



Tonkin Highway Extension: Annual Project Sustainability Report 2021

Prepared by Arup

This annual report covers the period from July 2020 to July 2021.

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About this Report

This report has been prepared by the *Tonkin Highway Extension* 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 Global Reporting Initiatives (GRI) principles. Material topics reported in this report have been determined through a materiality process that adheres to the Infrastructure Sustainability Council (ISC).

The *Tonkin Highway Extension* project is aligned with the ISC Planning rating framework (version 2.0).

Introduction

Tonkin Highway is a key road corridor that currently stretches from Reid Highway to Thomas Road. It forms a crucial artery in servicing key economic areas around the Perth metropolitan area including Perth Airport, as well as the Malaga, Collier Road and Kewdale industrial estates. This project is part of the \$1.2 billion Tonkin Highway Transformation project, which also includes the Tonkin Gap and Associated Works and Tonkin Grade Separations projects.

The *Tonkin Highway Extension – Thomas Road to South Western Highway* project will extend Tonkin Highway from Thomas Road in Oakford to South Western Highway in Mundijong whilst minimising the impact to the environmentally and culturally sensitive areas within the project extents.

The project team's vision is for **"a sustainable transport network that meets social, economic and environmental needs"**. The team is committed to delivering a project that achieves the best sustainable outcome that aligns with the United Nations Sustainability Development Goals (UN SDGs) and provides a positive social, environmental and economic legacy for future generations.

Highlights

Sustainability highlights to date:

- Ongoing community and stakeholder engagement,
- Internal multidisciplinary workshops held across the project,
- Sustainability Management Plan developed,
- Sustainability Targets developed (including ongoing achievement of Planning Targets),
- Material United Nation Sustainable Development Goals identified,
- Urban Landscape Design Framework and Green Infrastructure Plan in development,
- Noise modelling complete,
- Water Assessment Undertaken,
- Greenhouse Gas Assessment completed,
- Renewable Energy Options Investigated conducted,
- Resource Efficiency Strategy developed,
- Soil sampling for detection of acid sulfate soils conducted,
- Resilience Plan in development,
- Climate Change and Natural Hazard assessment conducted, and
- Sustainability related risks and opportunities identified and assessed.

Overview

Tonkin Highway is a Primary Distributor and major freight route in the Perth Metropolitan Region and forms part of the planned orbital freeway network (comprising of the Reid, Tonkin and Roe Highways). The Highway currently runs north/south from Reid Highway in Beechboro to Thomas Road in Oakford, generally as a four-lane divided, controlled access highway.

Main Roads intends to extend Tonkin Highway (H017) from its current termination at Thomas Road (H038), 14km south to South Western Highway (H009) in Mundijong. This extent will encompass 5 intersections including Thomas Road, Orton Road, Bishop Road, Mundijong Road and South Western Highway. The project is expected to alleviate pressure on the current transport network, reduce travel times for residents, as well as improve safety and connectivity along Perth's South-Eastern Corridor in the Shire of Serpentine-Jarrahdale. This project also interfaces with various current and future projects, which are listed in Appendix 1.

The *Tonkin Highway Extension – Thomas Road to South Western Highway* preliminary concept includes:

- Approximately 14 kilometres of four lane carriageway,
- Upgrades and construction of intersections at Thomas Road, Orton Road, Mundijong Road and South Western Highway,
- A grade separated interchange at Bishop Road
- Bridges over the existing freight rail line 13 and Perth to Bunbury rail line and Wright Road,
- A principle shared path for pedestrians and cyclists along the eastern side of the road corridor, with planned connections to local path networks, and
- A vehicle, equine rider, and pedestrian underpass under Tonkin Highway at Abernethy Road.

Current planning includes upgrading of the existing highway to a freeway standard with extension north of Reid Highway and south of Thomas Road to Mundijong Road. The extension of Tonkin Highway currently considers two stages, an interim project case and an ultimate case, as defined below:

- The project case consists of 2 lane dual carriageway to Highway Standard from Thomas Road to South Western Highway. In the project case at-grade intersection treatments are proposed at all intersections except at Bishop Road intersection which is currently proposed to be grade separated. Aside from the intersections, an additional grade separation is proposed over the existing Perth to Bunbury railway line and Wright Road, south of Mundijong Road.
- The ultimate case consists of 3 lane dual carriageway to Freeway Standard with interchanges between Thomas Road and Mundijong Road, and 2 lanes dual carriageway between Mundijong Road and South Western Highway. In the ultimate case all intersections will be grade separated. An additional grade separation is also proposed over the existing Perth to Bunbury railway line and Wright Road, south of Mundijong Road.

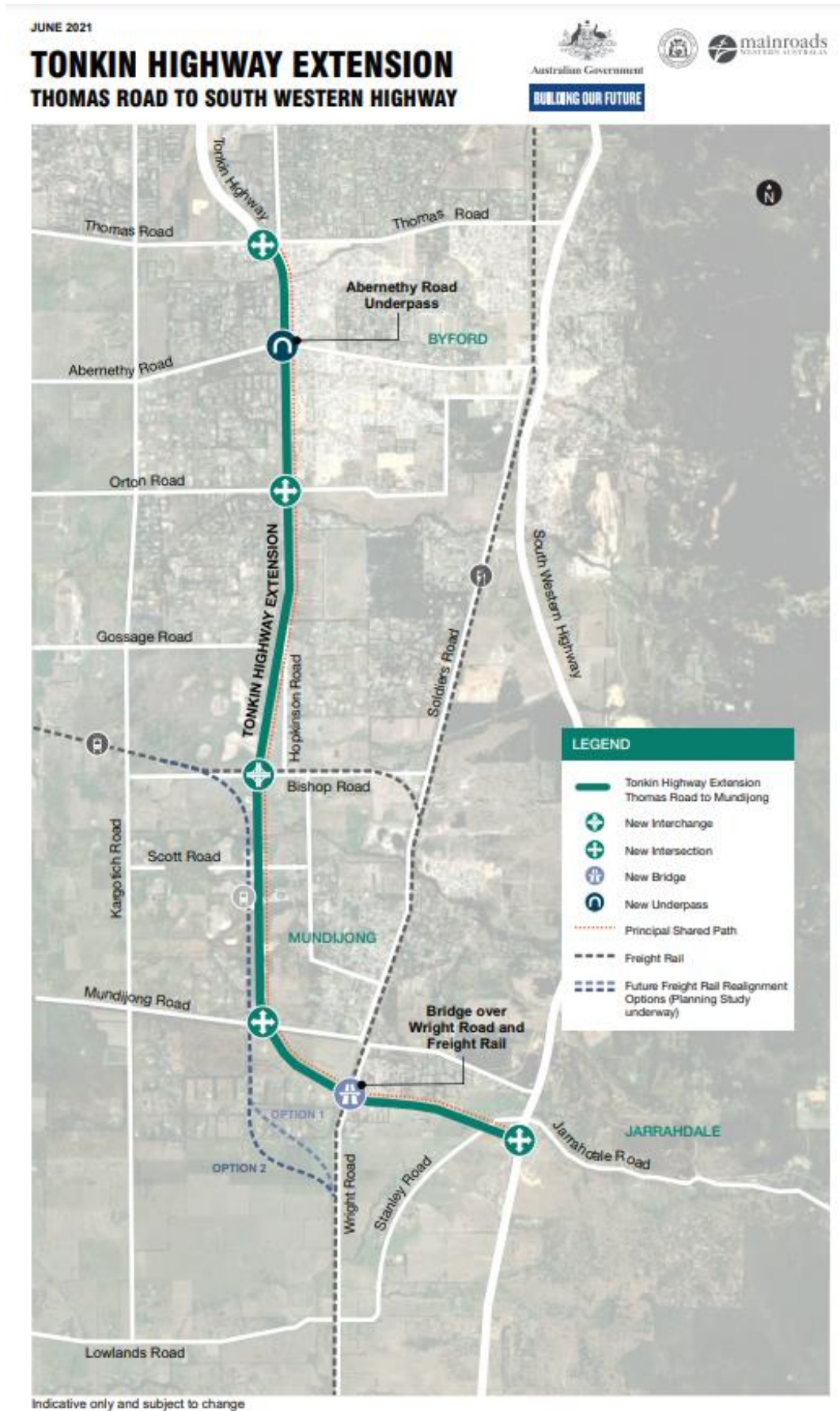


Figure 1: Tonkin Highway Extension Project Boundary

The committed project funding is \$505 million, with an 80/20 split between Federal and State funding. Contract award is anticipated in Quarter 1 of 2022 with construction commencement anticipated in Quarter 4 2022.

The project website can be found at:

<https://www.mainroads.wa.gov.au/projects-initiatives/projects/metropolitan/tonkin-highway-extension/>

Overall approach to Sustainability in Project Development

Main Roads has registered the *Tonkin Highway Extension* project with the Infrastructure Sustainability Council (ISC) for a Planning rating under the Infrastructure Sustainability (IS) v2.0 Planning framework. The latest version of the ISC IS Rating Tool Scorecard has been utilised to demonstrate the level of sustainable practice embedded within the project Works and deliver IS Planning rating components for the project.

Main Roads has an integrated sustainability team consisting of Main Roads discipline leads and a number of contributing parties (Arup, Aecom and Lloyd George Acoustics) working to deliver ISC credits with the aim of achieving a Bronze ISC Planning Rating. This scope of work has also required liaison with specific stakeholders, listed in Appendix 3.

The sustainability categories this project have focused on thus far include:

- Context,
- Leadership and Management,
- Resilience,
- Energy and Carbon,
- Environment,
- Resource Efficiency,
- Water, and
- Stakeholder Engagement.

The *Tonkin Highway Extension* project has developed a Sustainability Management Plan (SMP) aligned with the Main Roads Sustainability Policy. The SMP captures the vision and objectives that set the strategic direction for sustainability for the project and focus on these areas will allow the project to achieve sustainability outcomes beyond business as usual. The 'Keeping WA Moving' strategic objective is *"To provide world class outcomes for the customer through a safe, reliable and sustainable road-based transport system."* In the context of the *Tonkin Highway Extension* project, this requires alignment of all phases of a project's life cycle with the United Nations Sustainable Development Goals (UN SDGs).

The outcome to be achieved for sustainability is to *"develop a sustainable transport network that meets social, economic and environmental needs"*. To achieve this outcome the following objectives have been adopted by the project:

- Deliver a concept design of the *Tonkin Highway Extension – Thomas Road to South Western Highway* project that improves the overall road-based transport system,
- Improve community amenity, mobility and travel choice whilst reducing indirect environmental impacts,
- Improve operational efficiency and social amenity by providing a viable vehicle transport line to enhance connectivity,

- Improve economic prosperity and productivity by attracting investment and growth through reduction in urban congestion and improved travel times,
- The Environmental Footprint (emissions, pollution, waste, land use and resources) of the Tonkin Highway extension is minimised, and
- Maximise innovation and challenge beyond business as usual.

Targeted ISC credits have been progressed throughout the Development Phase of the project, with due consideration to sequencing and schedule to align with objectives and overall intent of the IS rating scheme. As part of the Planning Phase, sustainability targets have also been set by the Project that must be achieved and documented as part of the ISC process.

The sustainability deliverables for the *Tonkin Highway Extension* project aim to be submitted to ISC in Quarter 1 2022 to achieve a Bronze ISC Planning v2.0 Rating in Quarter 1 of 2022.

Material Sustainability Issues

A Materiality Assessment was undertaken with key internal stakeholders during the Kick-Off Sustainability Workshop for this project on 16th October 2020 to identify the material sustainability topics for the project. The SDGs that are weighted as having a 'High' or 'Very High' materiality are considered as material goals. The overall material goals identified are:

- SDG 3: Good Health and Well-being
- SDG 7: Affordable and Clean Energy
- SDG 8: Decent Work and Economic Growth
- SDG 9: Industry, Innovation and Infrastructure
- SDG 11: Sustainable Cities and Communities
- SDG 12: Responsible Consumption and Production
- SDG 13: Climate Action
- SDG 15: Life on Land

It should be noted that omission of the rest of the UN SDGs from the above list will not result in the project neglecting the potential positive impact it can have on achieving those omitted goals, rather they have been assessed to be less material. This assessment feeds directly into the project's Sustainability Management Plan (SMP), which provided guidance on the work to be undertaken during the project Development Phase, timing and dependencies for facilitating successful integration of sustainability into the design and other activities during project development.

In addition to the materiality assessment, the Kick-Off Sustainability Workshop included a risk and opportunities discussion. This enabled internal stakeholders to list direct and indirect governance, economic, environmental and social risks and opportunities throughout the entire project lifecycle. External stakeholder feedback on the identified risks and opportunities will be requested during the Reference Design. For specific aspects of the project, the most material issues currently identified are listed in the table below:

Table 1: Material Project Sustainability Issues

Identified Material Issue	Description	How it is being considered within Concept Design
UN SDG 3: Good Health and Well-Being	<ul style="list-style-type: none"> Consider improved health and wellbeing through extending a critical link in the Highway to reduce rates of Killed or Seriously Injured (KSI) road users Consider improved health and wellbeing through extending a critical link in the PSP network to encourage active transport aligned with the Urban Landscape Design Framework, the Green Infrastructure Plan and the Long-Term Cycle Network Strategy 	<p>Detailed investigations into a principle shared path for pedestrians and cyclists along the eastern side of the road corridor, with planned connections to local path networks and vehicle, equine rider and pedestrian underpass under Tonkin Highway at Abernethy Road.</p>
UN SDG 7: Affordable and Clean Energy	<ul style="list-style-type: none"> Consider alternative renewable energy sources to be used in construction and/or operation 	<p>An investigation was conducted to identify additional opportunities utilising renewable energy that could be implemented into the project to reduce emissions. The following renewable energy opportunities were identified as site suitable:</p> <ul style="list-style-type: none"> Solar powered noise walls, Road reserve solar farms, Wind-solar hybrid lighting, Solar powered PSP shading Traffic wind turbine, Solar electric vehicle charging stations, and Energy harvesting compression plates. <p>The feasibility of these opportunities will be investigated further within the Design Phase and the opportunities to be implemented (if any) will be confirmed.</p>
UN SDG 8: Decent Work and Economic Growth	<ul style="list-style-type: none"> Consider improved economic growth through improved freight efficiencies Creation of jobs throughout project life cycle 	<p>Western Australia’s Land Use Planning and Transport Strategies recognise Tonkin Highway as a critical component of the Metropolitan Road Freight Network. As part of this network, Tonkin Highway facilitates movements to and from major commercial / industrial zones and serves a critical purpose in facilitating the movement of freight and commuter traffic. The Tonkin Highway Extension project will provide connectivity through Byford, Mundijong and Jarrahdale to improve economic prosperity and</p>

Identified Material Issue	Description	How it is being considered within Concept Design
UN SDG 9: Industry, Innovation and Infrastructure	<ul style="list-style-type: none"> Consider reduced material energy and carbon emissions, based on reasonable estimates, calculations or predictions of energy use by the project over its life cycle. Consider Scope 1, 2 and 3 emissions estimates and identify any innovations to reduce as part of the greenhouse gas emission assessment 	<p>productivity by attracting investment and growth.</p> <p>A Greenhouse Gas (GHG) Assessment has been undertaken for the full extent of the project. The assessment predicted the volume of GHG emissions (including scope 1, scope 2 and scope 3 GHG emissions) throughout the project life cycle. The GHG assessment presents the preliminary 'Base Case' emissions, which is based on the current Reference Design for the project and will be compared to the 'Actual Case' (i.e. 100% Design) in the Design Phase.</p>
UN SDG 11: Sustainable Cities and Communities	<ul style="list-style-type: none"> Consider requirements to retain connectivity to the surrounding locality around each interchange Consider journeys to local schools/clubs ensuring these are not adversely impacted Consider resilience requirements into the future through climate and natural hazards workshop and collaborative risk and opportunities identification Ensure emergency service access within the project zone of influence in this high-risk bushfire area 	<p>Recommendations for a Procurement Strategy to be produced for the project that priorities sourcing local materials and engaging with the local workforce to enhance the economic prosperity within the local community and the Perth Metropolitan region.</p>
UN SDG 12: Responsible Consumption and Production	<ul style="list-style-type: none"> Address material energy and carbon emissions reductions through using local raw material sources, with reduced haulage resulting in lower impact on local traffic network. Highway lighting will be the most significant contribution to Greenhouse Gas (GHG) emissions during project operation Consider streamlining the design and power source Consideration of transportation of materials to and from site during construction 	<p>A Resource Efficiency Strategy (RES) has been developed based on investigations undertaken for resource use and waste. This strategy outlines the relevant approvals required for the project, resource efficiency goals, resource estimation, key risks and opportunities relating to resource efficiency and potential partnerships that could be beneficial for later stages of the project to assist in achieving the resource efficiency targets.</p>
UN SDG 13: Climate Action	<ul style="list-style-type: none"> Consider future climate projections and ensure the design can adapt and is resilient constant changing climate 	<p>Climate change and natural hazard risks have been assessed for the <i>Tonkin Highway Extension</i> project using the AS 5334 process for risk assessment. A high-level review of historically recorded climate change and natural hazard events for the project site has been undertaken. In</p>

Identified Material Issue	Description	How it is being considered within Concept Design
		<p>addition, the inherent levels of tolerance to climate change and natural hazards have been investigated.</p>
<p>UN SDG 15: Life on Land</p>	<ul style="list-style-type: none"> • Mitigate project impacts through implementation of Green Infrastructure • Strengthening ecological linkages through aligned landscape design and offsetting impacts (where required) 	<p>Due to the potential for environmental impacts, the project has been referred to the State and Federal environmental regulators for assessment. Careful consideration has been given to avoiding and minimising impacts to these environmentally sensitive areas in the design process, and the project can't proceed without the appropriate approvals being obtained from the State and Federal environmental regulators.</p> <p>An Environmental Management Plan will also be developed for the project that will detail the approach to managing environmental protection, conservation and enhancement and how this will be integrated into the project's overall design.</p>

Environmental Aspects

Environmental Context

The project is located within the Perth metropolitan area on the eastern side of the Swan Coastal Plain entirely within the Shire of Serpentine Jarrahdale, a peri-urban location south of Perth with abundant rural and natural areas. The project alignment is located immediately west of two urban settlements (Byford and Mundijong), with several east-west Regional Green Linkages intersecting the alignment. Within the project boundary there are several environmental constraints that require assessment and approval of the project by the State and Federal regulators. The wider *Tonkin Highway Extension* project from Mills Road to South Western Highway was assessed as a Public Environmental Review in 2001 and approved by the WA Minister for Environment. A separate referral under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for this section of the *Tonkin Highway Extension* project (Thomas Road to South Western Highway), has been submitted to the Department of the Agriculture, Water and the Environment (DAWE) for impacts on Matters of National Environmental Significance (MNES) and is currently undergoing assessment.

The project area exists in an extensively cleared local landscape that was cleared for agricultural purposes. The project area is generally low-lying and poorly drained and prone to flooding due to the proximity of many existing waterways and the nature of the soils. The project is located within a Conservation Category Wetlands (CCW) area and runs through various environmentally sensitive areas, including:

- Threatened and Priority Ecological Communities (TECs and PECs),
- Black Cockatoo species,
- Bush Forever Sites,
- Threatened and Priority flora,
- Watercourses, and
- Fauna habitats, including habitats for Threatened and Priority fauna.

See Appendix 2 for a list of the protected fauna and flora species and habitats identified within the project area.

Water courses in the project area take the form of meandering ephemeral streams and generally run east to west. Not only do these features have ecological value, they also act as a drainage function and are recognised for special treatment within the district and local structure plans of future urban expansion areas around Byford and Mundijong Whitby. Field screening tests showed that there are acid sulphate soils (ASS) and potential acid sulphate soils (PASS) within the project boundary, however the associated risk was determined to be low.

There are also numerous sites of Aboriginal heritage significance within the project boundary that contain Heritage Artefacts, some of which are registered under the *Aboriginal Heritage Act 1972* and require section 18 approval to disturb. The project intersects two major Aboriginal tributaries – Beenyup Brook (North of Abernethy Road) and Cardup Brook (South of Orton Road).

The Natural Environmental and Heritage constraints are summarised in Figure 2 below (alignment is shown as the thick red line).

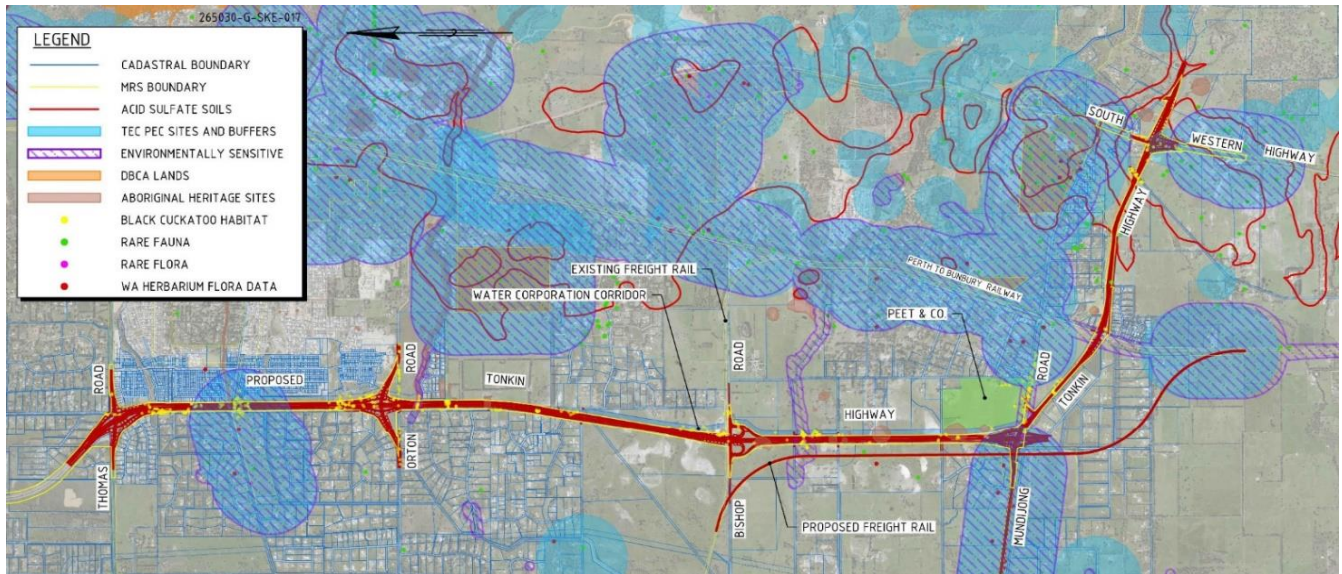


Figure 2: Environmental and Heritage Constraints

Environmental Management

The following environmental or heritage approvals, permits or licences are needed for implementation of the project:

- Environmental Protection Act 1986 Section 38 referral to the EPA,
- Environment Protection and Biodiversity Conservation Act 1999 referral to DAWE,
- AH Act section 18 consent,
- Rights in Water and Irrigation Act 1914,
- Environmental Protection (Controlled Wastes) Regulations 2004, and
- Environmental Protection (Noise) Regulations 1997.

Due to the potential for environmental impacts, the project has been referred to the State and Federal environmental regulators for assessment. Careful consideration has been given to avoiding and minimising impacts to these environmentally sensitive areas in the design process, and the project can't proceed without the appropriate approvals being obtained from the State and Federal environmental regulators.

An Environmental Management Plan will also be developed for the project that will detail the approach to managing environmental protection, conservation and enhancement and how this will be integrated into the project's overall design.

Water Management

Careful management of existing water sources must be conducted as the existing landscape has a high-water table. A Water Demand Assessment has been undertaken that has identified the following:

- Appropriate water sources and their availability (this includes surface water flows, recycled water and desalinated water),
- Risk and opportunities associated with each water source, including full cycle impact from extraction to discharge,
- Volume of water storage available (dams, reservoirs, aquifers) (if any),

- Estimations of water required during construction and operations, and
- Opportunities to influence design to minimise and/or avoid water usage.

As the Water Demand Assessment considered significant water uses only, it was determined that the projects operational water demand was low compared to the deliver (construction including establishment and maintenance). It is recommended to undertake a review of the water demand within the future stages and incorporate any water demands deemed significant for further investigation and inclusion within the calculations.

The Water Demand Assessment details how specific opportunities will be incorporated into design (including timing and responsibilities) to ensure there is an optimal reduction in water demand across the project lifecycle. Construction in the form of material preparation for installation accounts for 99% of the water demand within the project. Whilst the application varies for the construction activities the consistencies lie in the high quality of the water required which limits the ability for non-potable water to be used in these applications. Opportunities may present themselves on further investigations to the use of alternative water options to potable water.

Carbon Emissions & Energy

A Greenhouse Gas (GHG) Assessment has been undertaken for the full extent of the project. The assessment predicted the volume of GHG emissions (including scope 1, scope 2 and scope 3 GHG emissions) throughout the project life cycle. The GHG assessment presents the preliminary 'Base Case' emissions, which is based on the current Reference Design for the project and will be compared to the 'Actual Case' (i.e. 100% Design) in the Design Phase.

The GHG assessment of the IS Base Case has been conducted to meet the requirements for the Energy Efficiency (Ene-1) credit for the IS Planning Rating under v2.0 and the EPA standards.

To compile the energy and carbon footprint for the project, the Carbon Gauge tool created by Transport Authorities Greenhouse Group, was utilised. The Carbon Gauge is an industry carbon calculator, which is a software implementation of the greenhouse gas calculation methods described in the GHG Assessment Workbook. Carbon Gauge provide a means of estimating the materiality significant whole of life GHG emissions during the major road activities of construction, operation and maintenance calculated over a 50-year infrastructure life.

Based on the assessment, the major sources of greenhouse gas emissions for this project are material production and construction, fuel combustion during construction and vehicle use on the road during operation.

It is important to focus on strategies to reduce GHG emissions for this project in order to improve air quality and consequently the health and well-being of the road users and natural environment. The following opportunities have been identified to reduce emissions throughout the project lifecycle and will be investigated in further detail in the Design Phase to determine if they are feasible.

Table 2: Emission Reduction Opportunities

Opportunity	Positive Impact
Reduce area of vegetation to be removed within the project boundary	Reduction in emissions due to clearing of vegetation whilst also reducing the quantity of lost carbon from removing such vegetation
Vegetation offsets	Replanting the disturbed vegetation and/or planting new vegetation will offset the lost carbon from the vegetation removal
Use warm mix asphalt instead of hot mix asphalt	Reduces greenhouse gas generation during manufacturing
Solar generated power for site offices / general areas	Reduction in fuel combustion from generating electricity to site offices / general areas
Inclusion of laydown electric car charging bays	Promotes the use of automated/electric vehicles within the boundary to reduce vehicle emissions
Solar generated power for streetlights	Reduction in emissions from powering streetlights within project boundary

In addition to the opportunities identified above, a separate investigation was conducted to identify additional opportunities utilising renewable energy that could be implemented into the project to reduce emissions. The following renewable energy opportunities were identified as site suitable:

- Solar powered noise walls,
- Road reserve solar farms,
- Wind-solar hybrid lighting,
- Solar powered PSP shading
- Traffic wind turbine,
- Solar electric vehicle charging stations, and
- Energy harvesting compression plates.

The feasibility of these opportunities will be investigated further within the Design Phase and the opportunities to be implemented (if any) will be confirmed.

Materials & Recycling

A Resource Efficiency Strategy (RES) has been developed based on investigations undertaken for resource use and waste. This strategy outlines the relevant approvals required for the project, resource efficiency goals, resource estimation, key risks and opportunities relating to resource efficiency and potential partnerships that could be beneficial for later stages of the project to assist in achieving the resource efficiency targets.

A multi-disciplinary team were involved in the identification of goal areas and opportunities for resource efficiency as part of sustainability workshop in February 2021. The overarching priority resource efficiency goals that were identified include:

- Developing a design that minimises project waste outputs,
- Optimisation of materials required throughout the project life cycle,
- Utilisation of existing local resources,
- Promoting responsible material sourcing (i.e. minimising haulage of material, sourcing materials from near-by sites),
- Consideration of various drainage designs with regards to pollution control,
- Ensuring a balance of cut and fill material,
- Catering for the future traffic demands, and

- Consideration of alternative barrier systems.

Potential hurdles with pursuing these opportunities that were identified include increased cost, resource availability and complying with current standards.

Whilst all these goals provide opportunity to incorporate sustainable design outcomes within the project, it is important to ensure that these solutions do not impact the accessibility for maintenance nor the longevity of the asset.

Opportunities minimise both project inputs and outputs have been investigated to assist in achieving the resource efficiency goals set for the project during Construction and Operation. The feasibility of these opportunities will be investigated further during the Design Phase and the Resource Efficiency Strategy will be updated accordingly.

Emissions

Methods to reduce other adverse impacts including noise, air quality, vibration, light spill and dust mitigation will be investigated further during the Design stage and included within the Environmental Management Plan. The emissions listed are all considered within the project's Risk and Opportunity Register that details potential treatment options that have been investigated throughout the Planning Phase.

Acid Sulphate Soils

The Acid Sulphate Soil (ASS) desktop assessment illustrates that the project is also within a moderate to low risk area. A preliminary geotechnical investigation by Arup detected ASS at Ch 44,800 and Ch 52,800, and PASS between Ch 44,800 and Ch 45,100, as well as between Ch 50,700 and Ch 53,000. It was noted that the proposed underpass near Abernethy road intersects this PASS zone and thus will need further testing prior to construction. Management actions for delivery will be documented in a project Environmental Management Plan or Acid Sulfate Soil Management Plan (ASSMP) if appropriate.

Contamination

A high-level desktop assessment that identifies any potential contamination from agricultural or industrial sources within and/or immediately around the alignment (within 200m) was conducted. No sources of potential hazards were observed from aerial imagery or on the Government of Western Australia Department of Water and Environmental Regulation Contaminated Sites Database, however there may still be potential for additional localised sources, such as:

- Cow tips,
- Asbestos from older structures,
- Agricultural runoff, and
- Contaminated building materials or stockpiles.

Economic Aspects

Economic Context

Tonkin Highway is a 44 km north-south highway and partial freeway in Perth. It is part of the National Land Transport Network and links Perth Airport and Kewdale with the city's north-eastern and south-eastern suburbs, as well as providing metropolitan freight and road users with a major north-south route. It connects to Reid Highway and Roe Highway to form part of a critical freight and passenger vehicle orbital around the Perth metro area.

Western Australia's Land Use Planning and Transport Strategies recognise Tonkin Highway as a critical component of the Metropolitan Road Freight Network. As part of this network, Tonkin Highway facilitates movements to and from major commercial / industrial zones and serves a critical purpose in facilitating the movement of freight and commuter traffic. Table 1 contains the local industries and businesses impacted within the study area of which will directly benefit by the *Tonkin Highway Extension* project. The *Tonkin Highway Extension* project will provide connectivity through Byford, Mundijong and Jarrahdale to improve economic prosperity and productivity by attracting investment and growth.

Table 1: Identified positively and negatively impacted business and special interest groups

• PUMA Service Station (Byford)	• Woolworths Byford
• McDonalds Australia (Byford Store)	• 711 Byford
• Redgum Brook Estate (Satterley)	• KFC Byford
• Oakford Fields (Developer TBA)	• Hungary Jacks Byford
• Oakford Equestrian Centre (Kargotich Road)	• Byford and Districts Country Club – administration and board
• The Glades (LWP)	• Four Seasons Nursery & Hardware Supplies
• Strand Lakeside Cafe	• Byford IGA
• Regent Park Stockfeeds	• Mundijong Public Library
• Byford BMX Club	• Serpentine Jarrahdale Community Resource Centre
• Serpentine Jarrahdale Community Recreation Centre	• Serpentine Historical Society
• Coles Byford	• Mundella Farms Pty Ltd

Key Economic Outcomes

The *Tonkin Highway Extension* project is part of the Tonkin Highway Transformation that sets out to:

- Provide connectivity between Tonkin Highway and South Western Highway through the Shire of Serpentine-Jarrahdale,
- Improve safety,
- Ease congestion and reduce capacity pressures on the wider metro transport network,
- Provide equestrian connectivity across project area,
- Provide PSP connectivity for cyclists and pedestrians, and
- Enable full realisation of benefits of existing infrastructure associated with Gateway and Northlink and future infrastructure and planning initiatives (e.g. Westport and MKSEA).

Options Assessment

A rigorous Multi Criteria Analysis (MCA) process was undertaken to determine the most appropriate interchange configurations for the Thomas Road, Orton Road, Bishop Road, Mundijong Road and South Western Highway intersections. Various intersection treatment options were considered for both the project Case and Ultimate Case, each assessed to outline the environmental, social, economic, network performance and road safety impacts.

Sustainable Procurement

Sustainable procurement for the *Tonkin Highway Extension* project must be conducted to ensure optimal positive environmental, social and economic impacts over a project's lifecycle. A Procurement Strategy will be produced for the project that priorities sourcing local materials and engaging with the local workforce to enhance the economic prosperity within the local community and the Perth Metropolitan region.

Resilience

Careful consideration and planning have been conducted to ensure this project contributes towards the resilience of the Perth Metropolitan Region. Through a workshop with key stakeholders (including Main Roads, Arup and the Shire of Serpentine-Jarrahdale) a range of acute shocks and chronic stresses that are likely to impact the functionality of the asset and its service to the community were identified. Interdependent physical assets and services within and surrounding the project extents that are likely to be impacted if the asset lost functionality or operate at minimal capacity were also identified. Treatment options to manage the impact of these shocks and stresses to Tonkin Highway and the interdependent assets were discussed in detail. A Resilience Plan has been produced to capture the outcomes of the resilience study/work and desktop assessment.

Climate Change Assessments

Climate change and natural hazard risks have been assessed for the *Tonkin Highway Extension* project using the AS 5334 process for risk assessment. A high-level review of historically recorded climate change and natural hazard events for the project site has been undertaken. In addition, the inherent levels of tolerance to climate change and natural hazards have been investigated. During a workshop with key stakeholders (including Local Government representatives), asset components within the project (e.g. pavement, structures, lighting, etc.) were assessed based on the impact that specific natural hazards would have on the asset in 2020, 2030 and 2090 using current climate projections. It is noted that ideally this assessment should be done to cover the full design life of the asset (100 years). However, current climate projections only present up to the year 2090 estimates. The natural hazards considered were:

- Heatwave,
- Drought,
- Bushfire,
- Flooding,
- Storm, and
- Cyclones.

Treatment options to mitigate these risks to the asset components were discussed during the workshop and later summarised within the Climate and Natural Hazards Risk Register. A Climate Change Assessment

Report has been produced that details the assessment outlined above and identifies treatment options to mitigate the impact of climate change on the infrastructure asset.

Social Aspects

Social Context

Amount	Type of engagement
2055	Subscribers to the email marketing list, which is subscription service via the Main Roads website. Customers can choose to opt-in to the email marketing list.
115	Phone and email enquiries to the project (defined as cases in CONNECT).
12	Customer complaints
799	Individual interactions with stakeholders (defined as activities in CONNECT).
75	Stakeholders that have had direct engagement with the project via email and phone enquiries.
5	Registered Aboriginal Heritage Sites will be impacted by the project.
5	Lodged Aboriginal Heritage Sites will be impacted by the project.
3	European Heritage Sites will be impacted by the project.

The communities surrounding the project area are extremely important stakeholders and create the urban fabric in which the project sits. The surrounding communities are impacted by the changes to the roadway daily, as they live next to, commute on, and move across the highway.

The residential communities immediately surrounding the project include the suburbs of:

- Byford (Shire of Serpentine-Jarrahdale), and
- Mundijong (Shire of Serpentine-Jarrahdale).

The community facilities and characteristics of the above suburbs will be described in detail in the Urban Landscape Design Framework (ULDF).

The suburb Jarrahdale (Shire of Serpentine-Jarrahdale) is located to the east of the alignment and not affected by the project as is heavily vegetated with state forests.

Broad land uses within the project area include farming, equestrian, tourism, viticulture, small holdings activities and businesses, rural living and urban activity. Community activities are conducted at the following community facilities that are within and/or surround the project area:

- Byford Trotting Complex,
- Darling Downs Equestrian Reserve,
- Darling Scarp,
- Millbrook Wines,
- Byford Secondary College,
- West Byford Primary School,
- Beenyup Primary School,
- RDA Oakford,
- Redgum Brook Estate Park,

- Kalimna Oval,
- Mindijong Station,
- Whitby Falls Farm,
- Jarrahdale Equestrian Centre,
- Serpentine Camping Centre,
- Grocery stores and fast-food chains, and
- Various local businesses.

These facilities have and will continue to be considered within the Planning Phase to minimise impacts throughout the project's lifecycle.

There are also numerous sites of Aboriginal heritage significance within the project boundary that contain Heritage Artefacts, some of which are registered under the *Aboriginal Heritage Act 1972* and require section 18 approval to disturb. The project intersects two major Aboriginal tributaries – Beenyup Brook (North of Abernethy Road) and Cardup Brook (South of Orton Road). Efforts will be made to remove or mitigate impacts to these sites.

The expected social outcomes from the project are:

- Provide connectivity for the suburbs of Byford and Mundijong to the greater Perth metropolitan region,
- Create urban design solutions for the project that enhance the project for the surrounding communities,
- Provide structural forms and ULD solutions that connect communities that are separated by the highway,
- Provide connectivity for public transport within the project interchanges, including adjust facilities outside the project area where required,
- Provide safe cycling, pedestrian and equestrian routes for the communities across the alignment so facilities can be easily accessed,
- Provide hard and soft landscaping, Mitigate/minimise impacts to Aboriginal Heritage sites, and
- Processes identified within the Access and Connectivity Strategy

Community & Stakeholder Engagement

Stakeholder consultation is being undertaken in accordance with Community and Stakeholder Engagement Strategy (CSES) developed for the project using the Main Roads template, which is aligned with ISC reporting requirements. The CSES has been produced to provide strategic framework to guide all communications and engagement for Tonkin Highway Extension project. Main Roads are liaising with key stakeholders (Appendix 3) to integrate community and stakeholder objectives:

Objectives

- Stakeholder and community input is being sought as the project progresses through development and concept design stages.
- Main Roads initiated a broad engagement program to identify wider community and special interest group concerns, ideas and views about the project during 2019/2020.

- A high level concept plan will be presented to the community and open for feedback in 2021. The feedback will be used to refine the project scope and concept design and relevant management plans for construction.
- Main Roads will liaise closely with local stakeholders and the community throughout the refinement of the highway concept design, development of project scope and pre-construction process. This includes residents and property owners directly bounding the highway reserve, as well as other relevant business owners, amenity groups and neighbouring landowners.
- Project information will be available through a number of channels including targeted briefings, information sessions, proposed community and stakeholder workshops around the concept design, website, email, social media and newsletters.
- Future construction activities will be guided by a series of management plans developed by the Contractor to ensure drainage, noise, dust and vibration is managed within acceptable levels.

Guiding Principles

- Early and ongoing engagement with the community through multiple channels, ensuring a customer-centred approach.
- Undertake a proactive approach to community engagement – identifying areas of community interest and reaching out to interested parties.
- Set clear parameters and expectations around areas of community influence (consult vs inform) i.e freeway corridor is predominantly set.
- Undertake clear and consistent communication based on approved messages that reflect the objectives of the State Government, Main Roads and other key stakeholders.

In consultation with the project team negotiable and non-negotiable issues have been identified. This was done in consideration of the project scope and will be provided to stakeholders to inform where stakeholder input may be considered. Non-negotiables are the elements of a planning process or project that cannot change e.g. legislative and safety requirements. Negotiables are those that are not bound by legislative or statutory requirements e.g. landscaping and alignment of shared paths.

The Communication and Stakeholder Engagement Strategy is integrated into the project. Project leads and other team members are involved in the development of the Strategy. The Strategy includes:

- Project 'negotiables' and 'non-negotiables' developed with the project team.
- The identification of potential social, environmental and economic impacts of a project and considers if and how engagement activities associated with these assessments, and any related regulatory approvals, need to be incorporated and supported.
- A requirement that engagement is a regular agenda item on relevant project meetings. Topics include progress on engagement activities, summary of input received, any issues identified etc.

The project will adopt a strategic approach to proactively deal with enquiries and complaints received, to ensure community concerns are taken seriously and are thoroughly considered. This will include targeted activities. Progress on implementing this Strategy (and achieving the measurable objectives), must be

monitored, reviewed and documented, and the strategy updated at least quarterly/as necessary.

Addressing Community Concerns

The Communication and Stakeholder Engagement Strategy outlines the process to engage key stakeholders to prioritise negotiable issues. The Contractor must consider these issues to inform the Communications and Stakeholder Engagement Plan, which will detail, review, respond and report on mitigation of issues as they arise during the delivery of the Contract.

Main Roads' Strategy and Communications Directorate will have overarching responsibility for determining the most effective communication methods to address the overlap with other projects in the area to ensure:

- Consistent and accurate information across multiple projects.
- Community support during project delivery.
- Political support through events and media to communicate milestones.
- Materials are consistent with Main Roads branding guidelines.
- Community concerns and requests for information receive timely responses.
- Communication, community and stakeholder engagement and activities protect the reputation of and are consistent with the objectives of Main Roads, State and Federal Governments.
- Impacted stakeholders are engaged, informed and empowered.
- Concerns of impacted stakeholders are proactively addressed.

A range of communication activities will be implemented to heighten awareness and facilitate two-way dialogue during project development, pre-construction and construction stages. Mechanisms for communications across the contract shall be chosen to best reach the target audience in the most efficient and cost-effective way.

The contractor is encouraged to show initiative in the use of communication channels and stakeholder engagement activities.

Measurement tools will provide an important measurement for reporting post-engagement, as well as for monitoring progress during the communication and stakeholder engagement program to determine gaps in information dissemination or messaging, and issues requiring mitigation. These include, but are not limited to:

Tool	Aim
Communication and Stakeholder Engagement Plan	Develop and update table to ensure all tasks are being progressed and implemented, and add to as required. Provides a record of collateral and implementation (briefings, presentations, displays and meetings external stakeholders). Can be updated and circulated to project representatives at agreed intervals.
CONNECT Database: Stakeholder and	Record all queries between external stakeholders and the Contractor to

Tool	Aim
community queries, and email addresses for all stakeholders, general community and those from queries database	<p>provide an ongoing report of all enquiries and status, as well as identify issues.</p> <p>The CONNECT CRM is the mechanism for managing any complaints or incidents received. This CRM, in addition to Main Roads' Customer Information Centre, outlines timeframes and approval processes for complaint management.</p> <p>All Project Updates, Construction Updates and Roadworks Updates (as appropriate), are to be issued to the project's electronic subscription list through CONNECT's Click Dimensions function, allowing each piece of communication to be logged against each stakeholder's record.</p>
Stakeholder Commitments Register	<p>Record commitments made to individual stakeholders or stakeholder groups.</p> <p>Record progress and status of number of commitments made and achieved at milestone phases of the project.</p>

Appendix 1 - List of Interfacing Projects

Projects that are directly interfacing and/or near by the project extents of the *Tonkin Highway Extension* project are:

- Thomas Road and Nicholson Road dual lane roundabout (Main Roads),
- Thomas Road and Kargotich Road new roundabout (Main Roads),
- Thomas Road between Bombay Boulevard and Kargotich Road street lighting (Main Roads),
- Armadale Rail Line Extension (METRONET).

Appendix 2 - Protected fauna and flora species and habitat

At time of reporting there were no threatened (T) and priority (P) flora species identified within the project boundary.

The following conservation significant fauna species and their habitats have been identified within the project boundary:

- Carnabys Cockatoos

Appendix 3 – List of Stakeholders to the Project

The following key external stakeholders have been identified in relation to the project:

- Department of Transport (DOT),
- Department of Agriculture, Water and Environment (DAWE),
- Department of Biodiversity, Conservation and Attractions (DBCA),
- Department of Water and Environmental Regulation (DWER),
- Department of Planning, Lands and Heritage (DPLH),
- Public Transport Authority,
- Department of Education,
- Shire of Serpentine-Jarrahdale,
- Local residents,
- Local businesses,
- Community interest groups,
- Freight and logistics industry,
- All road users,
- South West Aboriginal Land and Sea Council (Gnaala Karla Boodja Noongar group),
- Department of Fire and Emergency Services,
- Arc Infrastructure,
- WAPC,
- Private Developers, and
- Utility Providers.

Appendix 4 – Glossary of Terms

Table 3: Glossary of Terms

Term	Definition
AHD	Australian Height Datum
AS 5334	Australian Standard: Climate Change Adaptation for Settlements and Infrastructure - A Risk Based Approach
ASS	Acid Sulfate Soils
ASSMP	Acid Sulfate Soil Management Plan
Credits	Each IS v2.0 credit has up to three levels of achievement and addresses a specific aspect of sustainability performance within the category.
CSES	Community and Stakeholder Engagement Strategy
EPA	Environmental Protection Authority
GHG	Greenhouse Gas
GRI	Global Reporting Initiatives
IS	Infrastructure Sustainability
ISAP	Infrastructure Sustainability Accredited Professional
ISC	Infrastructure Sustainability Council (formally Infrastructure Sustainability Council of Australia (ISCA))
IS Materiality Assessment	Process to identify the priority sustainability topics that should be included in the sustainability plan, strategy and targets
IS Rating Scheme	Infrastructure Sustainability (IS) rating scheme comprises: <ul style="list-style-type: none"> • The IS rating tools for Planning, Design and As Built and Operation • ISC education and training programs (including the IS Accredited Professional program) • Working and Advisory Groups
IS Rating Scorecard	Infrastructure Sustainability Rating Scorecard used to summarize approach to achieving credit requirements.
IS Themes	Governance: context, leadership and management, sustainable procurement, resilience and innovation Economic: options assessment, business case and benefits Environmental: Energy and carbon, green infrastructure, environmental impacts, resource efficiency, water and ecology Social: stakeholder engagement, legacy, heritage and workforce sustainability
IS Rating Tool	The IS rating tool is the tangible part of the scheme, used to undertake assessment. It comprises: <ul style="list-style-type: none"> • The IS Technical Manual • IS rating tool scorecard (IS Scorecard) • IS Materials Calculator – a calculator used to measure performance in the Materials category (Design & As-Built and Operations only)

Term	Definition
IS v2.0 Planning Technical Manual	Technical manual that details all the requirements for ISC credits to be achieved to obtain a Planning Rating.
MCA	Multi Criteria Analysis
MRWA	Main Roads Western Australia
PEC	Protected Ecological Community
PSP	Principal Shared Path
RES	Resource Efficiency Strategy
SMP	Sustainability Management Plan
SP	Sustainable Procurement
TEC	Threatened Ecological Community
THE	Tonkin Highway Extension
ULDF	Urban Landscape Design Framework
UN SDG	United Nations Sustainability Development Goals