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Armadale Road to North Lake Road Bridge: Annual Project Sustainability Report 2021

This annual report covers the period from 1/07/2020 to 30/06/2021. This is the second annual sustainability report prepared for this Project. The Projects Sustainability Lead & Communications Lead can be contacted at: enquiries@mainroads.wa.gov.au or 138 138

About this Report

This report has been prepared by the Armadale Road to North Lake Road Bridge (ARNLR) project team on behalf of Main Roads Western Australia. This report forms part of Main Roads’ annual sustainability reporting which is integrated into its Annual Report. The report content is prepared in accordance with GRI principles. Material topics reported in this report have been determined through a materiality process that adheres to the Infrastructure Sustainability Council of Australia (ISCA) framework.

The Project is registered with ISCA to achieve an official Infrastructure Sustainability (IS) rating and is using the version 2.0 IS Rating Tool. This report includes information which will be used as part of the ISCA Rating Submission.

This Annual Report includes information relating to environmental approvals obtained as part of Project Planning, Design and Construction phases.

Introduction

The Armadale Road to North Lake Road Bridge will provide a direct link between Armadale Road and North Lake Road, improve access to Kwinana Freeway and support residential and commercial expansion in Cockburn and Armadale.

The Project team is committed to the delivery of the Armadale Road to North Lake Road Bridge Project in a way which seeks to improve the overall road-based transport system by ensuring the social, environmental, and economic aspects of the project are delivered in the most sustainable and practicable manner possible.

The Main Roads strategic direction *Keeping WA Moving* provides objectives and guiding principles that form the basis for the behaviours driving the ARNLR project team.

Among other considerations, the project team is committed to seeking opportunities during design and construction to minimise impact to the Environment including wetlands, Banksia Woodlands and Black Cockatoo foraging habitat, as well as to continue the improvement of efficient use of resources, energy and water on the project and reduction of waste in both construction and operation.

Highlights

Sustainability Metric	Highlight
Resource Efficiency - reuse and recycle of onsite and offsite materials	<ul style="list-style-type: none"> Use of Crushed Recycled Concrete (CRC) as a subbase material for some pavement areas: Initial forecast of CRC use on the Project was 16,000 tonnes. To date, more than 28,000 tonnes of CRC has been installed on the Project, which represents 27% of all permanent subbase material installed being constituted from recycled materials. The CRC material has been generated from onsite demolition concrete materials and imported recycled materials. Use of imported fill from other nearby projects:

	<p>Circa 14,000 tonnes of select fill was imported from nearby projects, which results in 10% of reused fill of total fill installed to date.</p> <ul style="list-style-type: none"> • Use of onsite demolition materials as deep fill in embankments. • Use of recycled materials (Eco Blocks - local recycled construction waste that has been crushed and graded) for construction of retaining walls.
<p>Waste Targets</p>	<ul style="list-style-type: none"> • 100% Site won fill diverted from landfill and reused on site: To date, circa 160,000 m3 of fill excavated and reused on site (unless contaminated with asbestos). • 100% removed existing asphalt diverted from landfill. Existing asphalt is excavated and reused in embankments or taken offsite by one of the suppliers and recycled. To date, circa 2,500 m3 of asphalt waste is encapsulated in embankments and circa 4,200 m3 of asphalt profiling waste sent for offsite recycling. • 91% C&D (Construction & Demolition) waste diverted from landfill. All concrete waste is removed offsite by one of the suppliers, crushed and either supplied back to site or used by other projects as CRC. Circa 2,000 m3 of concrete waste to date was reused onsite via encapsulating in embankments.
<p>Reuse of assets from previous projects</p>	<ul style="list-style-type: none"> • MRIA assets being reused on the Project: <ul style="list-style-type: none"> ○ Traffic barriers ○ Project offices ○ Temporary fencing ○ VMS (Variable Message Sign) Boards and Lighting Towers
<p>Groundwater & sensitive urban water design</p>	<ul style="list-style-type: none"> • High level of Water Sensitive Urban Design has been implemented on the Project to reduce the volume of stormwater and pollution entering water ways, such as: <ul style="list-style-type: none"> ○ Every opportunity has been sought to discharge to swales where possible. ○ The wetland area between Kentucky Court and the North Lake Road northbound freeway entry ramp has largely been left untouched other than the earthworks for the Principal Shared Path (PSP). Runoff has been discharged to this area after first passing through a water quality device. This allowed existing vegetation to further treat runoff prior to infiltration back to groundwater.
<p>Environmental Initiatives</p>	<ul style="list-style-type: none"> • 50 Grasstrees relocated to Cockburn Wetlands revegetation area.

Aboriginal Business employment opportunities	<ul style="list-style-type: none"> Target exceeded for Aboriginal business procurement Target of \$5 million contract value set for Aboriginal business procurement. To date, key awarded packages at circa \$6.28 million awarded, which includes fencing, earthworks (various), site waste and asbestos, heritage monitoring, retaining wall supply and install, safety barriers, traffic management, Aboriginal artwork, and landscape subcontracting.
Aboriginal Employment	<ul style="list-style-type: none"> 105 Aboriginal people have been employed on the project to date.
Aboriginal Trainees	<ul style="list-style-type: none"> 15 trainees sourced and selected via NUDGE
Cultural Awareness	<ul style="list-style-type: none"> 10 Cultural Awareness sessions held with Danny Ford
Community Involvement	<ul style="list-style-type: none"> Seven quarterly meetings with the Construction Reference Group (CRG) with one as a 'VIP on-site CRG visit' taking attendees on a site tour Four Public Sentiment Surveys conducted to date generally showing low impact to residents and positive community sentiment Deadly Sista Girlz Partnership – Community Artwork Project with the Aboriginal female students from Southern River College
Construction and Operations Water	<ul style="list-style-type: none"> Design includes 100% native plantings across the project Removal of reticulated irrigation for all Feature Landscape areas

Overview

On 7 May 2017, the State and Commonwealth Governments announced a \$2.3 billion package of road and rail infrastructure works, which will reduce congestion and lead to smarter, safer, and more efficient journeys around Perth's southern suburbs. The Armadale Road North Lake Road Bridge was part of the package.

The Armadale Road to North Lake Road Bridge project was allocated \$237 million as part of the \$2.3 billion road and rail infrastructure works package, jointly funded by Federal (\$189.6 million) and State (\$47.4 million) governments.

Organisations involved

The Armadale Access Alliance, a consortium comprising Laing O'Rourke and BG&E in partnership with Main Roads Western Australia, was awarded to design and construct the project following a competitive tendering process in early 2019.

Location including a map of the project

The Project is located within the City of Cockburn, on Armadale Road between Kwinana Freeway and Ghostgum Avenue (refer Figure 1).

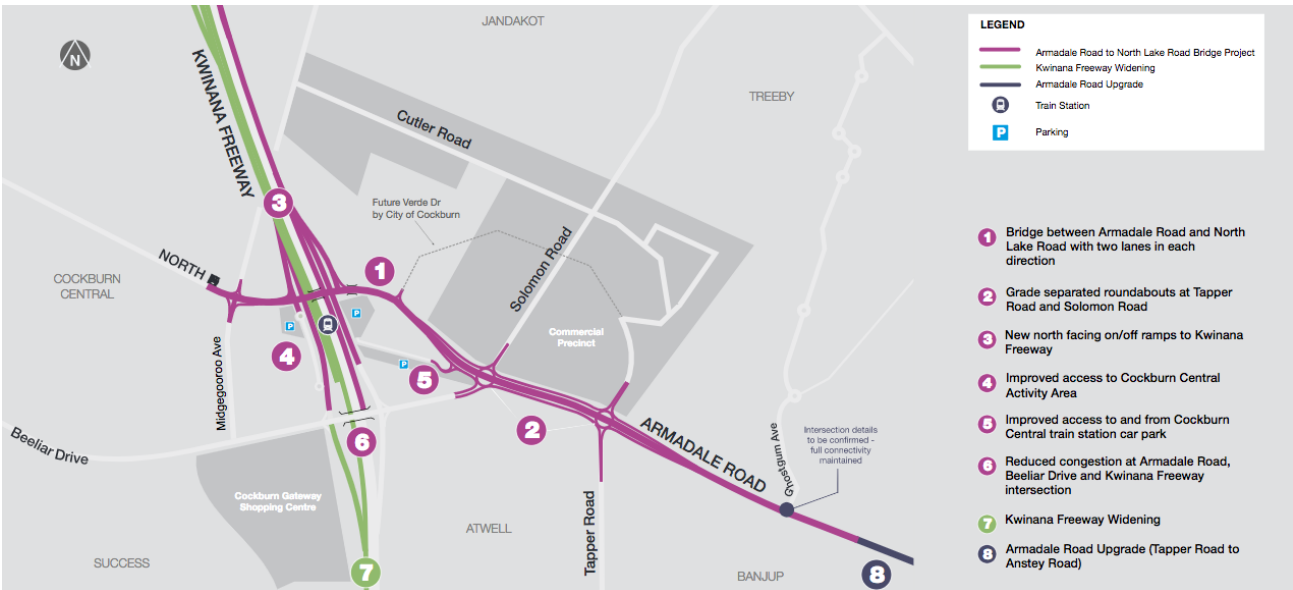


Figure 1: Project Location

Project characteristics

The Project includes:

- Construction of a new bridge over Kwinana Freeway connecting Armadale Road and North Lake Road (Refer to Figure 2).



Figure 2: Armadale Road to North Lake Road Bridge Progress

- Additional lanes and turning capacity added to the intersection of Armadale Road and Ghostgum Avenue to support ongoing residential growth in the suburbs of Calleya and Treeby (Refer Figure 3).



Figure 3: Ghostgum Ave – Armadale Road Progress

- New north facing entry and exit ramps connecting to the new bridge over Kwinana Freeway and collector-distributor roads on both sides of the Kwinana Freeway from Berrigan Drive to Armadale Road, enabling safer and more efficient merging conditions (Refer to Figure 4)



Figure 4: Kwinana Freeway southbound collector-distributor road

- 2.85 km Armadale Road upgraded from Tapper Road to Kwinana Freeway, passing over the intersection of Tapper Road with a new bridge (Refer to Figure 6), and under the intersection of Solomon Road via a trench structure (Refer to Figure 5), the first of its kind in WA.



Figure 5: Solomon Road Dive Structure Progress



Figure 6: Tapper Road – Verde Drive Bridge Progress

- Local roads reconfigured with two new roundabouts to maintain connectivity.

Duration of project

The Project Design phase completed in mid-June 2020 with the Construction Practical Completion planned for late 2021.

Improvements considered

The proposed upgrade from Armadale Road (at Ghostgum Avenue) to North Lake Road (at Midgegooroo Avenue), including a bridge over Kwinana Freeway, will reduce congestion and improve access.

The primary objectives of this Project are to provide efficient and safe road access for all road users and to provide road infrastructure that supports economic and regional development. In particular the Project will:

- provide a direct link between Armadale Road and North Lake Road bypassing congestion at Cockburn Central train station and Cockburn Gateway shopping centre;
- improve access to Kwinana Freeway to and from the north;
- provide easier access to Cockburn Central train station;
- reduce congestion on Armadale Road;
- improve access to the adjacent commercial precinct; and
- complement other significant road improvements in the southern metropolitan corridor including the duplication of Armadale Road from Anstey Road to Tapper Road, widening of Kwinana Freeway northbound from Russell Road to Roe Highway, and the Murdoch Drive extension to Kwinana Freeway and Roe Highway.

Regional and Economic Importance of the Project

Armadale Road is a strategic freight route and one of the main east-west links within the Perth metropolitan transport network. This link forms part of the route to Fremantle Port with approximately 27,000 vehicles using Armadale Road daily between Tapper and Warton Roads. This congestion is preventing the full implementation of the Cockburn Central Activity Centre Strategy and the achievement of its vision and key strategic objectives.

Upon completion in late 2021, the Project will help to address significant congestion in the Cockburn Central area resulting from the growth of the Cockburn Gateway Shopping Centre, surrounding commercial, retail, and residential development and traffic passing through the area to access Cockburn Central Station, Kwinana Freeway and other destinations west of Kwinana Freeway.

For public transport users, the project will improve access to and from Cockburn Central Train Station by alleviating heavy congestion around the station car park during peak times.

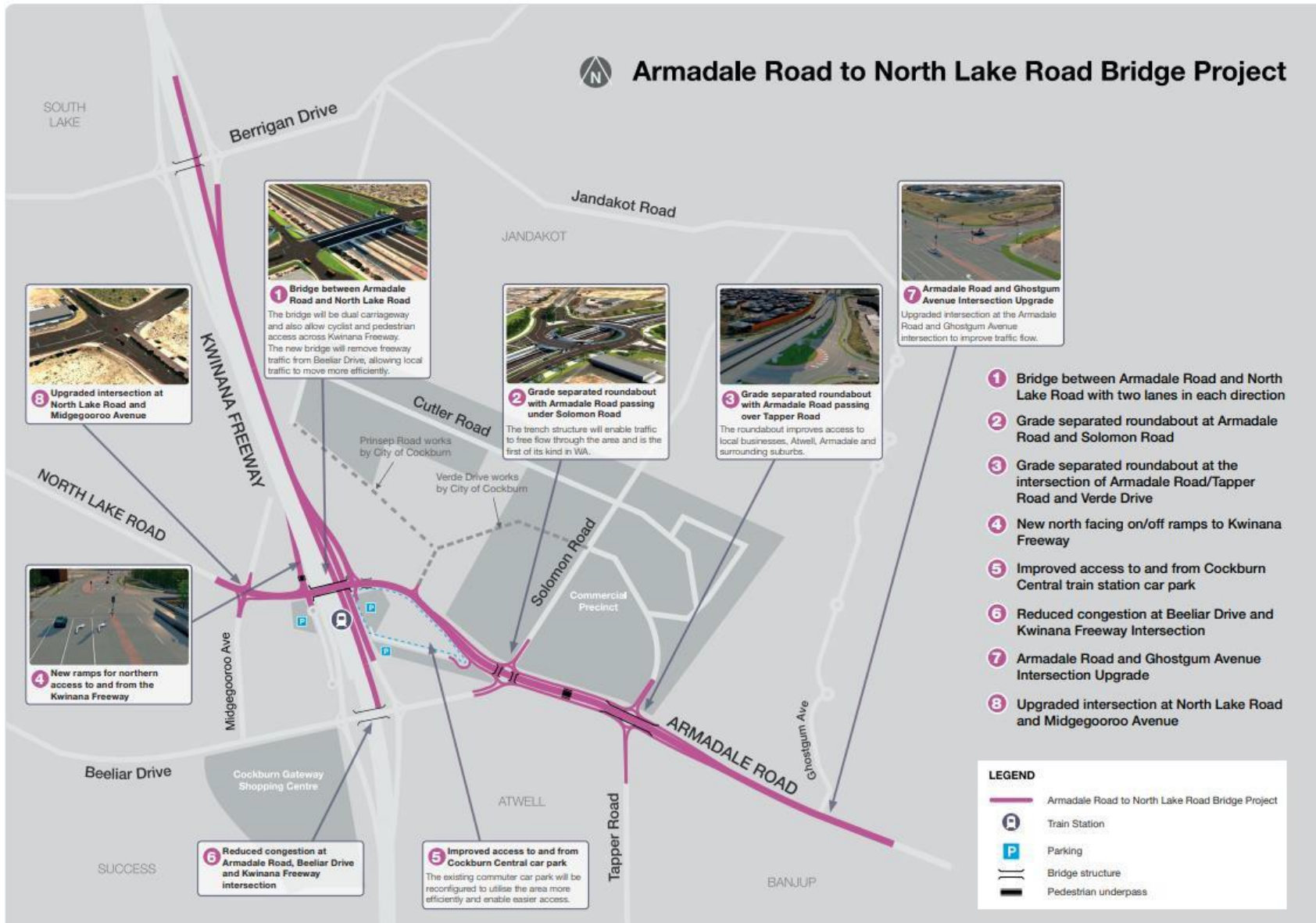
Once delivered, the Project will benefit the area by providing a supporting road network that feeds traffic to bypass the heart of the Cockburn Central Activity Centre.

Key stakeholders to the project

Refer to the list in Appendix 3 for the Key Stakeholders.

Link to project website for further information

The Project website can be found at: <https://project.mainroads.wa.gov.au/home/armadaleroadbridge/Pages/default.aspx>



Overall approach to Sustainability

The Project has been registered to achieve an Infrastructure Sustainability Council of Australia Design and As-Built rating using version 2.0 of the Rating Tool. Currently, the project is undergoing verification for the Interim Design rating. The As-Built rating submission is expected in late 2021.

The key Project Sustainability Priorities are identified in the Sustainability Management Plan and reflected in the Sustainability Position Statement which is available on the Supply Chain Sustainability School Project Landing Page:

<https://www.supplychainschool.org.au/learn/partner-landing-pages/armadale-road/>.

Project Sustainability Objectives and Initiatives are aligned with the Main Roads Sustainability Policy dated July 2016, which is underpinned by six key aspects: Sustainable Transport, Climate Change, Environmental Footprint, Behaviour, Governance and Performance, and Funding and Financing.

Environmental Aspects Performance

At a glance

Aspect	Year to 30 June	Total for Project
Forecast Clearing (ha)	0.2	14.44
Clearing permit allowance (ha)	0.2	14.94
Actual clearing to date (ha)	0.2	14.44
Rehabilitation/revegetation planned (ha)	5	5
Actual rehabilitation/revegetation to date (ha)	5	5
Environmental offset via Monetary contribution actual (\$)	\$0	\$197,657
Total Water Consumption to date (kL)	167,132,200	219,481,000
Total water licence allowance (kL)	396,000kL	792,000kL
Total GHG emissions (scope 1, 2 & 3) to date (t CO ₂ -e)	Circa 2,500 t CO ₂ -e	Circa 6,000 t CO ₂ -e
Total energy consumption to date (mj)	148,261kWh– purchased at site compound. 38,903,966 mj – total energy consumption to date which includes energy from fuel use and electricity	150,737 kWh– purchased at site compound. 45,688,938mj- total energy consumption which includes energy from fuel use and electricity
Total quantity of recycled content used in project (t)	44,501 t excl. steel	44,501t excl. steel
Total imported materials used in project (t)	390217.1	435190.1
Total waste generated by project (t) – includes recycled waste	20348.8	26764.6

Environmental Management

The Project was referred under the Environment Protection and Biodiversity Conservation Act (EPBC Act) in 2018. It was determined that the project is not considered a controlled action and can therefore progress without further reference to this legislation.

The Project was referred to the Environmental Protection Authority (EPA) on 22 August 2018. The EPA determined the proposal does not warrant formal assessment. The referral documentation and decision on whether to assess this proposal can be found in the link below:
<http://www.epa.wa.gov.au/proposals/armadale-road-north-lake-road-bridge>

As part of the due diligence undertaken for the wider ARNLR Project, appropriate environmental investigations were undertaken to determine potential impacts of the Project. These included detailed studies of flora and vegetation, fauna, acid sulfate soils (ASS), contamination, hydrogeology and dewatering, noise and vibration and Aboriginal heritage. The outcomes of these studies informed the Project’s Environmental Impact Assessment.

The following sections provide a summary of the existing environmental factors that are present within the Project and wider area:

Vegetation - Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs)

Six native vegetation types were identified within the Project and wider area mapped inclusive of three Banksia Woodlands, one Marri Woodland, and two Wetlands. All these vegetation types were previously disturbed, impacted by weed invasion and urban development.

One TEC within and adjacent to the Project alignment was identified. This TEC (inferred Floristic Community Type 23a), was confirmed to represent the Banksia Woodland of the Swan Coastal Plain TEC which is also a Priority 3 PEC as listed by DBCA.

In order to maintain biodiversity, native vegetation was retained wherever possible through design changes. All retained vegetation and TEC adjacent to the project boundary was protected through the installation of fencing, signage, weed management and environmental awareness information delivered to the project team. Awareness and education material identified constraints when working around native vegetation, focusing on unauthorised access to vegetated areas and Tree Protection Zones.

Declared Rare and Priority Flora

A detailed flora and vegetation assessment was undertaken for the Project and recorded no conservation significant flora species under State or Federal legislation.

Wetlands

A number of geomorphic wetlands were identified within the vicinity of the Project footprint. These wetlands have been previously categorised as Multiple Use or Resource Enhancement wetlands, based on their hydrological and ecological qualities. Development over the past 30 years has modified most of the land nearby the Project with remnant wetlands present to the north and southeast, and two modified wetlands within urban housing to the south.

Acid Sulfate Soils (ASS)

An assessment of the Department of Water and Environmental Regulation's (DWER) ASS mapping indicated that the risk of ASS occurring along the Project alignment as 'moderate to low risk of ASS occurring within 3 m of the natural soil surface'. Based on the moderate to low risk of ASS, the location away from sensitive areas, the lack of ongoing groundwater drainage or dewatering during operations, and the lack of excavation below the groundwater table, the Project is not expected to cause significant impacts to the quality of land and soils.

Terrestrial Fauna

The Project will impact on habitat for conservation significant species, including:

- 8.4 ha foraging/roosting habitat for Carnaby's Cockatoo (*Calyptorhynchus latirostris*)
- limited habitat (0.1 ha) for Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*).
- 6 potential black cockatoo breeding trees
- 8.4 ha of habitat for Quenda (*Isoodon obesulus fusciventer*)
- 13.8 ha of habitat for Perth Lined Skink (*Lerista lineata*)

Water Management

Groundwater and surface water monitoring is being conducted at adjacent surface water bodies

and monitoring wells along the Project alignment. It is not anticipated that construction activities associated with the ARNLR Project will have significant impacts on underlying groundwater quality of nearby surface waters. However, the described monitoring programs are being undertaken for the early detection of any changes in water quality and assurance purposes for environmental compliance. If adverse impacts are identified following a monitoring event, further mitigation measures and potential remedial program will be implemented.

Results from recent monitoring events show no changes in water quality of groundwater or surface water.

Hydrogeology

The project lies within the Jandakot groundwater system which comprises:

- The shallow unconfined Superficial (water table) aquifer known as the Jandakot mound;
- The deep, partially-confined Leederville aquifer;
- The deep, mostly-confined Yarragadee aquifer.

The Jandakot mound is a source of water for open space, horticulture, industry and gardens, and contributes to Perth's public water supply.

A majority of the Jandakot Mound is separated from the deeper Leederville aquifer by a confining layer of Kardinya Shale. As a result, potential for inter-aquifer impacts across most of the mound is limited. The confining nature of the shales means that abstraction from the Superficial aquifer has a greater impact on wetlands on the Jandakot Mound than abstraction from the deep aquifers (DoW, 2015).

In order to prevent impacts to the aquifer as a result of groundwater abstraction, regular monitoring is conducted to ensure groundwater levels remain within acceptable limits. Management controls are also implemented to ensure construction activities do not impact the Jandakot mound, namely the Wellhead Protection Zone (WHPZ) and Public Drinking Water Source Areas (PDWSA). This includes protection of stormwater drains, restricted activities within Wellhead Protection Zones (WHPZ) and Priority 1 Public Drinking Water Source Areas (PDWSA), water treatment where required, and delivery of awareness and education material to the project team. Awareness and education material provides information on correct storage and handling of Toxic and Hazardous Substances (THS), stormwater management practices, and spill response.

Water Demand Assessment and Management of Impacts

The water demand for the construction and operations phase has been modelled considering water required for:

- Soil conditioning and compaction;
- Dust suppression;
- Landscaping establishment and
- Water used for toilet flushing and cleaning in staff compounds and offices.

During the construction phase of the Project, there are number of activities that require use of potable water, such as preference of potable water use for mechanically stabilised earth walls where steel straps are placed behind the face of the wall. Construction of road pavements, particularly basecourse, have strict water quality requirements limiting use of groundwater due to the salt and alkali content hence making potable water more compatible with the bituminous asphalt surfacing.

During the operational phase, there will only be a requirement for irrigation for a brief landscaping establishment period. Landscaping utilises local drought tolerant species and will not require irrigation after it's established.

One Water Corporation hydrant standpipe is currently in use where the use of potable water is required by law (such as ablutions) or on water quality grounds.

The Alliance obtained three 5C licences in early 2020, allowing the use of groundwater for the majority of construction water requirements such as dust suppression, soil compaction and conditioning. Two out of the three production bores are operated under a DWER approved Groundwater Operating Strategy. An operating strategy was not required for the third production bore due to the small annual water entitlement (45,000kL per annum). In total, the Alliance is approved to draw 396,000kL of groundwater each year. However, less than half of this annual entitlement has been abstracted (42% or 167,000kL).

Prior to obtaining these licences, environmental investigations were conducted identifying a significant risk of drawdown in the shallow aquifer through dewatering and similar abstractions. Abstracting large volumes of groundwater could impact sensitive environmental receptors including ecological communities and wetlands that rely on the shallow groundwater for year-round replenishment.

Utilising water from the groundwater bore in addition to scheme water will reduce the potential for adverse environmental impacts from drawdown on the adjacent TEC and wetlands as well as reduce the risk for oxidation of PASS (Potential Acid Sulfate Soils). This in turn will reduce the direct or indirect impacts to sensitive environmental receptors, as well as nearby bore users and structures.

Ongoing monitoring has identified no unacceptable drawdown or environmental impacts as a result of groundwater abstraction.

Strict Groundwater monitoring of the production bore is aligned with the approved Groundwater Operating Strategies with measures in place to minimise abstraction of water such as:

- The abstraction and storage system are fully automated with cut-offs
- Pumped groundwater volumes being continuously metered
- Inspections and maintenance are regularly carried out on the equipment. Daily visual inspections are undertaken by a nominated supervisor to monitor water storage levels.

Source	Year to 30 June	Total for Project
Water purchased from the scheme in litres	76,000	1,137,000
Water pumped from bores in litres	167,056,200	218,344,000
Water pumped from rivers, lakes or harvested in litres	N/A	N/A
Recycled or waste water use (typically from another industry) in litres	N/A	N/A

Water Reduction Initiatives:

Several initiatives were implemented on the Project that reduce water use during both construction and

operation phases, such as:

- Targeting 100% native plantings across the Project for the revegetation and rehabilitation program.
- Targeting seed spread and planting of tubestock and mature trees during the wet winter months to ensure there was minimal water needed for the vegetation establishment phase.
- Eliminating irrigated turf areas where possible and replacing with native plants. This will allow a once off application of water for all newly planted trees and will reduce water requirements for landscape establishment and for landscape maintenance over 100 year design life of the Project.
- Applying dust suppressants (Dustex) for areas of temporary access tracks and crane pads.
- Optimising the spread of mulch throughout the alignment at the earliest opportunity.

Carbon Emissions & Energy

An Energy and Carbon Emissions Reduction and Renewable Energy Feasibility Study was undertaken for the whole-of-life carbon footprint of Armadale Road to North Lake Road Bridge Project.

The following emissions reduction and renewable energy initiatives were assessed for operation:

- LED luminaires for street lighting,
- Solar PV for various sites for operational energy,
- GreenPower (25%) for LED luminaires,
- GreenPower (100%) for LED luminaires

The use of LED bulbs for street lighting was considered the only feasible option and adopted in the Final Design as a cost-effective mechanism to reduce the asset emissions through the operational phase due to lowered power consumption to provide similar luminescence.

Additionally, LEDs have significantly longer design lives than conventional bulbs, meaning that the maintenance and capital costs are likely to be lowered by comparison. Based on modelling, there is a 49% reduction in annual consumption from street lighting resulting from use of LED bulbs over traditional HPS solution.

The following renewable energy initiatives were assessed for construction however further analysis determined that none were feasible for implementation:

- Biodiesel,
- GreenPower (25%),
- GreenPower (100%),
- Solar PV.

Most energy savings came from design optimisation and reduction of quantities, which led to reduced plant burn hours to perform land clearing, bulk earthworks, road building and surfacing, as well as electrical and drainage installation. However, the majority of GHG emissions are derived during the operational phase from emissions attributed to street lighting, traffic

lighting, light and heavy vehicle traffic users.


Total construction emissions were calculated at 8,637 tCO₂e, while total operational emissions for the 100-year Design Life were calculated at 96,616,293 tCO₂e. Total GHG Reduction of 7% is currently calculated for the Project whole of life, mainly based on implementing LED bulbs street lighting over HPS.




Source	Year to 30 June	Total for Project
Energy usage by source in mega joules	39,622,366	46,932,164.6
From fuel use (mj) <i>note: (excl. Scope 3 emissions during operations due to traffic)</i>	38,240,828	45,016,887
From electricity (mj) <i>note: (excl. Scope 3 emissions during operations due to traffic)</i>	1,381,538	1,915,277.6
Energy saved (mj) – operational savings only can be claimed based on implementing LED bulbs street lighting	0	0




Materials & Recycling

A Resource Efficiency Strategy has been developed for the Project. Based on the guidance provided by Main Roads, overview of regulatory approvals related to resource reuse, disposal, stockpiling and transportation on or off site, design, procurement and construction methodology considerations, the following resource efficiency targets were developed. Refer to Table 1 for detail on Resource Efficiency Targets and Initiatives implemented to achieve set targets.

Table 1: Resource Efficiency Targets and Initiatives

Impact	Target
Material Reduction	<p>Target: 5% reduction in materials lifecycle impacts compared to a Base Case footprint</p> <p>Currently Tracking:  exceeding - 27% reduction in materials lifecycle impact to date based on Design quantities</p> <p>Initiatives Implemented:</p> <ul style="list-style-type: none"> • Significant reductions in asphalt, bitumen and concrete quantities comparing to the base case due to the efficiencies in design. • Significant drainage savings over the reference design by replacing pit and pipe with kerb openings whenever possible, refining the drainage network configuration and using innovative ways of retaining basins without affecting storage requirements and maximising size of the drainage basins • Maximised retention of existing pavement (including asphalt) • Maximised resurfacing of pavements where proposed design levels are consistent with existing levels

Impact	Target
<p>Recycled Materials</p>	<p>Target: 5% Reclaimed Asphalt Pavement (RAP) used in Asphalt Pavement</p> <p>Currently Tracking:  on target, ~5%</p> <p>Initiatives Implemented:</p> <p>The Project Specifications require that at least 5% of Reclaimed Asphalt Pavement (RAP) is used in the full depth asphalt intermediate courses. The Project team challenged this requirement with Main Roads WA Materials Engineering Branch (MEB) to increase maximum percentage of RAP by mass of total aggregate in the Intermediate Course layers to up to 25%. This would reduce the use of virgin aggregate on the project by reuse and recycling of materials from an existing pavement structure containing bituminous binder. This proposal was approved by MEB. However, due to technical issues, asphalt supplier was unable to increase the percentage RAP and Project is currently tracking around 5% RAP target.</p>
<p>Recycled Materials</p>	<p>Target: 100% use of CRC (Crushed Recycled Concrete) as subbase and base course under Full Depth Asphalt where environmentally and technically applicable</p> <p>Currently Tracking:  on target, ~100%</p> <p>Initiatives Implemented:</p> <p>Project team challenged use of CRC on the Project and succeeded in increasing quantity of CRC from initially forecast with 16,000 tonnes of CRC to more than 28,000 tonnes CRC installed to date, which resulted in 27% of all permanent subbase material installed being constituted from recycled material.</p>
<p>Recycled Materials</p>	<p>Target: >30% SCM (replacement of Portland Cement with Fly Ash or Slag in structural concrete)</p> <p>Currently Tracking:  under target, ~23%</p> <p>Initiatives Implemented:</p> <p>Low Heat Cement mix S40LH is included in structural design for cast in-situ elements with thickness greater than 500mm (circa 2,300 m³). Type LH cement is the mixture of Type GP cement and ground blast furnace slag with approximate ratio 35%:65. This contributes to % use of Supplementary Cementitious Materials (SCMs) on the Project.</p>
<p>Landfill diversion targets</p>	<p>Targets:</p> <p>Clean/Inert excavation spoil</p> <p>✓ >95% reuse diverted from landfill</p>

Impact	Target
	<p>Office resource outputs</p> <ul style="list-style-type: none"> ✓ >70% diverted from landfill <p>Other inert resource outputs</p> <ul style="list-style-type: none"> ✓ >80% diverted from landfill <p>Currently Tracking:</p> <ul style="list-style-type: none">  exceeding @ 100% (target >95%) clean spoil reuse diverted from landfill  under target @ 49.7% (target >70%) office waste diverted from landfill  exceeding @ 93.1% (target >80%) C&D (Construction & Demolition) waste diverted from landfill <p>Initiatives Implemented:</p> <p>The waste strategy has been implemented in the initial phases of the Project and incorporated into design and procurement to ensure avoidance or minimisation of resource outputs.</p> <p>As part of the Resource Efficiency Strategy, various opportunities to minimise resource output (waste) were reviewed, including:</p> <ul style="list-style-type: none"> • Design for maximum cut and fill balance to minimise generation of excess fill. This was achieved by optimising Vertical Alignment for cut-and-fill balance and optimising size of drainage basins • Design to maximise retention of existing pavement and maximise resurfacing of pavements, which will reduce removal of unsuitable existing pavement and removal offsite as C&D (Construction & Demolition) waste <p>Reuse of resource on site and off site has been widely implemented throughout design and construction phases, such as:</p> <ul style="list-style-type: none"> • Reuse of existing asphalt as part of deep embankment fill and for temporary access tracks • 100% reuse of non-contaminated site won fill on site • Reuse of major signs • Reuse of approved demolition materials as deep fill in embankments <p>Recycling of resources has been mainly implemented via segregation of office waste and C&D waste such as scrap metal and sending for offsite recycling.</p>
<p>Resource management (Acid Sulfate Soils, Contamination)</p>	<p>Targets:</p> <ul style="list-style-type: none"> ✓ >65% Contaminated material is retained onsite/reused/<10% sent to landfill ✓ >85% Acid Sulfate Soil (ASS) treated and diverted from landfill and >50% reused on site

Impact	Target
	<p>Currently Tracking: ! under target @ 49% (target >65%) contaminated material is retained/reused</p> <p>Initiatives Implemented:</p> <p>To date, circa 4,600 m³ of contaminated material has been remediated/diverted from landfill via asbestos emu picking, which is tracking at 55% of total contaminated material remediated which is currently below the 65% target.</p> <p>To date No ASS has been encountered on site.</p>

Material and Waste Statistics

Imported Materials	Year to 30 June	Total for Project
Sand (t)	135210.47	153,529
Gravel (t) – Laterite Gravel	132.7	132.7
Clay (t)	0	0
Limestone (including crushed) (t)	55671.32	74876.32
Crushed Rock (t)	53043.01	54055.01
Crusher Dust (t)	130.1	130.1
Aggregate (t)	5432.78	5432.78
Asphalt (t)	52080.45	52355.45
Concrete (t)	12871.125	14829.125
Steel (t) includes reinforcement steel and noise wall steel posts	1031.16	1251.16
Precast concrete (t)	108.5	4092.5
Emulsion (t)	74430	74430
Bitumen cutter (t)	0	0
Bitumen (t)	0	0
Glass (t)	0	0
Paint (t)	1.8374	1.8374
Topsoil (t)	0	0
Mulch (t)	0	0
Bluemetal (t)	73.66	73.66

Waste to Landfill	Year to 30 June	Total for Project
Unsuitable material (t)	0	0
Existing seal / asphalt (t)	0	0
Roadside litter / municipal solid waste (t)	7.06	8.01
Commercial / industrial waste (t)	0	0
Green waste (t)	53.23	71.23
Concrete / kerbing (t)	0	0
Construction / demolition waste (t)	1065.58	1065.58
Contaminated material (t)	213.45	213.45
Asbestos (t)	4525.35	8304.35
General/Green Waste (t)	0	0
Other (t) – mixed builders waste (20% sent to landfill)	1065.58	1258.92

Waste Recycled		
Sand (t)	0	0
Road base (t)	0	0
Asphalt (t)	0	0
Timber (t)	0.6	0.6
General waste (site office / roadside litter) (t)	6.58	7.11
Steel (t)	19.1	36.1
Concrete (t)	9129.9	10435.9
Green waste / mulch (t)	0	2
Plastic (t)	0	0
Other (t) – mixed builders waste (80% recycled)	4262.32	5361.38

Imported recycled content *	Year to 30 June	Total for Project
Sand (t) – <i>Imported reused fill from other projects</i>	14,086	14,086
Road Base (t) – <i>Crushed Recycled Concrete Subbase</i>	28,015	28,015
Crumbed Rubber (t)	0	0
Recycled asphalt (t) – <i>Reclaimed Asphalt Pavement (RAP)</i>	2,400	2,400
Steel (t)	TBD	TBD
Concrete (t) – <i>PC replaced with Ground Blast Furnace Slag</i>	402	402
Crushed Glass / beads	0	0
Limestone (t)	0	0
Plastic (t)	0	0
Green waste / mulch (t)	0	0
Topsoil (t)	0	0
Unsuitable material (t)	0	0
Other (t)	0	0

Noise (construction and future operations)

The Project is in proximity to major roads, a variety of planning zones, and standalone sensitive receptors.

Noise sensitive receptors include:

- Residential properties between Kwinana Freeway and Tapper Road to the south of Armadale Road, as well as those to the east and west of Kwinana Freeway, between Armadale Road and Berrigan Drive
- Atwell Primary School located to the south of the alignment and Leap Start Early Learning Childcare Centre at 12 Solomon Road
- Fiona Stanley Hospital and a number of medical centres located to the north and east of the alignment
- Success Library located to the east of the alignment

Future Operations

The Project has been grouped into eight Noise Catchment Areas (NCA).

Noise measurements and modelling have been undertaken in the early design stage.

Three scenarios have been modelled:

1. Existing noise levels

2. Forecast 2041 (no mitigation scenario) noise levels and
3. Forecast 2041 (with mitigation including noise walls) noise levels.

The noise criteria for this Project is for all existing noise sensitive premises to be no more than the limit of 60 dB LAeq(Day). The existing traffic scenario resulted in several receivers (residential dwellings) being above the limit. Hence, when future modelling was undertaken, noise reduction treatments had to be adopted.

As a result, the new modelling improved noise impact to nearby receptors through installing new noise walls on the residential boundaries, extending some existing noise walls and at-property treatments to select individual dwellings in the area.

Construction

Noise and vibration generated by construction activities is managed in accordance to the Construction Noise and Vibration Management Plan (CNVMP) and Consolidated Out of Hours Noise and Vibration Management Plan (COHNVMP). Both plans are available at the Project website:

<https://project.mainroads.wa.gov.au/home/armadaleroadbridge/Pages/default.aspx>

Noise levels are being monitored with the aim to understand noise generated due to construction activities. This includes monitoring data collected from noise monitoring stations situated in the vicinity of sensitive receptors along the Project alignment, together with public complaints arising from construction noise. Intervention and Action targets are presented in Table 2.

Table 2: Noise Intervention and Action target levels

Noise Criteria	Intervention target (investigate source and implement mitigation)	Action target (stop works and investigate source)
Qualitative	Up to 2 complaints within 24 hours from a stakeholder, local community member or business.	Multiple (>2) complaints within 24 hours from a stakeholder, local community member or business.
Quantitative	N/A	LAeq, 8 hours of 85dB(A)

A range of control measures have been implemented to minimise disturbance which include:

- using the quietest machinery and work methods wherever possible
- undertaking regular servicing of machinery to avoid unnecessary noise
- using noise monitoring equipment during night works
- notifying construction teams immediately to prevent exceeding the prescribed limits

Air Quality and Dust

Air pollution is not predicted to increase because of the Project works. There will be temporary impacts during construction due to potential dust lift and construction traffic contributing to increased pollutant emissions.

The main air pollution and amenity issues during the construction phase of the Project are:

- Annoyance due to dust deposition (soiling of surfaces) and visible dust plumes

- Elevated PM10 (PM10 describes inhalable particle matter, with diameters that are generally 10 micrometres and smaller) concentrations due to dust-generating activities
- Exhaust emissions from diesel-powered construction equipment

The identification and control of construction-related air quality is addressed in the Construction Environmental Management Plan.

Some of the controls currently implemented on the Project are listed below:

- Dust Management Plan for the Site Compound has been prepared and approved by the City of Cockburn
- Street sweepers available for cleaning of roads and removal of excess dust
- Water trucks conduct dust suppression where required across the project
- Dust suppression techniques including the use of surfactants have been used during high risk works
- Dustex and hydromulch have been used on exposed areas
- Four permanent dust monitoring stations have been installed across the alignment to confirm compliance, with two mobile monitors to be located where high-risk works are being undertaken
- Dust monitoring data is reviewed monthly for compliance, or when the predetermined trigger level is exceeded
- All dust complaints received (typically along with other complaints e.g. noise, vibration etc.) are responded to within 24 hours of complaints being received
- Following complaints, dust data is reviewed to confirm compliance
- Speed limits are enforced to minimise dust
- Dust is addressed in the Project induction

Discharges & Spills

No unauthorised discharges or reportable spills have occurred on the Project to date. All storm water has been retained and managed within the Project boundary, with no impacts to adjacent sensitive receptors. Some minor spills have resulted from construction operations, none of which occurred within protected groundwater areas.

Vibration

The Project is situated near a number of sensitive receivers, residential premises, and heritage areas. Receptors existing within 100m of the Project boundary have been identified as potential receivers of vibration. Residential properties dominate the volume of expected receptors and are distributed closer than other receptors. Commercial businesses operate to the north of Armadale Road, although those that are vibration sensitive fall outside of the 100m buffer zone.

Several Aboriginal (largely artefact scatter and mythological sites) and European heritage sites have been identified in the vicinity of the Project boundary. However, none of these occur within 100m of the boundary and are unlikely to be impacted by vibrational construction activities.

Existing infrastructure within and adjacent to the corridor may also be subject to vibration impacts; these items include the gas and Water Corporation pipelines (Asbestos and Cement and Mild Steel Concrete Lined). Avoidance of impact to underground services has been managed through permits.

All construction works which require vibration intensive activities within 100m of sensitive receivers have been scheduled during specific (less sensitive) times of the day in attempt to

limit the impact on human comfort. Should vibration intensive works be conducted within 100m of sensitive receptors, the affected receivers have been notified and vibration levels have been monitored against the approved target levels.

Five static noise and vibration monitors have been established at nominated locations which are operational 24/7 for the duration of the project.

To help minimise vibration impacts, a range of measures are being implemented including:

- operating equipment on the lowest effective vibration setting
- maintaining equipment to minimise vibration
- considering alternative construction methodologies where appropriate
- placing vibration monitoring equipment in strategic locations to monitor vibrations levels to ensure they do not exceed compliance limits.

Experiencing vibration does not mean that structural damage to a property will occur. We are working in accordance to the Australian standards for acceptable vibration levels for humans and structures.

Light spill

The existing lighting system to Armadale Road utilized high-pressure sodium lighting with no effect light control.

As part of the electrical design, LED based street lights have been included to sections of the Kwinana Freeway and the new Armadale Road. The proposed solution especially along Armadale Road offers a compliant lighting installation, which has a reduced energy consumption and requires less maintenance. The proposed LED solution will emit no direct lighting above the horizontal plane in reference to the luminaire mounting position. Glare shielding will be installed where spill light issues have been identified based on computer modelling.

Acid Sulfate Soils

An Acid Sulfate Soils (ASS) sample analysis plan (SAP) and detailed site investigation (DSI) was undertaken for the Project. The report identified that the Project is located within a Moderate to Low risk of ASS area. However, it should be noted that High to Moderate risk ASS zones exist to the north and south of the alignment.

While ASS was not likely to be encountered on the Project, the Alliance completed some assurance sampling to confirm the absence of ASS.

Additional sampling was also completed at the base of the deep excavation once the dive structure excavation was complete.

All sample results confirmed no presence of ASS.

Clearing

Three Native Vegetation Clearing Permits (NVCP) under Part V of the Environmental Protection Act (EP Act) were submitted and approved (CPS 7623, 7992, 8233/2) to allow for clearing of native

vegetation within the Project.

The two permits CPS 7623 and CPS 1992 were granted to the Duplication of Armadale Road and managed as part of that Project.

Under Clearing Permit CPS 8233/2 granted to this Project, clearing will result in the following significant residual impacts:

- 3.7 hectares of foraging habitat for black cockatoos;
- 2.1 hectares of Banksia Woodlands of the Swan Coastal Plain threatened ecological community; and
- 2.8 hectares of vegetation growing in association with a multiple use wetland.

Due to the efficiencies in design and construction methodologies, reductions in the clearing footprint were realised, in particular:

- A compact ramp arrangement has been used for the western ramp terminal on the North Lake Road interchange. This is to mitigate against clearing of native vegetation in Lot 9500;
- Steepening of batter slopes in environmentally sensitive areas and providing retaining walls where required reduced the earthworks footprint consequently reducing the clearing of native vegetation; and
- Optimising vertical grades and heights to follow existing topography reduced the requirement of earthworks and interference with groundwater.

Main Roads WA had a strong preference that the existing wetland area, between Kentucky Court and North Lake Road entry ramp to Kwinana Freeway northbound, would not be cleared other than for the footprint of roads and paths.

During detailed design, the wetland area between Kentucky Court and the North Lake Road northbound entry ramp, has largely been left untouched other than the earthworks for the PSP (Principalle Shared Path). Runoff will be discharged to this area after first passing through a water quality device and permit existing vegetation to further treat runoff prior to infiltration back to groundwater.

During the construction phase, prior to the start of any ground disturbance or construction activities, clearing is strictly monitored in accordance with Clearing and Grubbing Inspection and Test Plan, Ground Disturbance Permit and Fauna Management Procedure.

Contaminated sites

No known confirmed contamination sources were identified within the Project during initial investigations.

However, some Areas of Potential Environmental Concern (APECs) that have the potential to cause contamination based on their past or current land use have been identified.

The Project is largely located within the road reserve; however, illegal dumping was identified during the flora and vegetation assessment near Cockburn Central.

As the project progressed, further asbestos contamination was identified at a number of locations within the Project as a result of fly tipping and burial of demolition rubble containing asbestos products. Asbestos products were also suspected to be present within a residential shed at Imlah Court, which needed to be demolished to allow for construction of a drainage basin.

Following investigation, friable and non-friable asbestos was identified within the residential

shed at Imlah Court.

Extensive remediation works were conducted to remove all asbestos products and asbestos contaminated soil. All remediation works were completed by a licenced asbestos removal contractor in accordance with relevant legislation, Australian standards, and the Alliance Asbestos Management Plan.

The Asbestos Management Plan outlines the management practices to be implemented by Alliance and its subcontractors should Asbestos Containing Material (ACM) be encountered during the construction phase of the project. It also addresses appropriate remediation actions and controls to be implemented during remediation works.

The high-level Project targets relating specifically to asbestos management objectives adopted for this Project are:

- Zero incidents involving uncontrolled distribution of asbestos containing material, asbestos fines, or free asbestos
- No unacceptable exposure to respirable asbestos fibres.

To date, these targets have been achieved.

Dieback

An assessment was undertaken to determine the presence of dieback throughout the Project area. Most of the assessment area (88%) was comprised of roads, verges, cleared parklands, and disturbed areas. These areas have been disturbed to an extent that they are not assessable for the presence of dieback, and therefore excluded from dieback interpretation. Due to the extent of disturbance, it is assumed that excluded areas are likely to be dieback infested.

The remaining assessment area consisted of:

Dieback Classification	Description	Percentage of Assessment Area
Infested	Plant disease symptoms observed were consistent with the presence of the pathogen	6%
Uninfested	Determined to be free of plant disease symptoms that indicate the presence of the pathogen	1%
Uninterpretable	Indicator plants are absent or too few to determine the presence or absence of disease caused by the pathogen	5%

Due to the majority of the assessment area being excluded from the dieback interpretation, all ground disturbance activities within the defined project are managed as infested. Controls and treatments are in place to ensure the pathogen cannot be vectored offsite and potentially impact biodiversity values.

Case Study – Grasstree translocation supports local rehabilitation project

To reduce the Project’s impact on native vegetation, an investigation into the relocation and reuse of grass trees for local businesses and revegetation projects was undertaken. The City of Cockburn indicated a need for grasstrees as part of revegetation works for one of their projects. As a result, over 50 grasstrees were

extracted and transplanted to the Cockburn Wetlands Precinct in Bibra Lake (Refer to Figure 8). This key community asset has recently undergone redevelopment to improve environmental education, wildlife protection and rehabilitation, and community engagement.



Figure 8: Grass Trees (50+) relocated to the City of Cockburn Wetlands

Case Study – Increased quantity of Crushed Recycled Concrete (CRC)

To improve sustainability outcomes and increase the use of recycled products on the Project, the Alliance challenged restrictions on the use of Crushed Recycled Concrete (CRC).

CRC is not generally specified on Main Roads pavements as a 'basecourse' (layer prior to Bituminous Seals and Wearing Courses in granular pavements). However, the use of CRC for this purpose was challenged and ultimately endorsed by the Main Roads Materials Engineering Branch in various locations of the Project.

These include:

- Use as subbase under full depth asphalt (20,400 t)
- Use as subbase on light traffic roads and as subbase for the Cockburn Central Station Carpark (7,590t) (Refer to Figure 9)

To date, circa 28,000 total tonnes of CRC has been installed, which constitutes 29% of the total tonnes of permanent subbase and which is a great result for the Project.



Figure 9: Crushed Recycled Concrete Subbase complete after trimming and sweeping

Economic Aspects Performance

At a glance

Economic Aspect	Year to 30 June	Total for Project
Funding	\$26 million	\$237 million
No. of vehicles per day	22,400	22,400
Travel Time Saving	TBD	TBD
Increase of vehicle capacity	TBD	TBD
Increase in cycling and pedestrian facilities (i.e. increase in PSP length)	PSP length increased from 2.062km to 4.526km	PSP length increased from 2.062km to 4.526km
<i>Workforce and Supply Chain</i>		
Number of people employed by supply chain at various stages of project	1034 supply chain employees completed project induction to date	1426
Total number of suppliers engaged	69 Suppliers 39 Subcontractors	143 Suppliers 98 Subcontractors
Total number of Indigenous Enterprise	17 Subcontractors/ minor suppliers and Consultants engaged but not all started	17
Total number of Disability Enterprise	1	1
Buy Local Spend (to date)	\$83,244,780	\$105,324,802

Economic context

The Project is located at the Cockburn Activity Centre, an area that has undergone major transformation over the past 20 years from low density and undeveloped land into a largely urbanised area. Refer to Figure 10 for Project location in relation to the Cockburn Activity Centre.

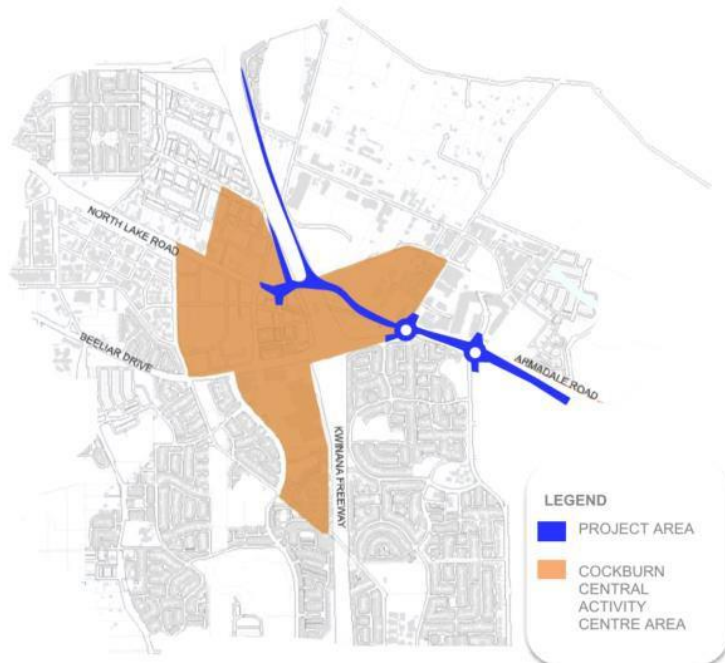


Figure 10: Project Area in relationship with Cockburn Activity Centre and surrounding area

Cockburn Central is a strategically important employment, activity, and transport hub in south-west

Perth, approximately 23 km south of the Perth CBD. Ongoing development and population growth in the City of Cockburn has significantly increased the volume of traffic travelling to and passing through the area.

The key east–west route through Cockburn Central is Armadale Road and Beeliar Drive, and the major north–south route is the Kwinana Freeway. The Cockburn Central train station also provides links north to Perth and south to Mandurah for residents commuting from the area, as well as access to employment in the sub-region.

The ongoing land use changes and population growth in the City of Cockburn are leading to higher traffic volumes travelling to, or through, Cockburn Central. This has caused poor reliability, accidents, and delays in this area.

Armadale Road is a Primary Regional Road in the Metropolitan Region Scheme, which currently carries approximately 22,400 vehicles per day. Armadale Road is projected to become heavily congested in the near future, and the current design is progressing a solution to improve traffic operations, particularly around the freeway intersection. Upgrades from a single lane carriageway to a dual lane carriageway are also progressing east of the project area. Armadale Road is projected to carry approximately 56,000 – 58,000 vehicles per day in the long term and is anticipated to include a triple-lane divided carriageway design.

In response, the primary objective of the Project is to reduce congestion throughout the Cockburn

Central area by:

- allowing east–west regional traffic to bypass the regional centre, to improve traffic flow and remove regional traffic from local access roads
- improving access to the Kwinana Freeway through additional access points, in order to ease congestion at other freeway access points (mainly Berrigan Drive interchange)
- improving access to the Cockburn Central train station where there are limited access routes available.

Key Economic Outcomes

The key economic benefits of delivering the Project are to address congestion, improve road users saving time on their journeys and divert regional and freight traffic away from Cockburn Central.

The Project aligns well with local and state plans:

- The WA Government’s State Planning Strategy and Perth and Peel @ 3.5m identifies the need to limit urban sprawl and its associated costs, and this Project helps facilitate higher-density development and provides opportunity to catalyse a more efficient and sustainable land use form.
- The City of Cockburn’s Integrated Transport Plan identifies congestion problems, particularly around Cockburn Central, which this Project helps address. The Project is likely to improve bus travel times and access to rail for existing public transport users.
- The Infrastructure Priority List includes Armadale Road to North Lake Road Bridge Project as a Priority Initiative, and this Project responds directly to the urban congestion problems identified in this nationally significant Initiative. Most of the benefits of the Project are for road users saving time on their journeys (63% of total benefits). Beneficiaries include private road users accessing the Cockburn Central area and those travelling east–west by removing the need to travel directly through the Cockburn Central area. The Project will also improve access and amenity for the local community and businesses.

Additional expected economic benefits of the Project include:

- Public transport benefits
- Residual value of assets
- Improved amenity and operations of the shopping centre (through removal of heavy vehicle freight movements from Cockburn Central)
- Improved response times (and associated community welfare benefits) of emergency response vehicles
- Improved productivity of existing businesses and business expansion (with associated land use change and employment) due to improved accessibility
- Improved road safety for all users
- Additional employment created from the Project

Deliverability and Risks

Main Roads Western Australia is leading the delivery of the project. Main Roads Western Australia has extensive experience in delivering similar projects using an alliance approach.

The Project does not present significant environmental, social, or technical issues that impede or prevent the delivery of the preferred solution. There are no significant environmental constraints or impacts

(the Project site is a brownfield site within the existing designated road and rail reserve). There are controls in place to mitigate any potential social impacts during construction.

Sustainable Procurement and Buy local

The Project has committed to work constructively with Australian industry to identify and develop options for maximising local content in performing the work and delivering the Project. Main Roads has developed an overarching Industry Participation Plan (IPP) to help achieve this objective and to ensure consistency with the State Government's Building Local Industry Policy. The IPP details the strategies that will be undertaken to ensure Australian industry is provided a full, fair and reasonable opportunity to participate in all aspects of the Works.

A Project Industry Participation Plan & Aboriginal Participation Plan have been prepared by the Alliance Management Team incorporating the requirements of Main Roads IPP, the government's requirements in relation to the *Buy Local Policy* and the *Building Local Industry Policy*.

While value for money is the underlining principle of procurement policies and processes, the Alliance endeavoured to maximise opportunities to Western Australia, in the first instance, and then countrywide. All suppliers and subcontractors were required to subscribe to the relevant strategies in the IPP and cascade them to all tiers of their supply chains.

Furthermore, the participants have agreed to use their best endeavours to provide employment to Aboriginal People and were required to make opportunities available for Aboriginal enterprises to tender for subcontract works to provide goods and/or services to the Project.







Sustainable considerations were integrated into the procurement process at the early stage via:

- Main Roads contract documentation such as Basis for Design and Construction (BDC) and Scope of Works and Technical Criteria (SWTC) sustainability requirements and initiatives;
- Design Value Engineering and Innovation Processes;
- Design Reports including Sustainability considerations;
- Sustainability Impact Scoring of procurement packages;
- Communication of Project sustainability commitments early on to potential suppliers and subcontractors;
- Inclusion of specific sustainability requirements in specifications and scope of works for packages identified as having high sustainability risk/impact;
- Supplier acknowledgement of Project's sustainability expectations by signing Supplier Code of Conduct;
- Non-commercial evaluation of shortlisted tenderers which includes quality, environment, sustainability, previous experience, safety, local and aboriginal participation considerations;
- Early engagement with the key suppliers; and
- Sustainability commitments and compliance management written into contracts and measured via Monthly Reporting

Sustainable Procurement Targets

The following Sustainable Procurement targets were set for the Project (Refer to Table 3):

Table 3: Sustainable Procurement Targets

Impact	Target
Human Right Compliance	<p>Target: 100% Supplier/Subcontractor acknowledgement of Code of Conduct</p> <p>Currently Tracking:  on target</p>
Human Right Compliance	<p>Target: 100% Oversees suppliers for at risk countries are evidence checked for human right compliance</p> <p>Currently Tracking:  on target</p>
Compliance with environment and fair operating practices impact areas	<p>Target: 100% Procurement Packages are evaluated based on commercial and non-commercial multiple criteria</p> <p>Currently Tracking:  on target</p>
Local Procurement	<p>Target: 100% Workforce from within Western Australia 90% supply-only items from within Western Australia</p> <p>Currently Tracking:  on target</p>
Aboriginal business engagement	<p>Target: \$5m spent on engagement of Aboriginal Owned Businesses</p> <p>Currently Tracking:  exceeding, ~6.28m (Refer Aboriginal Procurement Section below)</p>
Sustainable Labels	<p>Target: 2% of the Total value of all products must have sustainable labels</p> <p>Currently Tracking:  under target, ~1%</p>

Local Contractors

The Project committed to allow opportunities for smaller contracting companies to participate in the Project and to award separate packages of work to a range of contractors who are prequalified with Main Roads. The aggregate value of these packages must be a minimum of 20% of the Direct Cost Target (DCT).

Aboriginal Procurement

The Project team committed to provide employment opportunities to Aboriginal persons and subcontract and supply opportunities for Aboriginal businesses throughout the Project.

As of August 2021, the Alliance has spent more than \$6.28m direct with Aboriginal businesses with 17 different businesses working across 22 different work packages.

The Alliance has enabled businesses to build their capacity and capability while on the Project, with five businesses tendering for further works with Laing O'Rourke projects and were successfully awarded packages. This exceeds the \$5m target spent (refer to Figure 11).

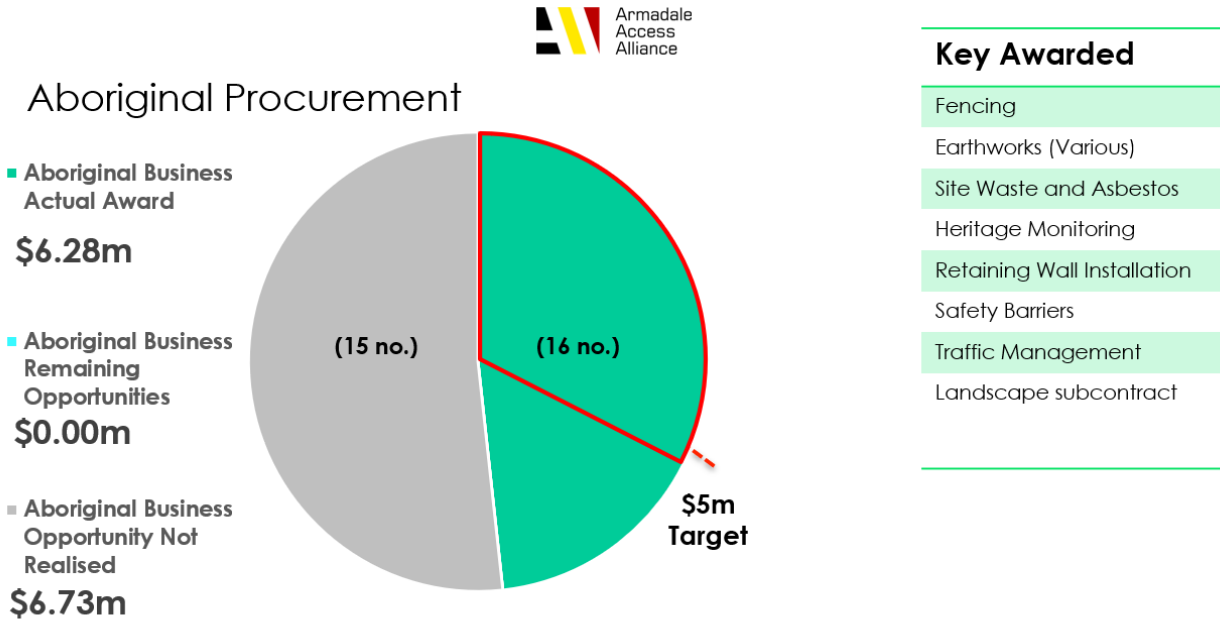


Figure 11: Aboriginal Procurement \$6.28m Spent


Climate Change Assessments

Climate Change Adaptation Plan was developed for the Project to understand the direct and indirect impacts of natural hazards and climate change on the ARNLR project.

The key historical natural hazards in the Perth region include storms (including cyclones), heavy rain and flooding, heatwaves, bushfires, earthquakes, and tsunamis. Climate change is likely to exacerbate many of the climate-related hazards into the future. A summary of the projected changes to the climate is provided in Table 4.

Table 4: Summary of key climate projections for the Armadale Road to North Lake Road Project

Climate variable	Projected change
Maximum Temperature	↑
Frequency and duration of warm spells	↑
Precipitation intensity	↑
Time in drought	↑
Sea level rise	↑
Fire weather	↑
Wind speed in winter	↓
Wind speed in summer	↑

Confidence level		
Low		High

Risk Findings

The risk assessment process identified and assessed 53 risks, most of which are related to the implications of increasingly variable rainfall on local and regional flooding, as well as temperature-related climate variables. The flooding category has the highest number of risks to the project (Refer to Table 5).

Table 5: Summary of climate and natural hazard risks to the Armadale Road to North Lake Road Project

Climate Variable	Low	Moderate	High	Very High
Hot days	1	8	1	0
Heatwaves	0	6	0	0
Average temperature	0	1	0	0
Droughts	0	1	0	0
Flooding	4	15	1	0
Storms and wind	0	6	0	0
Hailstorms	1	3	0	0
Bushfire weather	0	3	0	0

Key impact areas

Key impact elements of the asset associated with the highest number of climate risks include:

Structures

The key climate impacts for structures included increased intensity of hot days, increased average

temperatures, and flooding impacts.

Some of the controls adapted in the final design included:

- Provision of asset management plans incorporating control and observation measures for the client
- Increase in servicing and maintenance needs for asset structural elements
- Ensuring the noise wall posts (free ends) need to be designed appropriately for increasing climate change related intensity of storms and wind

Pit and pipe infrastructure

The key climate impacts for structures included increased intensity of hot days, increased average temperatures, and flooding impacts.

Some of the controls adapted in the final design included the latest version of basin design software PC Sump (v6.0), which allows for the implementation of increased rainfall per Australian Rainfall & Runoff Interim Climate Change Guidelines (2016) using a simplification process. The effective service life for the drainage basins is based on the minimum design life for pavement, which is 40 years. The consequences of impact on performance and exposure risk to climate change for drainage basins have been judged to be medium, and therefore a 5% increase to design rainfalls has been applied due to climate change.

Sustainable Transport

One of the major Project concerns is safety for vulnerable off-road users at the two roundabouts at Solomon Road and Tapper Road. This concern arises from the commercial, residential estates, and train/bus stations being within the immediate vicinity of these intersections.

A Trauma Review Group was formed to specifically consider pedestrians and other Vulnerable Road Users at intersections of Solomon Road and Tapper Road.

The final agreed pedestrian facilities can be summarised as:

- A 4.0m wide Principal Shared Path (PSP) has been constructed on the north side of Armadale Road with at-grade crossings of side roads linking to the suburb of Armadale, connecting to Kwinana Freeway PSP, , and to the Cockburn Central rail station.
- A shared path on the south side of Armadale Road from Tapper Road to Beeliar Drive.
- A signalised pedestrian crossing roughly midway between Solomon Road and Tapper Road, with an underpass under the main carriageways of Armadale Road, providing the main movement corridor between the commercial area to the north and the residential area to the south.
- An uncontrolled crossing on the west side of Solomon Road roundabout.

The Project also includes a separate principal shared path along the Freeway for cyclists and pedestrians (Refer to Figure 12).



Figure 12: PSP – west of Kwinana Freeway Progress

For users of public transport, the Project will improve access to/from Cockburn Central Train Station and alleviate heavy congestion around the station car park during peak times.

Better, more reliable access to the train station will support the growth of Cockburn Central as a transit-oriented hub and complement construction of the Thornlie-Cockburn Link as part of METRONET.

The population of the City of Cockburn is forecast to grow from 106,000 in 2015 to more than 170,000 residents by 2031, which will increase pressure on the road network. Provision of key transport infrastructure is considered critical to the ongoing, sustainable development of the corridor.

Benefits Realisation

The Project business case was accepted for the Infrastructure Australia's assessment on 14 July 2020. The business case included economic, social, and environmental analysis of the Project benefits. The Infrastructure Australia assessed the Business case and added the Armadale Roads to North Lake Road Project to the Infrastructure Priority List as a Priority Project. The Infrastructure Australia assessment can be found under link:

<https://www.infrastructureaustralia.gov.au/projects/armadale-road-bridge-0>

Technology and Innovation

Value workshops have been held during the design development stage to ensure that the design optimises innovation and maximises value including time and cost benefits over the whole of life for the Project. Design and Construction Interface Manager and design partners further interrogated the design solutions during detailed design and reviewed functional analysis of

design against contract requirements. Items for Value Engineering included the aspects of geometric, drainage and structural design including a number innovations that will be included as part of the ISCA Design Rating submission.

Case Study – Innovation - WA’s first ‘duck and dive’ structure

One of the pioneering solutions that make this Project stand out is WA’s first ‘duck and dive’ structure on Armadale Road, between Verde Drive and Kwinana Freeway (Refer to Figure 13).

The grade separated intersection, which will see Armadale Road lowered to pass beneath a new roundabout at Solomon Road, is an innovative solution to the population growth and increasing traffic congestion in the Cockburn Central area by separating local traffic and freeway-bound road users. It also minimises visual amenity impacts for residents in the northern part of Atwell.



Figure 13: Solomon Road Roundabout/Dive Structure Progress

Equity and Distributional Impacts

There is no significant equity or distributional impact from the Project.

Case Study – Supply Chain Day

Supply Chain Day was held on the Project at the early procurement stage to educate potential suppliers on Project Sustainability Requirements and on Main Roads key sustainability issues, as well as some evolving sustainability topics like circular economy and modern slavery. Presentation was led by Supply Chain School and had circa 50 potential suppliers in attendance. Supplier Workshop presentation is available at: <https://www.supplychainschool.org.au/learn/partner-landing-pages/armadale-road/>

Social Aspects Performance

At a glance

Social Aspect	Year to 30 June	Total for Project
Community Satisfaction to Project	Varies based on the results of Community Sentiment Survey – available upon request	Varies based on the results of Community Sentiment Survey – available upon request
No. of Stakeholders engaged with during project development	3709	3709
No. of complaints	167	218
No. of legacy commitments	0	0
No. of heritage sites in project vicinity	0	0
No. of heritage sites significantly impacted	0	0
No. of traffic safety incidents within project boundary	0	0
Percent of women in workforce	7.5%	7.5%
Percent Indigenous in workforce	8.87%	8.87%
LTIFR	0	0
No. of hours training during project	Available on request per training type	Available on request per training type
No. of development employees and apprentices on the project	27	27
No. of employees (FTEs) sourced from local community	N/A	N/A

Social context

Key stakeholders involved in the Project are summarised in the Figure 14 below and further detailed in the Appendix 3.



Figure 14: Key Stakeholders map

The key community and stakeholder impacts resulting from project design, planning and construction include:

- Noise walls and screen walls
- Accommodation works
- Property access
- Visual amenity
- PTA car park
- Intelligent Transport Systems (ITS)
- Local Government Access (LGA) roads

These are managed by a dedicated Community and Stakeholder Engagement team that works closely with all interested and affected residents, businesses, and stakeholder groups. A Construction Reference Group (CRG), consisting of members from local community groups, government, and key stakeholders, was formed during the planning phase with regular meetings held with the Project team and Main Roads throughout the Project. CRG members are updated on issues that may be of particular interest to them, such as design of noise walls, landscaping, urban aesthetics, and Principal Shared Path (PSP).

To date, seven CRG meetings were held, and summaries can be found on the Project website:

<https://project.mainroads.wa.gov.au/home/armadaleroadbridge/Pages/default.aspx>

Indigenous Opportunities – Public Art

As part of the community engagement, public art was identified as an opportunity for Aboriginal Participation on the Project, to increase both Aboriginal Participation, and provide local community ownership within elements of the project.

Two emerging Noongar artists, Seantelle Walsh and Rohin Kickett, were selected to produce digital works for the two underpasses, roundabout treatments, and Bridge 1828 Visual Screen.

Seantelle Walsh of Kardy Kreations has designed and painted the Armadale Road underpass and the PSP underpass west of Kwinana Freeway.

For the Armadale Road underpass, Seantelle created a constellation piece based on the night sky, which represents the Milky Way as well as our past, present, and future. Plaques will be installed to complete the underpass and provide the community with the design narrative and background information on the artist. Refer to Figure 15 for completed artwork at Armadale Road underpass.

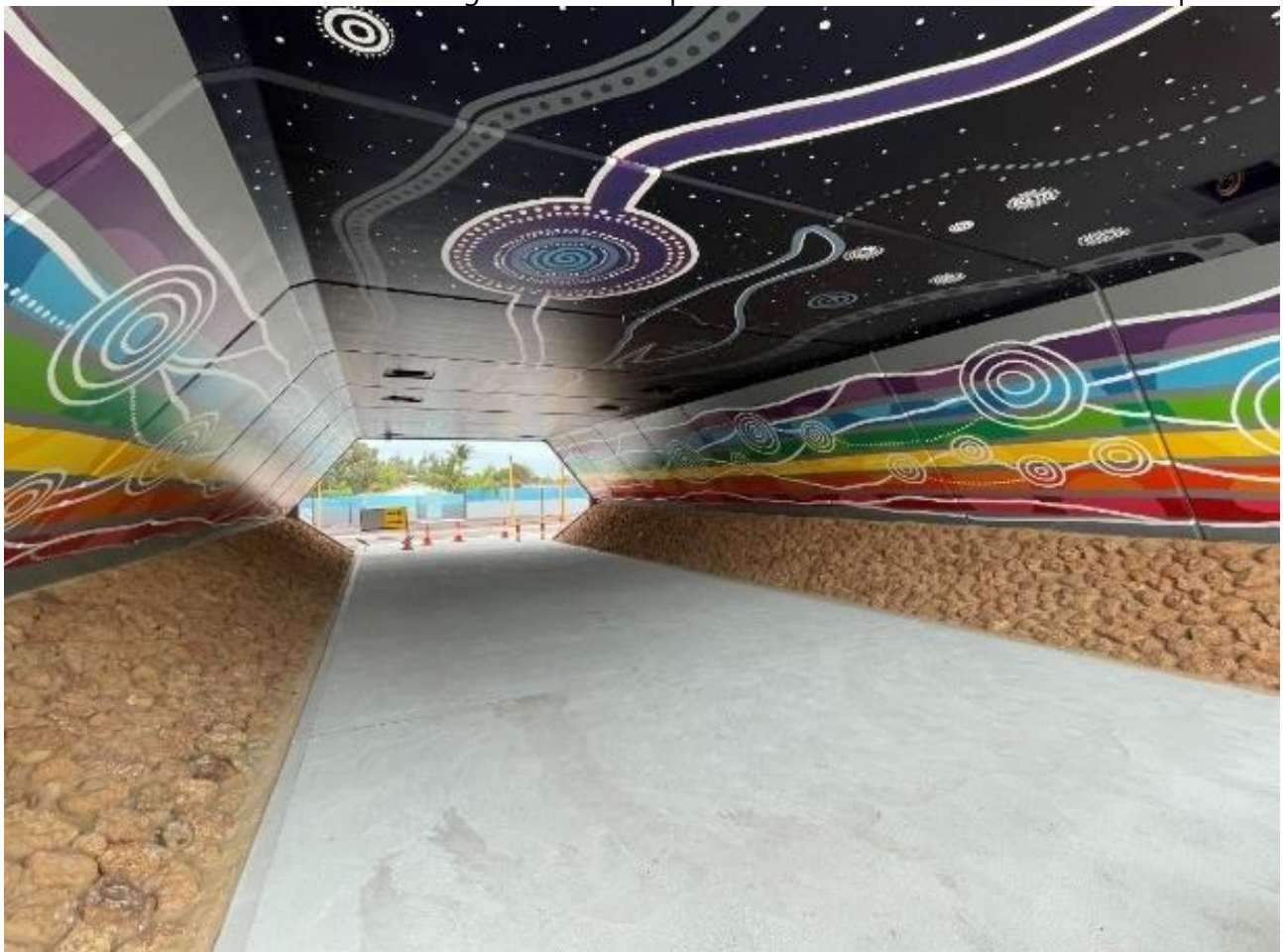


Figure 15: Completed artwork at Armadale Road underpass

Rohin Kickett of Dushong Art designed the Epoxy Bonded Aggregate landscaping at the two new roundabouts along Armadale Road. His artworks represent the Nyungar region by aerial view landscapes in an abstract style, while also exploring alternative ways of mark making. Refer to Figure 16 for the completed landscaping design at Solomon Road and Armadale Road intersection.



Figure 16: Completed landscaping design at Solomon Road and Armadale Road intersection

Community & Stakeholder Engagement (CSE)

The Community and Stakeholder Engagement team (CSE) is integrated within the Project delivery team and are responsible for the delivery of a comprehensive engagement program with the community and stakeholders throughout the Project. The Project is aligned with the Main Roads Communication and Stakeholder Engagement Strategy and is being managed based on the Community and Stakeholder Engagement plan developed for the Project, as well as dedicated CSE strategies for key construction elements that have high CSE risk.

Addressing community concerns

The Construction Reference Group (CRG) is a key forum to engage at an 'Involve' or 'Consult' level (according to the IAP2 Engagement Model) with stakeholders throughout the Project lifecycle. CRG meetings are held regularly throughout the Project.

The Construction Reference Group for this project was formed in mid-2018 and has now met seven times, with positive feedback from the local community members.

In December 2020, the Project welcomed CRG members to the Armadale Access Alliance site office for an exclusive site tour (refer to Figure 17).

The Construction Manager and Superintendent took 11 members on a behind the scenes tour of the project site, which was a great opportunity to showcase the key milestones of the project.

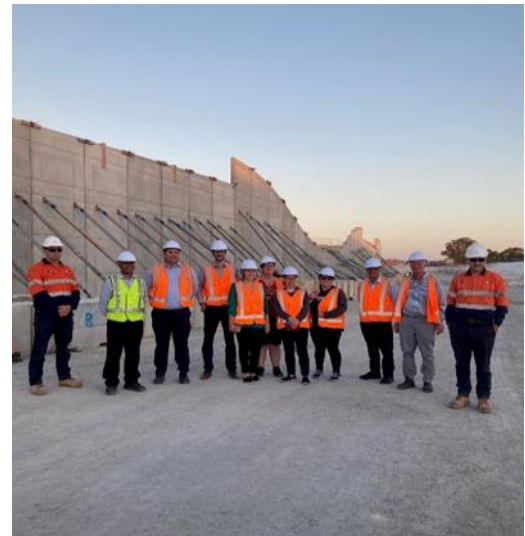


Figure 17: CRG members on an exclusive project site visit

Additional avenues to manage community concerns employed by the Project are:

- Noise Management Plan developed in consultation with and approval from Main Roads and the City of Cockburn for all out of hours works
- Weekly Roadworks Updated with traffic disruptions and detours providing advanced notice to the public prior to scheduled works
- Dedicated Community and Stakeholder Engagement (CSE) strategies developed for key elements
- Visual amenity including digitally engineered renders and 3D models utilised
- Local Government Authorities (LGAs) consulted at each stage of the Project where required
- PTA consulted with regards to the commuter car park at Cockburn Central train station and rail possessions
- Property condition surveys during pre and post construction carried out by independent, qualified assessors within the extent of the area that may be affected by the Project activity
- Access disruptions to residential and business properties managed as high priority and communicated to those directly affected in advance of implementation with adequate information and visual aids provided
- Qualified archaeologists engaged to identify and be present to supervise any excavations of buried European or Aboriginal material
- All communication about changes to the pathway network and access for pedestrians and cyclists communicated to the public prior to scheduled works

Case Study – Treeby Community Association

Extensive drainage, cable installation and pavement works were required to enable construction of the new signalised intersection at Ghostgum Avenue and Armadale Road. The construction team needed to close Ghostgum Avenue for approximately eight days to complete the works.

To keep the community informed, a program was presented to Treeby Community Association to explain the works in more detail.

The intended closure date was prior to the school holidays and upon discussion with key stakeholders, there was strong community feedback to have the closure re-scheduled to school holidays to avoid disruptions to

local school traffic.

The construction team was able to accommodate the request and the full closure of Ghostgum Avenue, between Armadale Road and Cedarleaf Entrance, was re-scheduled to 5pm Thursday 8 April through to 9am Sunday 18 April 2021. These works were scheduled during the April school holiday period when traffic volumes were lower to reduce inconvenience to the community and disruption to peak hour journeys. The rescheduling of this event received substantial positive feedback from the community.

Heritage

An Aboriginal Heritage Survey and appropriate approvals under the Aboriginal Heritage Act 1972, were undertaken to proceed with the project.

It was recommended that the Alliance gives due consideration to the Whadjuk WC2011/009 Native Title Claim group representatives' requests that:

- Aboriginal archaeological monitors be present during any ground disturbing works in order to observe any artefacts which may be uncovered as a result of the works
- Main Roads consults with the Whadjuk Working Party in regards to the process of salvaging and relocating artefacts pertaining from Aboriginal occupation of the land

Aboriginal monitors from a Noongar owned business are being present on-site during ground disturbance works in certain areas to observe any artefacts which may be uncovered as a result of the works.

Road Safety

The Main Roads WA Road Safety Management System (ROSMA) reduction target tool has been used to determine the required reduction in Killed and/or Seriously Injured (KSI) crashes associated with the Project.

Armadale Road to North Lake Road including Local Roads:

The Armadale Road assessment was carried out for Year 2031 & 2060. The intersections Trauma Reduction Targets were met for 2031 and 2060. The road section Target was met for 2031 but not for 2060.

The Trauma Reduction Target is 70.2% for the intersections. The four existing KSI crashes are Head on, Rear End, Right Angle, and Right Turn Through. The Project is to grade separate the existing at grade intersections at Tapper Road and Solomon Road, conversion of the existing traffic signal as roundabout and reduces the posted speed from 70 km/h to 60 km/h on the CD roads connecting to the roundabouts. The combination of the above treatments is likely to substantially exceed the target CRF. Therefore, it is recommended that no further safe system treatment selection or development is required.

The Trauma Reduction Target is 68% for the road section. It has not been determined at this stage whether or not the project can achieve this. It is recommended that the process moves to the Treatment Selection stage where it will be determined whether or not the project is likely to achieve the target. If the target is unlikely to be achieved the Project will be enhanced with other treatments so that the target is met.

Kwinana Freeway H015 Southbound SLK 15.90 to 20.60 including CD roads and ramps

The KSI crash reduction target for this Project is 74%. The Project implemented ramp metering

and point to point average speed cameras to enable the KSI crash reduction target to be met. A total KSI crash saving of 79% would be anticipated.

Traffic Management / Community Safety

The Traffic Management Plan has been prepared for the Project to ensure efficient and safe road access for public and site vehicular traffic and non-vehicular traffic through and around the site during the construction period of the ARNLR Project. The key approach to traffic management includes:

- Minimise road network congestion surrounding the Project site and minimise journey time delays, particularly during peak periods
- Minimise interference to traffic flow on and in the vicinity of the site in accordance with Main Roads Policy for Traffic Management at Roadworks on State Roads, and make adequate provision for the safe movement of all legal road users including permit vehicles
- Implement an effective TMP with minimal complaints from local businesses and residents
- Ensure the road safety of the public and the Project workforce for the Project duration
- Provide safe access and ensure continuity of the travel network for all modes of transport including vehicles, heavy vehicles, pedestrians, and cyclists, for the duration of the Project.

All project communication relating to changes in road layout, disruptions, and closures is being released to the public at least 21 days prior to scheduled work being undertaken or as soon as possible in the case of urgent non-scheduled work. The Project Team works closely with Main Roads to provide information to the community in advance of traffic changes via:

- Formal updates to Main Roads and other key stakeholders;
- Roadworks notifications issued by EDM to Project email distribution list;
- Social media posts via Main Roads Facebook page;
- Newspaper advertisements (if required);
- Signage in key community areas;
- Letterbox distribution;
- Main Roads media channels, website, etc.;
- Signage displayed at the site (VMB signs);
- Face-to-face consultations as required (including with the Technical Working Group);
- Email notification to select groups (e.g. businesses) as required; and
- Specific or ad-hoc initiatives as necessary.

Workforce Safety

The workforce safety is managed on the Project via the Safety and Health Management Plan (SHMP) in conjunction with the Rail Safety Management plan.

The Project Safety strategy is based on Next Gear which is a Laing O'Rourke approach to Safety based on three principles and five tools (Refer Figure 19 and Figure 18):

NEXT GEAR IS A NEW APPROACH TO SAFETY



Figure 19: Three Next Gear principles

TOOLS TO ENABLE NEXT GEAR

- Fatal & Severe Risk Reviews (FSR's)
- Collective Insights
- Gearbox App
- Positive Investigations
- Pit Crews

Figure 18: Five Next Gear tools

The Next Gear is publicly available and further details can be found via link:

<https://lorhsems.com/>

Diversity

The Alliance team are committed to building a more diverse workforce and ensuring we have a fully inclusive culture.

The following Diversity and Inclusion Targets were set for the Project (Refer to Table 6):

Table 6: Diversity and Inclusion Targets

Impact	Target
Indigenous Employment	<p>Target: 10% construction man hours are Aboriginal employment</p> <p>Currently Tracking: on target - 8.87% cumulative % with 105 Aboriginal people have been employed on the project to date</p>
Aboriginal Training	<p>Target: Train and retain minimum 5 trainees over the project duration</p> <p>Currently Tracking: on target - Refer Case Study – Aboriginal Traineeship</p>
Cultural Awareness	<p>Target: >8 Cultural Awareness activities (Cultural Awareness Training, mentoring, cultural events)</p> <p>Currently Tracking: exceeding - 10 Cultural Awareness sessions held with Danny Ford</p>

The Project Specific Action Strategies include:

- Events to promote Cultural Awareness, diversity, health, and wellbeing
- Embed flexible work practices for the Project
- Detailed strategy for Aboriginal employment and business engagement
- Training partnership with NUDGE to effectively manage traineeships
- Career development for all personnel, including career discussions and development plans
- Mentoring program implemented on site for Aboriginal personnel
- Graduate and undergraduate opportunities
- Inclusive leadership training for senior management

Some Laing O'Rourke companywide initiatives supported by the Project include:

- Gender Diversity Action Plan – This plan specifically calls out Laing O'Rourke efforts around creating gender diversity but does not take away from the importance of continuing to develop teams that are diverse in many ways.
- Supporting pay equity – Laing O'Rourke Managing Director, Cathal O'Rourke, has joined over 100 CEOs and directors across the country as a Workplace Gender Equality Agency (WGEA) Pay Equity Ambassador.
- Inspiring STEM – School engagement programme is designed to encourage more girls to enter STEM courses at university and ultimately follow careers in construction and engineering.
- Connecting Women Network – A programme of networking events provides a forum for connecting our women, role modelling careers, and building new networks for support and advice.
- Executive Diversity and Inclusion Council – The council includes a range of Laing O'Rourke Senior Leaders, who establish the direction for our diversity and inclusion agenda and monitor progress.
- Laing O'Rourke Code of Conduct, Parental Leave Policy and Flexible Working Policy also contain information relevant to Project commitment to the principles of diversity and inclusion.
- Partnership with the National Association of Women In Construction (NAWIC) to encourage and celebrate women in the construction industry.

Workforce Development

A detailed register of the skills and competencies for all personnel for the activities that the personnel will undertake during the Project is maintained and Training Needs Analysis matrix has been developed based on the legal on-boarding, training, Induction and VOC requirements.

Additionally, the Employee Development Plan has been prepared and includes the following employee development initiatives:

- "Knowing Our People" strategy which is a Laing O'Rourke approach to talent and succession, engagement, remuneration and benefits, learning and development, leadership, and capability development
- Developing a Personal Development Plan (PDP), setting out development goals to be achieved over a 12-month period by each employee
- Career Conversations and Career Toolkits
- Next Gear workshops and tools
- Cultural awareness workshops
- Leadership programmes such as Engaging Leaders and Frontline Leaders
- Formal or informal mentorships
- Aboriginal traineeship

Case Study – Aboriginal Traineeship

The Alliance has seen some fantastic outcomes when it comes to Aboriginal Engagement.

The Alliance partnered with Nudge to support five Aboriginal trainees to complete a Certificate III in Civil Construction – Plant Operations. This partnership has been so successful that the Alliance was able to bring on an additional five trainees, one in Business Administration and four in Civil Construction.

Carey Training (an Aboriginal business) has continued to support the trainees throughout their learning. Currently, two trainees have successfully completed their qualifications and retained fulltime employment with Laing O'Rourke. The business intends to retain all trainees upon completion of their qualifications.

Case Study - Community Artwork Project

When planning the Project's Aboriginal and community engagement, the Project wanted to engage the local community in the development of a project specific art piece. To achieve this, the engagement with one of

the Project's public artists, emerging Noongar artist Seantelle Walsh of Kardy Kreations, was extended to include a community project.

Seantelle ran an arts workshop at the local high school, Southern River College, and worked with Year 9 and 10 students from the Deadly Sista Girlz Program (<https://www.wf.org.au/deadly-sista-girlz/>) to plan and design this artwork. During the school visits, Seantelle worked with the girls to build their art skills, and female members of the Alliance team also visited to discuss careers in construction and the project's progress.

The art piece is now proudly displayed at the Alliance site office. The artwork describes the connection between Boodja (country) and the water. The hands tell the students individual stories. "Always Was, Always Will Be" is in recognition of NAIDOC Week 2020.

Refer to Figure 20 and Figure 21 for the Southern River College girls working on the artwork project. After the Project is complete, Alliance will agree an outcome with Main Roads for its best community use.



Figure 20: Completed artwork



Figure 21: Southern River College girls work on the artwork under guidance of Seantelle Walsh

Appendix 1 - List of Protected Areas Project interfaces with:

The Project does not interface with any protected areas.

Appendix 2 - Protected fauna and flora species and habitat

Flora

No species listed as Declared Rare Flora or Threatened (T or X) under the Wildlife Conservation Act 1950 or as Threatened under the EPBC Act have been recorded within the Project area. Initial flora and vegetation surveys of the Project area didn't identify any Priority Flora species. Targeted orchid surveys were also conducted and did not identify any conservation significant orchid species within or immediately outside the Project area.

Vegetation

One Banksia Woodlands Threatened Ecological Community (TEC) occurs within and adjacent to the Project footprint with a total area of 5.87 ha. The TEC was mapped as Degraded to Very Good, with variations representing weed infestations. In accordance with the Conservation Advice, for the TEC assessment the entire patch was classified as 'Good' condition, informed by weed foliage cover and species diversity.

Four remnant native vegetation types were identified within the project footprint and mapped, including:

Code	Area/Description	Details
BmEpEc	5.87ha of Banksia Woodland	Inferred FCT23a, confirmed to represent the Banksia Woodlands TEC and Priority 3 PEC
BaXpEc	0.64ha of Banksia Woodland	Considerably degraded, did not meet minimum size and condition thresholds for TEC, unlikely to represent PEC
MpAsHr	10.3ha of Paperbark Wetland	Locally and regionally significant for its hydrological and habitat refuge functions
EmAcOP	0.47ha of degraded Wetland	Supports significant population of Declared Pest species, <i>Zantedeschia aethiopica</i> (Arum lily).

Fauna

Six species of conservation significance have been recorded within the Project site and surrounding area, including:

- Carnaby's Cockatoo (*Calyptorhynchus latirostris*)
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*)
- Quenda (*Isoodon obesulus fusciventer*)
- Horsfield's Bronze Cuckoo (*Chrysococcyx basalus*)
- Magpie Lark (*Grallina cyanoleuca*)
- Australian White Ibis (*Threskiornis moluccus*)

Eight fauna habitats have been defined within the Project area. The most common fauna habitat within the Project area, apart from Cleared Predominantly Bare Ground, is the Isolated Trees habitat at approximately 12%. This habitat generally comprises cleared, or partially cleared areas,

with scattered isolated mature trees (including Tuart and Flooded Gum). This habitat would support many of the common species of the area and may also be utilised by conservation significant species such as the Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*), Carnaby's Cockatoo (*Calyptorhynchus latirostris*), Perth Lined Skink (*Lerista lineata*), Quenda (*Isodon obesulus fusciventer*) and Rainbow Bee-eater (*Merops ornatus*).

The eight fauna habitats identified within the Project area include:

Fauna Habitat	Conservation Significant Species Potentially Utilising Habitat	Area (ha)	Percentage
Woodland	<ul style="list-style-type: none"> Forest Red-tailed Black Cockatoo Carnaby's Cockatoo Quenda Perth Lined Skink 	6.18	7.11
Woodland with minimal understorey	<ul style="list-style-type: none"> Forest Red-tailed Black Cockatoo Carnaby's Cockatoo 	0.55	0.63
Shrubland with minimal groundcover	<ul style="list-style-type: none"> Carnaby's Cockatoo Perth Lined Skink Rainbow Bee-eater 	5.15	5.93
Shrubland	<ul style="list-style-type: none"> Carnaby's Cockatoo Quenda Perth Lined Skink 	0.94	1.08
Isolated trees	<ul style="list-style-type: none"> Forest Red-tailed Black Cockatoo Carnaby's Cockatoo Quenda Perth Lined Skink Rainbow Bee-eater 	10.72	12.34
Parkland and maintained gardens	<ul style="list-style-type: none"> Forest Red-tailed Black Cockatoo Carnaby's Cockatoo Rainbow Bee-eater 	4.18	4.81
Wetlands, riparian vegetation, and drainage	<ul style="list-style-type: none"> Forest Red-tailed Black Cockatoo Carnaby's Cockatoo Quenda Perth Lined Skink Rainbow Bee-eater 	4.36	5.01
Cleared	<ul style="list-style-type: none"> Rainbow Bee-eater 	19.57	22.51

Appendix 3 – List of Stakeholders to the project

Local Government

City of Cockburn (principal LGA)
City of Cockburn Councillors

Federal MPs

Federal Minister for Infrastructure,
Catherine King
Member for Fremantle, Josh Wilson
Member for Burt, Matt Keogh

Other Government Agencies

Department of Prime Minister and Cabinet
Metropolitan Redevelopment Authority
Department of Planning
Department of Water and Environmental
Regulation
Department of Biodiversity, conservation and
Attractions
Department of Transport
Department of Aboriginal Affairs
Department of Fire and Emergency Services
St John Ambulance
Landcorp
WA Police

Road Users

Local media

The West Australian
Cockburn Gazette
The Sunday Times
Community newspapers
Metropolitan radio stations
Perth Now
WA Today

State

Minister for Transport, Hon. Rita Saffioti

State MPs

Member for Cockburn Hon. Fran Logan
Member for Kwinana Hon. Roger Cook
Member for Jandakot Mr Yaz Mubarakai

PTA and METRONET

Local Businesses

Local residents, special interest groups

Construction Reference Group
Other Local business operators and nearby
owners
Whadjuk People
South West Aboriginal Land and Sea Council
(SWALSC)
Local Residents
Atwell Community Association
Banjup Residents Group
Cockburn Resident Groups
Treeby Community Association
Schools

Project Team

Armadale Access Alliance

Social media

Facebook
Twitter

