• Department of Biodiversity, Conservation and Attractions</li> <li>• Department of Water and Environmental Regulation</li> <li>• Department of Planning, Lands and Heritage</li> <li>• Road Safety Commission</li> <li>• Department of Premier and Cabinet</li> <li>• Department of Aboriginal Affairs</li> <li>• Botanic Gardens and Parks Authority</li> <li>• Department of Fire and Emergency Services</li> <li>• Department of Local Government and Communities</li> <li>• Department of Parks and Wildlife</li> <li>• Development WA</li> <li>• Tourism WA</li> <li>• Main Roads Heavy Vehicles Operating Section</li> <li>• Racing and Wagering Western Australia (RWVA)</li> </ul>

	<p>Local</p> <ul style="list-style-type: none"> <li>• City of Belmont</li> <li>• City of Bayswater</li> <li>• City of Swan</li> <li>• Town of Bassendean</li> <li>• The Eastern Metropolitan Regional Council</li> <li>• WA Local Government Association</li> </ul>
Asset owners	<ul style="list-style-type: none"> <li>• Main Roads Western Australia</li> <li>• Public Transport Authority</li> </ul>
Service Providers and Customers	<ul style="list-style-type: none"> <li>• Western Power</li> <li>• Water Corporation</li> <li>• Atco</li> <li>• All telephone carriers</li> <li>• NBN</li> <li>• Alinta</li> <li>• Nextgen Networks</li> </ul>
Motorists and road users	<ul style="list-style-type: none"> <li>• Transport Forum WA Inc</li> <li>• WA Road Transport Association</li> <li>• Freight and Logistics Council WA</li> <li>• WA Farmers Federation</li> <li>• Livestock and Rural Transport Association</li> <li>• Royal Automotive Club of WA</li> <li>• WA Pilot Drivers Association</li> <li>• WA Road Transport Association</li> <li>• Planning and Transport Research Centre</li> <li>• Heavy vehicle operators</li> <li>• Taxi and similar operators</li> </ul>
Cyclists and pedestrians	<ul style="list-style-type: none"> <li>• WestCycle</li> <li>• Bicycling WA</li> <li>• Cyclesport WA</li> <li>• Visibility</li> <li>• Department of Transport Network Planning</li> <li>• Belmont City Cycling Crew</li> </ul>
Businesses, clubs and groups	<p>Business and associations</p> <ul style="list-style-type: none"> <li>• Bayswater Village Retailers Trade Association</li> <li>• Chamber of Commerce and Industry WA (CCI)</li> <li>• Local Business Enterprise Centre/s (BEC)</li> <li>• Local Business Advisory Group/s</li> <li>• Directly affected commercial properties</li> <li>• DFO</li> <li>• Perth Airport Pty Ltd</li> <li>• WA Racehorse Owners' Association Inc</li> <li>• WA Trainers' Association</li> <li>• Perth Racing</li> <li>• The Avon Descent committee</li> <li>• Costco</li> <li>• Tonkin Highway Industrial Estate</li> </ul>

Aboriginal stakeholders	<ul style="list-style-type: none"><li>• South West Aboriginal Land and Sea Council (SWALSC)</li><li>• Whadjuk Working Party</li><li>• Traditional Owners Advisory Group (established for this project)</li><li>• Noongar Chamber of Commerce and Industry (NCCI)</li></ul>
Community	<ul style="list-style-type: none"><li>• Residents within 100m of project works</li><li>• Residents within 500m of project works</li><li>• Residents within 1km of project works</li><li>• Residents and businesses from surrounding communities</li><li>• Horse trainer's (specialty group)</li></ul>
Media	<ul style="list-style-type: none"><li>• Print</li><li>• TV</li><li>• Social</li><li>• Radio</li></ul>

## Appendix 4 – List of Protected Areas

PROTECTED AREA	DETAILS	LOCALITY/ PROXIMITY	IMPACT
<b>Environmental</b>			
Swan Canning Riverpark and Development Control Area	Department of Biodiversity, Conservation and Attractions – Development Control Area	Intersects directly with the Project	0.25 ha directly cleared, river bank directly impacted where the coffer dams are installed and will be subject to rehabilitation, adjacent area indirectly impacted by dust and noise. Managed in the EMP and Swan River CEMP and subject to regular inspections.
<b>Heritage</b>			
Modified Tree – site ID 37868	Registered Aboriginal Heritage Site	Adjacent to the Project	Indirect impacts of dust and vibration are monitored monthly. Managed in EMP. Subject to regular inspections.
Swan River – Mythological, site ID 3536	Registered Aboriginal Heritage Site	Intersects directly with the Project	River bank directly impacted where the coffer dams are installed and will be subject to rehabilitation. Adjacent area indirectly impacted by dust, noise and vibration. Managed in the EMP and subject to regular inspections.

## Appendix 5 – Conservation Significant Flora and Fauna Species and Habitat

Detail the conservation codes here. VU - Vulnerable; T – Threatened; EN – Endangered; P3 – Priority 3.

SPECIES	CONSERVATION SIGNIFANCE CODE		IMPACT
	FEDERAL	STATE	
<b>Flora</b>			
Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community	EN	P3	Clearing of 3.95 ha. Retained habitat adjacent to the east of the Project. Management detailed in the EMP.
<b>Fauna</b>			
<i>Calyptrorhynchus banksii naso</i> (Forest Red-tailed Black Cockatoo)	VU	T	Clearing of 23.72 ha of black cockatoo foraging habitat and 66 potential breeding trees of which none had hollows suitable for breeding.
<i>Calyptrorhynchus baudinii</i> (Baudin’s Black Cockatoo)	EN	T	
<i>Calyptrorhynchus latirostris</i> (Carnaby’s Black Cockatoo)	EN	T	