Manuwarra Red Dog Highway: Annual Project Sustainability Report 2022

This annual report covers the period from August 2021 to July 2022. A previous annual sustainability report was prepared for the Project for December 2020 to July 2021.

Sustainability Lead: Pam.Simpson@jacobs.com
Stakeholder Engagement Lead: James.Nelson@jacobs.com

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About this Report

This report has been prepared by the Manuwarra Red Dog Highway Stage 4 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 principals. Material topics conveyed in this report have been determined through a materiality process that adheres to the Infrastructure Sustainability Council of Australia (ISCA). The Manuwarra Red Dog Highway Stage 4 project is aligned with the ISCA Planning rating framework (version 2.0).

Introduction

The Manuwarra Red Dog Highway (formerly Karratha – Tom Price Road) is a 269 kilometres (km) road linking the regional centres of Karratha and Tom Price in the Pilbara Region of Western Australia. The road provides crucial connectivity between these centres, as well as access to significant tourism destinations and mine sites in the region. However, use of this valuable route is currently restricted with 40 percent of the road unsealed and unable to safely sustain high volumes of traffic and freight. While safer sealed routes do exist, they compromise time efficiency, stretching over 550 km and adding at least another three hours to the journey. The lack of a safe and time efficient transport option adversely affects the residents and businesses of Karratha, Tom Price, Paraburdoo, and the wider Pilbara Region and is a major inhibitor to investment and growth in the tourism and mining sector.

The Manuwarra Red Dog Highway Stage 4 project is building approximately 112 km of new sealed road, to deliver a safe, sealed route between Karratha and Tom Price.

The project team's vision is for "**reliable, sustainable, resilient infrastructure, delivered in an engaging way, that builds connectivity, relationships and prosperity in the region**"'. The team is committed to delivering a project that achieves the best sustainable outcome and provides a positive social, environmental, and economic legacy for future generations.

Sustainability highlights to date:

- Ongoing community and stakeholder engagement
- Ongoing implementation of the Sustainability Management Plan
- Environmental surveys (flora and fauna) complete
- Preferred road corridor alignment selected
- project referred to State and Commonwealth governments for environmental approval
- Continuation of heritage surveys underway.

Overview

The Manuwarra Red Dog Highway consists of four stages: Stages 1 to 3 have already been completed; and Stage 4 is currently in the planning and design phase, see **Figure 1**. Sealing of the final 112 km section of road is expected to commence in 2023. The State and Federal Government have committed a total of $265 million to enable the completion of the final stage of Manuwarra Red Dog Highway. The road is being built

to:

- improve access to Millstream Chichester National Park and Karijini National Park, helping boost tourist traffic in the heart of the Pilbara
- reduce travel times and improve safety
- improve connectivity between Karratha, Roebourne, Tom Price, Paraburdoo and Newman
- improve access to hospitals and medical services, businesses, and shopping, education and service centres
- reduce maintenance and travel costs
- improve regional tourism opportunities
- improve reliability of road journeys by reducing road closures, particularly during wet season

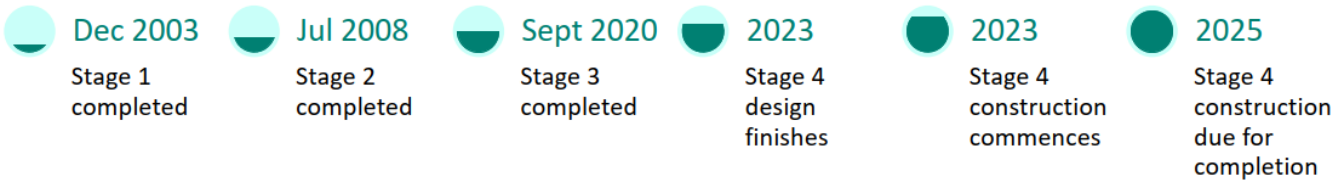

Figure 1 Manuwarra Red Dog Highway project timeline

The Manuwarra Red Dog Highway Stage 4 Planning phase is being delivered by Main Roads Western Australia (Main Roads) with support from key partners Jacobs, Arup, Cardno (KBR) and WSP. The Manuwarra Red Dog Highway Stage 4 project is supported by two design teams; the Coolawanyah Section base case design is being delivered by Jacobs, whilst both the Hamersley and Tom Price sections are being delivered by KBR.

Key Stakeholders include:

- Federal, State and Local governments
- State government agencies
- Traditional Owners
- Environmental regulators
- Residents and businesses
- Road users
- Emergency services
- Mining companies
- Pastoral stations
- Industry bodies
- Freight industry
- Visitor centres.

A comprehensive list of stakeholders is provided in Appendix 3.

The project website can be found on the Main Roads website.

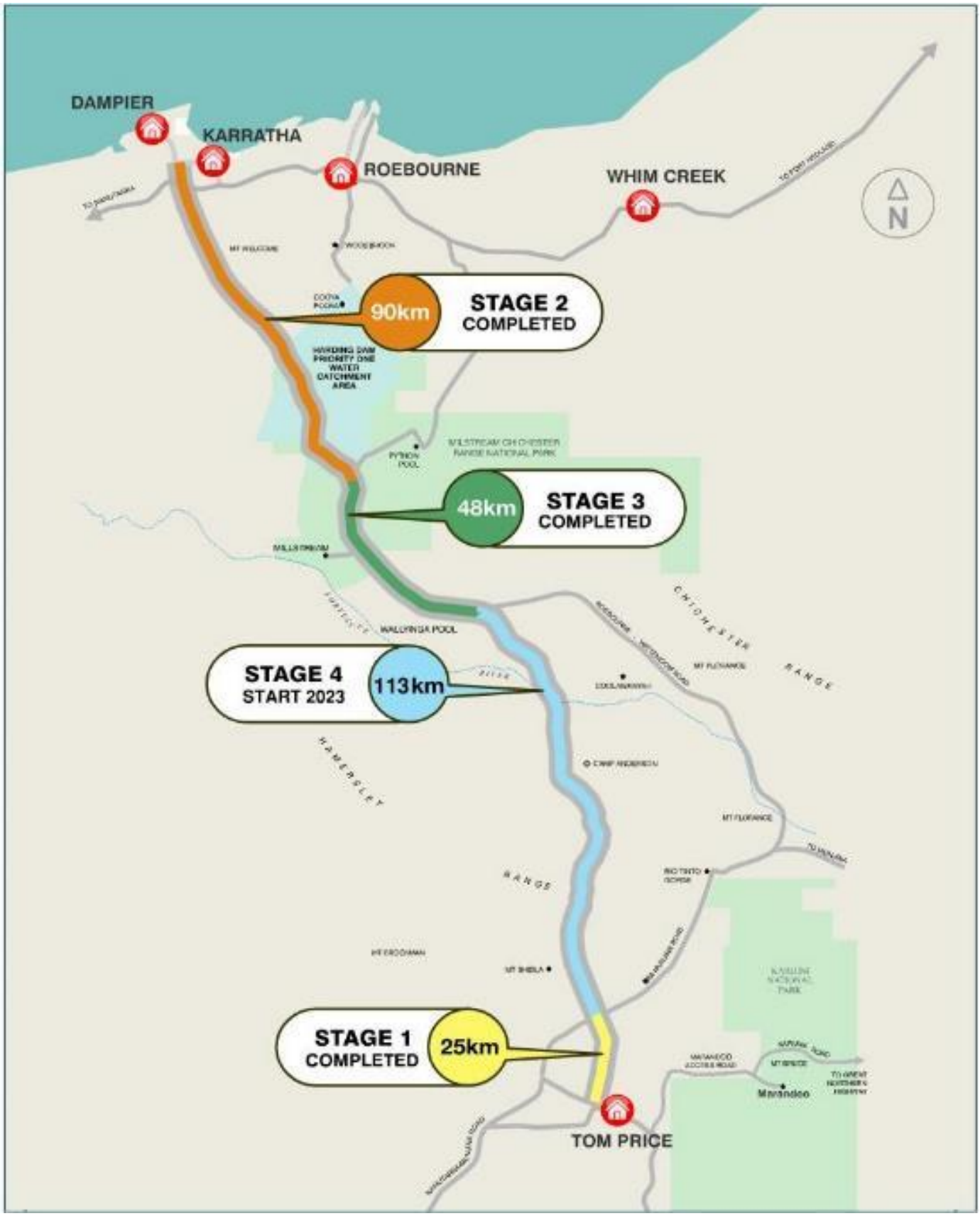

Figure 2 project overview

Overall approach to Sustainability in Project Development

Main Roads has registered Manuwarra Red Dog Highway for a Planning rating under the ISC Infrastructure Sustainability (IS) v2.0 rating process. The project team has developed a sustainability strategy for the project that focuses on achieving the best sustainable outcomes with guidance from the IS rating tool, which provides a framework for integrating sustainability across the project. A Bronze rating is being targeted.

The project has a dedicated Sustainability Lead who is an Infrastructure Sustainability Accredited Professional (ISAP) and reports directly to the Main Roads Project Manager. The Sustainability Lead is supported by a team of sustainability professionals.

The Manuwarra Red Dog Highway Stage 4 project has a Sustainability Management Plan that is aligned with Main Roads' Sustainability Policy (**Appendix 5** – Main Roads WA Sustainability Policy). The Sustainability Management Plan provides the framework for integration of sustainability into all project activities for Manuwarra Red Dog Highway and sets the strategic direction for the project to achieve good sustainability outcomes and leave a positive legacy in the Region. The Sustainability Management Plan was reviewed by the Project Manager and Sustainability Lead in 2022 as part of the project's continual improvement practice.

As part of the Planning phase, targets have been set by the project. The targets are tracked, with percentage complete updated monthly. For progress against the project objectives and targets, see **Figure 3.**

Planning Objective	Planning Target	% Target Complete
Maximise 'on alignment' materials/resources	Investigate two opportunities for recycled / efficient use of materials (i.e. rail ballast, carbon core)	100
	Develop a water-use spreadsheet to assist in minimising water use	100
	Identify and document two water efficient strategies (i.e. OMAR)	100
Enhance biodiversity and maximise positive environmental outcomes	Test alignment options to reduce impact on known sensitive vegetation and fauna habitats	100
	Test alignment options to reduce impact on existing water courses	100
	Investigate at least two environmental legacy initiatives	100
Maximise local employment and skills legacy	Develop a workforce optimisation spreadsheet to assist Delivery with a local employment and skills inclusion strategy	100
Maximise shared land use and infrastructure	Develop a shared land use concept	100
Maximise network resilience	Define and include Pilbara Proof design criteria in the basis of design	100
Maximise social and cultural capital	Test alignment options to reduce impact on known heritage sites	90
Maximise usability and serviceability	Develop safety related requirement through stakeholder engagement	95
Maximise innovation and challenge beyond business as usual	Identify and implement at least two innovative strategies to support project processes and/or design outcomes	100

Figure 3 Planning targets percent complete

Methodology

A materiality assessment was undertaken at the start of the Project to identify the important sustainability issues for the Project. The materiality assessment was informed by Main Roads' standard process. The priority sustainability topics for the project have been mapped to the United Nations (UN) Sustainable Development Goals **(UN Goals)** using the Main Roads assessment against the UN Goals. The mapping process then identified the positive and negative impacts the project may have on the UN Goals. The process is aligned to the requirements of the IS Rating scheme.

The materiality assessment was originally undertaken in 2020 and reviewed both in 2021 and 2022. No changes were made to the prioritisation of sustainability topics. The materiality assessment will be reviewed again at the start of the design phase (following Planning phase).

Material Sustainability Issues

A series of workshops has been held with both internal and external stakeholders to identify key issues and opportunities for the project. The project's impact on the 17 UN Goals has been assessed across the project, as seen below**.**

The process described above has resulted in the 'material' issues, or focus areas being identified for the project as listed in **Table 1** and provided the basis for development of the project's vision, objectives, and targets.

Table 1 Material Sustainability Issues

Issue	Description	IS Credits	UN Goals
Responsible use of resources	Encouraging 'circular economy' and reducing cost of materials	Rso-1 and Rso-4, Ecn-5, Ene-1, Wat-1, Wat-2	UN Goal 12
Partnerships and collaboration	Local knowledge, Pilbara partners, win-wins	Rso-1, Sta-1 and Sta-2	UN Goal 17
Reliable, sustainable, resilient infrastructure	'Pilbara proof' (able to withstand the Pilbara climate and weather); survivability	Res-1 and Res-2	UN Goal 9
Employment and economic growth enabled by the project	Opportunities in construction and operation	Ecn-5, Wfs-1, Wfs-2	UN Goal 8
Water quality and hydrological regime	Avoiding or reducing impacts on priority groundwater reserves and avoiding excessive disruption to hydrological regimes	Env-1, Eco-1, Wat-1, Wat-2	N/A
Positive project legacy	Responsible consideration of social, land clearing and heritage management and enhancement	Leg-1, Lea-1, Her-1, Inn-1	N/A
Safety	Responsible consideration of social management and enhancement		UN Goal 3

United Nations Sustainable Development Goals

The project is in Planning phase, therefore performance against the UN Goals is not yet fully realised. However, planned and ongoing activities that outline the project's expected performance against the relevant United Nations Goals are outlined in **Figure 4**. Each UN Goal relates to a Planning target. The relevant Planning targets are outlined in each of the UN Goals below. The Planning targets and their percentage of completion are outlined in **Figure 3**.

UN Goal 3
Good Health and Wellbeing

Positive Impacts	Negative Impacts
• Improved access to health services. • Road safety will be improved with a sealed road and shorter travel times.	• Road safety needs to be considered in the design including higher traffic speeds, higher volumes of traffic and a variety of vehicles using the road.

Manuwarra Red Dog Highway Stage 4 Planning Phase Performance

- Ongoing stakeholder engagement to develop safety related requirements.
- Road safety investigations have commenced and will continue through the design phase to deliver a safe road.
- The Planning target "*Define and include Pilbara Proof design criteria in the basis of design*" will help deliver a resilient road that improves access to health services.

UN Goal 6
Clean Water and Sanitation

Positive Impacts	Negative Impacts
• Water conservation / reduced water consumption by being innovative compared to "business as usual" design and construction	• High water use during construction, but minimal operational needs. • Potential for increased water

Manuwarra Red Dog Highway Stage 4 Planning Phase Performance

- The project has identified the need to protect the Millstream aquifer.
- The following targets have been progressed to incorporate water efficiency opportunities into the Planning phase:
  - *Develop a water use spreadsheet to assist in minimising water use.*
  - *Identify and document 2 water efficient strategies*
  - *Develop a shared land use concept*
- The Planning target "*Test alignment options to reduce impact on existing water courses*" contributes towards protecting water resources.

UN Goal 8
Decent Work and Economic Growth

Positive Impacts	Negative Impacts
• The project can support and facilitate business opportunities in the region during construction. • Economic growth in the region is encouraged by providing a faster route between Karratha and Tom Price.	• None identified during Planning phase.

Manuwarra Red Dog Highway Stage 4 Planning Phase Performance

- The Planning target "*Develop a workforce optimisation spreadsheet to assist Delivery with a local employment and skills inclusion strategy*" is complete.
- Stakeholder engagement continues with the Wintawari Guruma and Yindjibarndi Traditional Owners to identify local business and employment opportunities.
- The project team continues to explore opportunities to work with Pilbara-based suppliers to assist the project objective "*Maximise 'on alignment' materials/resources*".

UN Goal 9
Industry, Innovation and Infrastructure

Positive Impacts	Negative Impacts
A resilient road design that avoids overengineering is required. The road increases the resiliency of infrastructure in the region and improves industry and community mobility. The road will contribute to economic growth in the region.	Road design needs to minimise negative impacts to business such as the severance of pastoral leases. Road network maintenance can interrupt business activities. Road maintenance must enable ongoing access for pastoralists and mining companies.

Manuwarra Red Dog Highway Stage 4 Planning Phase Performance

- Innovation is a strong focus of the project team. Main Roads management encourages the project team to challenge business as usual and look for innovative solutions.
- The target "*Define and include Pilbara Proof design criteria in the basis of design*".
- The Planning target "*Investigate two opportunities for recycled / efficient use of materials*" is complete.
- The Planning target "*Identify and implement at least two innovative strategies to support project processes and/or design outcomes.*" is complete.

UN Goal 10
Reduced Inequalities

Positive Impacts	Negative Impacts
• Reduced inequality by protecting heritage sites where possible. • Potential for local and Traditional Owner communities and businesses to be involved in the project.	• None identified during Planning phase.

Manuwarra Red Dog Highway Stage 4 Planning Phase Performance

- Two Planning targets supporting inclusion of communities and local businesses in the project are complete: "*Investigate at least two environmental legacy initiatives*" and "*Develop a workforce optimisation spreadsheet to assist Delivery with a local employment and skills inclusion strategy*".
- The project is also investigating opportunities for social legacy initiatives that provide long-lasting positive benefits to local communities
- The project is continuing with heritage surveys and Traditional Owner engagement to reduce impact on known heritage sites

UN Goal 12
Responsible Consumption and Production

Positive Impacts	Negative Impacts
• Potential for innovative solutions around construction materials and waste products.	• High consumption of materials during construction. Significant planning required including investigation of alternative materials sources and use of material within alignment.

Manuwarra Red Dog Highway Stage 4 Planning Phase Performance

- The Planning target "*Investigate two opportunities for recycled / efficient use of materials*" is complete.
- A Resource Efficiency Strategy has been developed for the project.

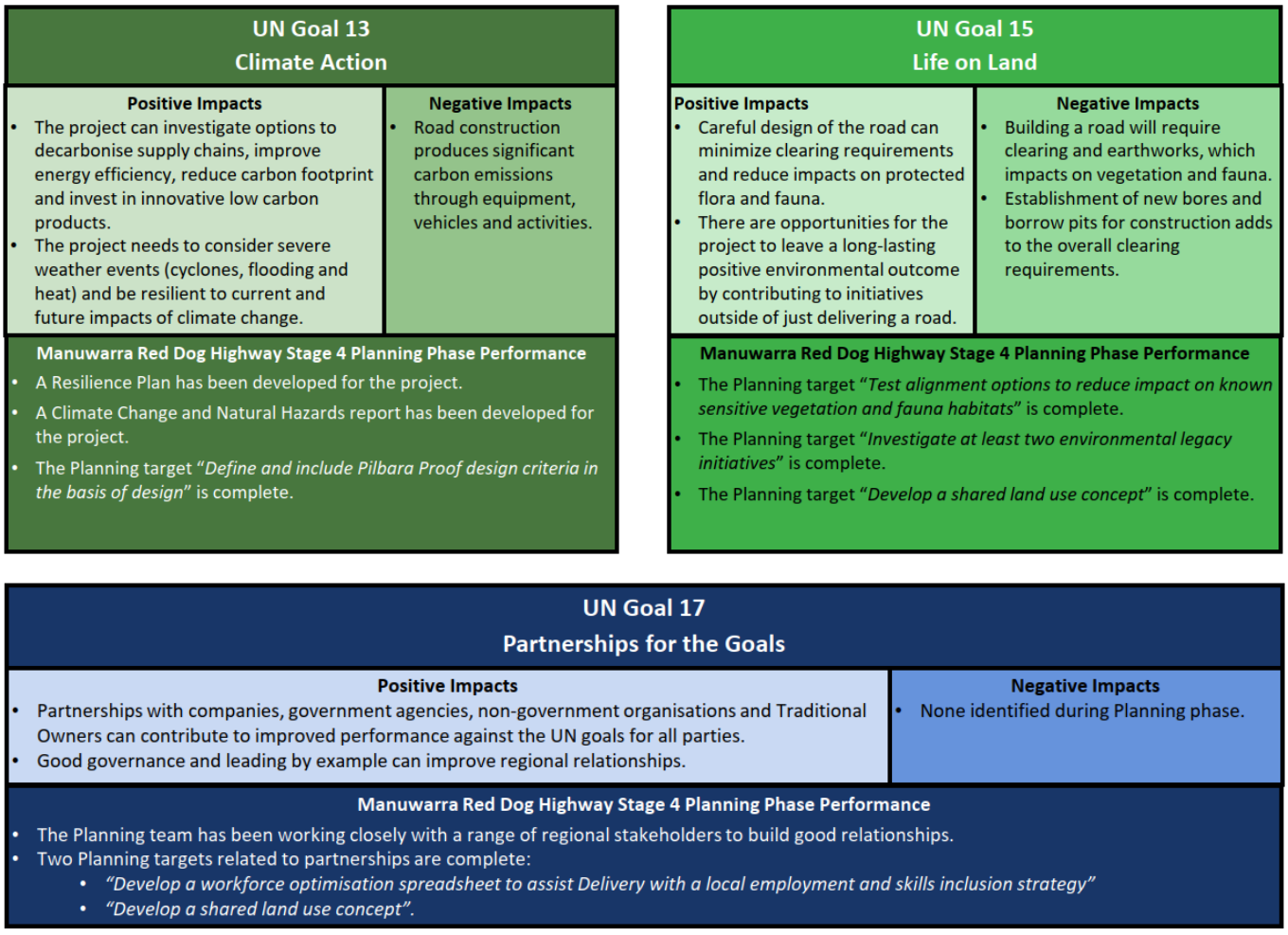

Figure 4 UN Goal Performance

Environmental Aspects

Figure 5 Acacia species

Environmental context

The project is located in the Pilbara region of Western Australia within the Shire of Ashburton. The Shire has historically been used for pastoral land, mining, tourism, and conservation.

Vegetation within the Development Envelope lies within the Beard (1975) Fortescue Botanical District (Pilbara Region) and is further divided into the Fortescue Valley and Hammersley Plateau subdivisions.

The project traverses the *Themeda grasslands on cracking clays (Hamersley Station)* Threatened Ecological Community (TEC). The vegetation community is listed as a vulnerable (Category A) TEC by the

Western Australian Department of Biodiversity, Conservation and Attractions (DBCA) but is not listed for the purposes of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

The project also traverses a known occurrence of the Priority Ecological Community (PEC) 'Brockman Iron cracking clay communities of the Hamersley Range'.

Eucalyptus and Melaleuca species that depend on groundwater have been identified by Biota (2021) as being present in and around the Development Envelope. This vegetation is restricted to the major drainage lines (Fortescue River, Weelumurra Creek and its tributaries; and Barnett Creek (Biota, 2021)).

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and Western Australian *Biodiversity Conservation Act 2016* listed flora and fauna species and ecological communities that may be impacted by the project are listed in Appendix 1 and Appendix 2.

The Fortescue River and associated tributaries intersect the project area in the northern part of the road. Weelamurra Creek also intersects the project area and has been lodged (not yet registered) as a heritage site. Caves Creek intersects the project area in the southern section of the road.

The Millstream wellfield is located approximately 100 km south of Karratha. Along with water from the Harding Dam Catchment Area and the Bungaroo Creek Water Reserve, it supplies the West Pilbara Water Supply Scheme. This scheme supplies water to Karratha, Dampier, Roebourne, Wickham, Point Samson, Cape Lambert, and the Burrup Peninsula. The Millstream wellfield and surrounding area is encompassed by a water reserve (the Millstream Water Reserve (West Pilbara) Public Drinking Water Resource Area [Millstream Water Reserve]) and associated Priority 1 and Priority 2 Groundwater Protection Areas. The project is located partially within both of these priority drinking water areas.

The project proposes to use the Pilbara Environmental Offsets Fund (PEOF) to facilitate offsets for Stage 4. The PEOF was established to invest in strategic conservation projects in the Pilbara region to improve vegetation and species habitat impacted by development. The fund delivers environmental offset projects in partnership with traditional owners, conservation agencies, industry and government. This enables the delivery of larger and more strategic landscape-scale projects than would occur if individual offset projects were delivered independently, leading to better biodiversity conservation outcomes (DWER, 2019).

Figure 6 Typical Landscape of Manuwarra Red Dog Highway

Environmental Management

Manuwarra Red Dog Highway Stage 4 will require permanent clearing of approximately 550 hectares (ha) of native vegetation (road, drainage infrastructure) and the temporary clearing of an additional 100 ha (camps, laydown, stockpiles, construction access) which will be rehabilitated. Rehabilitation will use locally native species and will comply with *MRWA Vegetation Placement within the Road Reserve* Doc. No. 6707/022 (Main Roads, 2013).

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

- *Environmental Protection Act 1986* Section 38 referral to the Western Australia (WA) Environmental Protection Authority (EPA)
- *Environment Protection and Biodiversity Conservation Act 1999* referral to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW)
- *Aboriginal Heritage Act 1972* Section 18 consent or consent through the *Aboriginal Cultural Heritage Act 2021*, if in force
- Licences to construct bore and abstract water
- Bed and banks permit.

A Preliminary Environmental Impact Assessment (PEIA) was undertaken to evaluate the potential environmental impacts of the project. Following this, Stage 4 was referred to both the WA EPA and

Commonwealth DCCEEW for environmental approvals.

In December 2020, the WA EPA decided to assess the project based on Referral Information. In January 2021, the EPA issued a notice requiring further information. Documents have been prepared for the EPA and the public review period of 4 weeks occurred from the 8th August 2022 to the 5th September 2022. Further information can be found on the WA EPA website.

The Commonwealth DCCEEW has ruled that the project is a controlled action. The project requires assessment and approval under the *Environment Protection and Biodiversity Conservation Act 1999* before it can proceed. The project will be assessed by preliminary documentation. Preliminary documentation are currently being prepared and are expected to be published in August 2022 for public comment on the EPBC Act Public Portal website.

The following management plans are being developed for Manuwarra Red Dog Highway Stage 4 to manage potential impacts:

- Aboriginal Heritage Management Plan(to be developed for Aboriginal heritage approvals)
- Construction Environmental Management Plan (to be developed during the detailed design phase) will include management measures for flora, weeds, fauna and fauna habitat, groundwater quality
- Groundwater and Surface Water Operating Strategy (to be developed during the detailed design phase to mitigate the impact of groundwater drawdown on groundwater dependent vegetation)
- Noise and Vibration Management Plan (to address any risks to Ghost Bats (to be developed during the detailed design phase to meet Commonwealth requirements))
- Fauna Action Management Plan (to be developed for Commonwealth approvals)

Water Management

Water management is a priority issue for Manuwarra Red Dog Highway Stage 4. Managing water consumption is critical, due to the proximity of the Millstream Water Reserve (West Pilbara) Public Drinking Water Resource Area.

Drinking water in the Pilbara is mainly groundwater and the Millstream Water Reserve services several key localities in the Pilbara region. The Development Envelope overlaps this water reserve, including areas listed partially as Priority 1 and Priority 2 drinking water areas.

Eucalyptus and Melaleuca species that depend on groundwater have been identified as being present in and around the development envelope. This vegetation is restricted to the major drainage lines (Fortescue River, Weelumurra Creek and its tributaries; and Barnett Creek (Biota, 2021).

A hydrological risk assessment was undertaken in 2022 which provides an understanding of the surface water regime throughout the Development Envelope; identifies and describes the hydrological risk factors and proposes design criteria to be adopted in managing major waterways. Selection of the preferred road corridor alignment included assessment of potential impacts on water features including numerous floodways and creek crossings, major watercourse crossings (Fortescue River and Weelamurra Creek) and groundwater dependent vegetation.

Materials & Recycling

Two resource efficiency workshops were undertaken in the previous reporting period to explore circular economy options associated with materials, waste products, and maximising reuse and efficiency. The outcomes of both workshops were incorporated into the project targets. These targets continued to be progressed in the 2021/2022 reporting period.

A Resource Efficiency Strategy has been completed for the project in alignment with Keeping WA Moving, Main Roads commitments, and the Main Roads Recycled Materials Reference Guide. The Resource Efficiency Strategy includes high-level estimates of the materials and resources needed for Stage 4, which has allowed the project team to identify opportunity areas to meet the project's resource efficiency objectives. These estimates will be refined during the design phase of the project. The opportunity areas are outlined in **Table 2**.

Table 2 Resource efficiency opportunity areas identified

	Resource efficiency opportunity areas
Waste (Resource Outputs)	Minimisation of waste generation
	Maximised onsite reuse of reusable waste material
	Maximised offsite reuse of reusable waste where onsite solutions cannot be identified
	Deconstruction/disassembly/adaptability of the asset
	Beneficial reuse of existing onsite materials
	Beneficial reuse of waste materials by nearby Projects/assets
Materials (Resource Inputs)	Optimisation of overall materials use
	Minimised use of virgin materials
	Maximised use of local materials
	Maximised use of materials that can be reused or recycled
	Beneficial reuse of material outputs from nearby project/assets
	Maximised use of material inputs with recycled content
	Minimised environmental and social impact of logistics

The key basic raw materials required for construction of the road include sand, limestone, clay, lateritic gravel, and crushed rock aggregate. Where practicable, the Proposed Action will seek to balance the 'cut to fill' requirements during construction to minimise any net import or export of material from the project. This will minimise the requirement to import additional material, thus minimising costs and environment impacts (e.g. carbon dioxide emissions) associated with transport.

Economic Aspects

At a glance

Economic Aspect	Total for Project
Funding	$265m
Current No. of vehicles per day	N/A – New Road
Forecast Travel Time Saving	4 hours*
Forecast Increase of vehicle capacity	N/A - New Road
Forecast Increase in cycling and pedestrian facilities (i.e. increase in PSP length)	N/A - Remote

* Note that we have considered a number of different routes to compare the travel time savings against, as some of the current roads require permits, are un-sealed, or are closed in the event of small rainfall

Figure 7 Northern end of Manuwarra Red Dog Highway Stage 4

Economic context

Manuwarra Red Dog Highway is a nationally important strategic investment. It will enormously improve linkages between major service centres and stimulate economic activity in the Pilbara, a powerhouse of the Australian economy and a burgeoning tourist destination, delivering significant social and community benefits. Compared to alternative sealed routes, distances and travel times will be approximately halved.

The Pilbara region is a globally significant mining and energy region, boasting a wealth of resource endowments, dynamic communities, rich Aboriginal culture and stunning natural landscapes. An upgraded road will enable much easier access to major tourism destinations such as Karijini National Park and open the potential for tourism opportunities such as Aboriginal cultural experiences and day trips from Karratha.

Reliable access to move personnel and equipment to and from mines significantly influences economics for the mining industry, because delays in logistics due to access issues can have considerable cost implications. A sealed road could enable some mines to be serviced on a Drive-in Drive-out (DIDO) rather than a Fly-in Fly-out (FIFO) basis, which would provide cost savings in terms of both logistics reliability and cheaper mode of transport for bringing in people, supplies and equipment.

Stage 4 of Manuwarra Red Dog Highway comprises approximately 112 km of new road from the southern end of Stage 3 of the Manuwarra Red Dog Highway (Wallyinya Pool) to the Nanutarra - Munjina Road. The road will be a standard two-lane single carriageway with associated waterway crossings. An upgraded road will substantially reduce the distance and cost of travel for remote communities. Currently the travel distance, cost of travel and the impact of road closures (e.g during flooding) significantly impact communities, including Aboriginal communities, and make it difficult to access health, education, and employment opportunities.

Key Economic Outcomes

The benefits that would arise from upgrading and sealing the road are summarised below:

- Major travel time savings
- Reductions in vehicle operating costs for all road users including businesses, passenger vehicles and tourists
- Improved safety
- Improved economic outcomes, especially mining and tourism, resulting from reduced travel costs, certainty of travel, and availability of new options
- Better access to education, health, and employment opportunities
- Potential of being able to replace FIFO mining operations with DIDO.

Options Assessment

During the Planning phase, options assessment has focused on potential high-risk areas of the project and challenging the ‘base case’ assumptions of these areas. By reviewing the ‘base case’ assumptions at this early stage of the project, and testing changes to these assumptions, small changes in alignment and design parameters can lead to large construction and maintenance savings; whilst providing a robust road that meets the needs of the local and regional communities.

An Options Assessment framework outlining a Multi-Criteria Analysis Tool was developed and used by the project team to provide a formal, objective and documented process in which key decisions regarding road alignment and road design parameters are interrogated using balanced environmental, social, and economic criteria. A number of project options were assessed in the previous reporting

period.

Further analysis of the options for the road alignment was undertaken in this reporting period to produce a preferred road corridor alignment. The preferred alignment addressed key constraints, such as the mitigation of impacts on other land users, environmental constraints and heritage constraints. These included:

- the existing Rio Tinto Dampier to Paraburdoo main rail line & spur line(s)
- the existing Fortescue Metals Group Eliwana rail line
- existing infrastructure such as 220kV overhead power line cables, the existing Telstra fibre optic cable and existing high-pressure gas line
- existing land uses such as the Coolawanyah and Hamersley pastoral leases, the Hamersley Homestead, tourism destinations, crown reserves and mining tenements
- numerous floodways and creek crossings
- major watercourse crossings (Fortescue River and Weelamurra Creek)
- major floodplain management (Fortescue and Eliwana Floodplains)
- heritage constraints including Aboriginal heritage sites and
- environmental constraints including State listed Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs); and State and Commonwealth listed protected flora, fauna and fauna habitat.

Climate Change Assessments

Resilient transport infrastructure plays a vital role in the resiliency of a region. Manuwarra Red Dog Highway Stage 4 is aimed at improving resilience against climate and natural hazards, shocks and stresses and the role it can play in contributing towards the resilience of the Pilbara region by considering the complex and interdependent systems that bind them together. In alignment with UN Goal 13, the project has investigated options to decarbonise supply chains, improve energy efficiency, reduce carbon footprint, and invest in innovative low carbon products.

A combined approach was taken to assessing risks to resilience for Manuwarra Red Dog Highway Stage 4, covering both climate and natural hazard risks as well as other shocks and stressors. A resilience, climate and natural hazard workshop was held in November 2020 with a broad range of internal and external stakeholders to develop shared understanding of resilience and climate change risk for Manuwarra Red Dog Highway Stage 4.

The outputs of the workshop supported the development of draft management measures for the identified shocks, stressors and climate risks. These management measures continued to be refined and progressed during the reporting period. A Resilience Plan and a Climate Change and Natural Hazards Report have been developed for the project based on the information available during this Planning stage of the project. As the Project progresses through detailed design and more information becomes available, the Resilience Plan, Climate Change and Natural Hazards Report, and management measures will be able to be refined.

Climate change and resilience were also factors discussed and considered during the project options assessment using a Multi-Criteria Analysis Tool. For example, the options assessment included potential impacts from changes in rainfall patterns (based on current climate change projections) on alignment options near waterways or that may be prone to flooding.

Water Resilience

Water resources are scarce and infrastructure projects play a vital role in efforts to conserve water. Water is required for the construction phase of the project, namely for dust suppression and material conditioning. To support water efficiency and use of suitable water sources during the construction phase, a preliminary water supply strategy was developed in 2020. A water-optimisation spreadsheet was also developed to estimate the water requirements during construction and assist with the assessment of different options to help the project understand how water-use can be reduced. The project has identified some opportunities to source water from non-potable sources and to reduce the water demand from construction related activities. These opportunities will be considered further as the project progresses.

In 2022, activities in the reporting period largely focused on continuation of options assessment and selection of the preferred road corridor alignment. Once the preferred road corridor alignment was chosen, the water estimates from 2020 were re-calculated and the water demand for the preferred road alignment are comparable to the preliminary water supply strategy.

Social Aspects

At a glance

Social Aspect	Year to 31 July
Community Satisfaction to Project	No unmanaged community concerns escalated during Planning Phase.
No. of Stakeholders engaged with during project development	84 documented engagements including workshops and community events.
No. of complaints	No documented complaints regarding Stage 4 project to date
No. of legacy commitments	Nil to date.
No. of heritage sites in project vicinity	Heritage surveys are continuing. To date, the following has been recorded: Wintawari Guruma country: • 14 newly identified sites to a Site Avoidance standard • 8 previously identified heritage places reassessed to a site avoidance standard • 4 new Eastern Guruma ethnographic sites recorded Yinjibarndi country: • 16 newly identified sites to a Site Avoidance standard
No. of heritage sites significantly impacted	

Figure 8 Project area

Social context

The Manuwarra Red Dog Highway Stage 4 project has prioritised stakeholder engagement efforts early in the project to construct a resilient and sustainable road that meets the need of all users.

The highway will play an important strategic role in improving connection between communities across City of Karratha and Shire of Ashburton. The majority of social benefit will be received from communities and businesses that may use the highway to improve reliability and duration of travel times between regional centres. Reducing the geographical isolation of these remote regional centres is expected to improve social amenity through better access to social and medical services, sporting, educational and employment opportunities.

External stakeholder feedback regarding the road's context and its interrelationship with external influences was provided in 2019. Stakeholders helped define the role of the road in the context of local, regional, state, and international communities as per **Table 3**. Ongoing liaison with stakeholders throughout 2021/2022 confirmed that these topics remained relevant, with stakeholders' areas of concern focused on the impacts to be mitigated through design and construction – including pastoral

impacts, cultural heritage considerations, local and Traditional Owner economic opportunities and consideration for exploration and mining leases.

Table 3 The role of Manuwarra Red Dog Highway

Roles of the Road in the Context of Community
Not the only road – pastoral use
Safe and efficient access - fatigue management
Missing link between earlier stages at Tom Price
Construction contracts
Business growth
Develop region
Save money
Reliability of access
Connects urban centres and National Parks with a sealed public road
Opportunities for the Port
Mine operations
Social connectivity – sports and family connections
Asbestos risk removal

Community & Stakeholder Engagement

Stakeholder consultation has continued with regards to the Manuwarra Red Dog Highway Stage 4 since 2019 and is expected to continue through the Deliver and Operations Phases.

A Communication and Stakeholder Engagement Strategy (CSES) has been implemented throughout the 2021/2022 reporting period to achieve the following outcomes:

- Stakeholder satisfaction with the engagement process – felt involved / had influence;
- Identify, address, and resolve stakeholder issues;
- Positive reputation for Main Roads and its project management;
- Build strong, ongoing relationships with the local community, generating trust and confidence in Main Roads and their vision for the road network.

As the Manuwarra Red Dog Highway Stage 4 project relies on a wide range of stakeholder participation from across government agencies, private sector and the wider community, early engagement can help Main Roads be better informed about stakeholder concerns, issues, and challenges. Additional stakeholders were identified in 2022 and a comprehensive list of stakeholders is provided in Appendix 3.

The project has been engaging with Traditional Owners throughout the Planning phase and the project team has prioritised a culturally focused approach. Work with Traditional Owners to form appropriate

Reference groups continued in 2021/2022.

Stakeholder input is being sought on many areas to provide input into the design. Several additional feedback themes have been identified through ongoing engagement with Manuwarra Red Dog Highway Stage 4 stakeholders. These feedback themes reflect key negotiables - elements of the project that are not bound by legislative or statutory requirements and can be influenced or changed by stakeholder feedback. The following were the most common themes:

- Alignment definition (road alignment, wayfinding and amenities)
- Opportunities for Wintawari Guruma and Yindjibarndi Aboriginal Corporations and other local businesses
- Industry collaboration opportunities
- Material supply (preference for local materials and reuse of existing available materials).

The project negotiables have been revised on several occasions throughout the Planning Phase to reflect progression of alignment decisions, field survey information and feedback from stakeholders. To date, stakeholder input has influenced development of the following Manuwarra Red Dog Highway project negotiables:

- Engagement with mining companies to facilitate future connectivity including Agreement on the highway Interface with the FMG rail bridge (Eliwana Arch)
- Community feedback on the naming of the Manuwarra Red Dog Highway (changed from Karratha – Tom Price Road)
- Defining of the 'Pilbara Proof' concept
- Corridor alignment and route selection including avoidance of Aboriginal heritage sites
- Wintawari Guruma representatives input into the corridor selected near Hamersley Homestead
- Workforce planning
- Signage strategies
- Safety and technical recommendations for the highway to remain on the western side of the existing rail line
- Freight industry preference to accommodate RAV10 vehicles.

The list of current negotiables at the end of July 2022 is detailed in **Table 4**.

Table 4 Stakeholder negotiables

Negotiables as at July 2022
Stakeholder led innovations
Stakeholder led legacy idea
Name suggestions
Environmental offset opportunities
Potential social offsets and win-win outcomes
Traditional owner and other local business opportunities
Input into construction methodology

Negotiables as at July 2022
Directional signage and branding
Water sourcing opportunities
Industry collaboration opportunities
Material supply
Defining 'Pilbara Proof'
Alignment definition
Roadside amenities
Avoidance of Traditional Owner heritage sites
Mitigation of Environmental Impacts

As the Manuwarra Red Dog Highway Stage 4 project progresses, it is expected that these negotiables will evolve alongside the alignment refinement.

It is expected that further incorporation of stakeholder feedback will be involved in the optioneering process to minimise potential impacts on cultural heritage sites, future extractive industry operations, pastoral station sterilisation and interaction with local road networks.

Addressing community concerns

The project team evaluated stakeholder engagement effectiveness in November 2020 to assess achievement of engagement objectives, identify opportunities for improvement and collate feedback from stakeholders on the level in which they felt their input had influenced the project. Stakeholder engagement lessons learned reviews were also undertaken internally in April 2021 and March 2022 to review stakeholder engagement objectives, engagement activities undertaken, key feedback themes and stakeholder influence on project negotiables.

A stakeholder engagement summary report has been prepared to capture key methods for sharing information, summarising key stakeholder and community concerns, as well as outlining how community and stakeholder concerns have been addressed to date. This summary report will assist in the planning for the delivery phase of the Manuwarra Red Dog Highway Stage 4 project.

Heritage

Native Title exists across the development envelope with the Ngarluma and Yindjibarndi People having Native Title rights in the northern portion of the development envelope and the Wintawari Guruma People having Native Title rights in the southern portion.

Ethnographic and archaeological heritage surveys with Traditional Owners over the northern sections (Coolawanyah and Hamersley) of the alignment corridor in Yindjibarndi country were conducted by Juluwarlu Group Aboriginal Corporation (JGAC), along with Stevens Heritage Services and Gavin Jackson Cultural Resource Management. Reporting of these surveys is being finalised.

Wintawari Guruma Aboriginal Corporation (WGAC) and Yulur Heritage conducted surveys with Eastern Guruma Traditional Owners over the Hamersley section and the southern section (Tom Price), and further surveys will be conducted in Eastern Guruma country to complete mapping of the alignment corridor.

The surveys identified and mapped the extent of archaeological or ethnographic heritage sites that exist

within the alignment corridor to enable Main Roads to avoid them where possible. The Yindjibarndi and Eastern Guruma Traditional Owners were also invited to provide recommendations on the management of those sites.

Workforce Development

The project's approach to workforce, guided by the sustainability vision has focussed the project leadership group on how the workforce strategy contributes to maximising social and cultural opportunities and the delivery of a resilient 'Pilbara proof' asset. A 'Workforce Sustainability' management capability underpins the approach which is supported by several workforce planning tools and the innovative Workforce Optimisation Tool. The tool maps the Manuwarra Red Dog Highway Stage 4 project lifecycle workforce and salary data to enhance the ongoing workforce management and decision-making for the Stage 4 workforce, from Develop through to Delivery stages.

Appendix 1 - List of Protected Areas Project interfaces with:

- *Themeda grasslands on cracking clays (Hamersley Station)* Threatened Ecological Community (Category A)
- Brockman Iron cracking clay communities of the Hamersley Range - Priority 1 (Priority Ecological Community)
- The Millstream Water Reserve (West Pilbara) Public Drinking Water Resource Area [Millstream Water Reserve]) and associated Priority 1 and Priority 2 Groundwater Protection Areas.

Appendix 2 - Protected fauna and flora species and habitat

Protected flora species:

- *Aristida lazaridis* (Priority 1)
- *Aristida jerichoensis* var. *subspinulifera* (Priority 3)
- *Astrebla lappacea* (Priority 3)
- *Dolichocarpa* sp. Hamersley Station (A.A. Mitchell PRP 1479) (Priority 3)
- *Eremophila magnifica* subsp. *velutina* (Priority 4)
- *Euphorbia australis* var. *glabra* (Priority 3)
- *Euphorbia inappendiculata* var. *inappendiculate* (Priority 2)
- *Euphorbia inappendiculata* var. *queenslandica* (Priority 2)
- *Glycine falcata* (Priority 3)
- *Goodenia berringbinensis*) (Priority 4)
- *Goodenia nuda* (Priority 4)
- *Gymnanthera cunninghamii* (Priority 3)
- *Hibiscus* sp. Mt Brockman (E. Thoma ET 1354) (Priority 1)
- *Josephinia* sp. Woodstock (A.A,. Mitchell PRP 989) (Priority 1)
- *Rhagodia* sp. Hamersley (M. Trudgen 17794) (Priority 3)
- *Sida* sp. Hamersley Range (K. Newbey 10692) (Priority 3)
- *Seringia exastia* - Critically Endangered under the EPBC Act and Critically Endangered under the BC Act. Expected to be de-listed due to recent genetic studies that show its similarity with the common and widespread species *Seringia elliptica*.
- *Swainsona thompsoniana* (Priority 3)
- *Themeda* sp. Hamersley Station (M.E. Trudgen 11431) (Priority 3)
- *Triodia basitricha* (Priority 3)
- *Vittadinia* sp. Coondewanna Flats (S. van Leeuwen 4684) (Priority 1)

Protected fauna species:

- Northern Quoll (*Dasyurus hallucatus*) - Endangered under the EPBC Act and BC Act
- The Pilbara Leaf Nosed Bat (*Rhinonicteris aurantia*) (Pilbara form) - Vulnerable under the EPBC Act and BC Act. Potential foraging habitat for the species within the project area.
- Ghost Bat (*Macroderma gigas*) - Vulnerable under the EPBC Act and BC Act
- Pilbara Olive Python (*Liasis olivaceus barroni*) - Vulnerable under the EPBC Act and BC Act.

- Night Parrot (*Pezoporus occidentalis*) - Endangered under the EPBC Act and Critically Endangered under the BC Act.
- Grey Falcon (*Falco hypoleucos*) - Vulnerable under the EPBC Act and BC Act
- Pacific Swift (*Apus pacificus*) – Migratory/marine under the EBPC Act, not listed under BC Act
- Western Pebble-mound Mouse (*Pseudomys chapmani*) – Priority 4 under the BC Act, not listed under the EPBC Act.
- Fork-tailed Swift (*Apus pacificus*) – Migratory under the BC Act, not listed under the EPBC Act.
- Northern Short-tailed Mouse (*Leggadina lakedownensis*) – Priority 4 under the BC Act, not listed under the EPBC Act.
- Lined Soil-crevice Skink (Dampier) (*Notoscincus butleri*) - Priority 4 under the BC Act, not listed under the EPBC Act.

Appendix 3 – List of Stakeholders to the Project

Stakeholder
Federal Government Federal Minister for Infrastructure, Transport, Regional Development and Local Government, Hon Catherine King MP
State Government Minister for Transport, Hon Rita Saffioti Premier Mark McGowan Minister for Regional Development Alannah MacTiernan
State Local Members Kevin Michel, MLA - Member for Pilbara Hon. Kyle McGinn, MLC - Member for Mining and Pastoral Region
State Government Agencies • Department of Transport (DoT) • Department of Planning, Lands and Heritage (DPLH) • Department of Biodiversity, Conservation and Attractions (DBCA) • Department of Health (DoH) • Department of Water and Environment Regulation (DWER) • Pilbara Development Commission (PDC) • Department of Mines, Industry, and Safety (including Worksafe) (DMIRS) • Water Corporation/Service providers • Regional Development Australia (RDA)
Federal Government Agencies • Department of Climate Change, Energy, the Environment and Water (DCCEEW)
Mining Companies Rio Tinto Iron Ore (RTIO) Mineral Resources Limited (MRL) Balla Balla Infrastructure (BBI) Fortescue Mining Group (FMG)
Pastoral Stations Coolawanyah Station Hammersley Station
Aboriginal Corporations Wintawari Garuma Aboriginal Corporation Yindjibarndi Aboriginal Corporation Other local PACs
Emergency Services • St John Ambulance

- Department of Fire and Emergency Services (FESA)
- WA Police

Local Governments
Shire of Ashburton
City of Karratha

Industry Bodies
Freight and Logistics Council of WA
Western Transport Federation
Pilbara Tourism Association (PTA)

Visitor Centres
Karratha Visitor Centre
Tom Price Visitor Centre

Businesses
Local businesses
Businesses (construction related)
Prescribe Aboriginal Corporation businesses

Chamber of Commerce and Industry
Karratha District Chamber of Commerce and Industry
Pilbara Inland Chamber of Commerce and Industry

Local Communities
Sporting groups

Training Resources
Tom Price High School
TAFE
Training Centres

Road Users
Residents within Karratha/Tom Price/Paraburdoo who may use the road
Tourists/Visitors

Environmental Groups

Appendix 4 – Sustainability Dashboard for Project Development

Environment

Aspect	Total for Project
Actual clearing to date (ha)	0
Actual rehabilitation/revegetation to date (ha)	0
Total water use for Project to date (kl)	0
Total energy use for the Project to date (MJ)	0
Total GHGs for the Project to date (t $CO_{2\text{-}e}$)	0
Total imported materials used (t)	0
Total recycled materials used (t)	0

Social

Social Aspect	Total for Project
No. of Stakeholders engaged with during Project development	N/A
No. of Legacy commitments	N/A
No. of heritage sites in Project vicinity	Surveys incomplete
No. of heritage sites significantly impacted	Surveys incomplete
Existing number of traffic safety incidents within Project boundary	N/A
Forecast number of traffic safety incidents within Project boundary	N/A
% of women in Project development workforce	N/A
% indigenous in Project development workforce	N/A
% of people with disabilities in Project development workforce	N/A
Number of hours training during Project development	N/A
Number of development employees and apprentices during Project development	N/A
Number of employees (FTEs) sourced from local community for Project development	N/A
Safety metrics during Project development i.e. ROSMA crash metric reduction target	N/A

Economic

Economic Aspect	Total for Project
Project spend to date	N/A
Project spend to date by significant Project activities including key contracts to deliver activities	N/A
Number of people employed by supply chain during Project development	N/A
Number of suppliers engaged during Project development	N/A
Number of Indigenous Enterprise during Project development	N/A
Number of Disability Enterprise during Project development	N/A
Buy Local Spend during Project development	N/A

Appendix 5 – Main Roads WA Sustainability Policy

MAIN ROADS WESTERN AUSTRALIA

JULY 2016

Sustainability Policy

We are committed to **developing a transport network that meets social, economic and environmental needs.**

Transport is essential to the development of Western Australia and plays a vital role in creating competitive economies and liveable, inclusive communities by enabling the movement of people and freight.

Intent

- Within the sphere of influence of road-based transport improve the overall outcomes of the transport system
- Address the implications of climate change for Main Roads with consideration of our customers and stakeholders
- Reduce the environmental footprint of our business
- To be informed of environmental, economic, cultural, political and social issues impacting us
- Ensure our key sustainability aspects are considered within our decisions
- Look for ways to maximise whole of government revenue
- Reduce our on-going operational costs

Objectives

- Deliver a road-based transport system that improves community amenity, mobility and travel choice whilst reducing indirect environmental impacts
- Develop an appropriate response and adapt to our changing climate
- Reduce our impact on the natural environment by focusing on emissions, pollution, waste, land use and resources
- Develop a culture of sustainability within our organisation, our industry and our community
- Ensure high standards in governance by measuring and reporting our sustainability performance against our key sustainability aspects
- Create opportunities for innovation in funding and financing for road infrastructure development and maintenance

Peter Woronzow
A/Managing Director of Main Roads

This policy is reviewed every two years or as required to ensure it complies and is relevant to legislative and business obligations.

mainroads WESTERN AUSTRALIA

Appendix 6 – Glossary of Terms

Term	Definition
CSES	Community and Stakeholder Engagement Strategy
DCCEEW	Department of Agriculture, Water and Environment
Develop Phase	Includes the development of the alignment and reference design, as well as development of plans that enable the successful delivery and implementation of the Project. The Project delivery method is determined, procurement options and the preliminary estimates are prepared.
Deliver Phase	Includes development of the preliminary (or tender) design, then detailed design and delivery of the Project to agreed time, cost and scope. A delivery partner may be selected at this point where a design and construct delivery method is employed.
EPA	Environmental Protection Authority
ISAP	Infrastructure Sustainability Accredited Professional
ISC	The Infrastructure Sustainability Council
IS Rating Scheme	Infrastructure Sustainability (IS) rating scheme comprises: The IS rating tools for Planning, Design and As Built and Operation ISCA education and training programs (including the IS Accredited Professional program) Working and Advisory Groups.
IS Rating Tool	The IS rating tool is the tangible part of the scheme, used to undertake assessment. It comprises: 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)
Main Roads	Main Roads Western Australia
Objective	The desired result or outcome that the Project is trying to achieve
PEIA	Preliminary Environmental Impact Assessment
Pilbara proof	Pilbara Proof refers to a resilient road design that acknowledges the unique hydrology considerations of the Pilbara. It provides a fit for purpose approach that maximises service availability, minimises requirements for post flooding maintenance requirements, and provides a value for money approach to delivering critical road facilities in the Pilbara.
Planning Phase	Includes the Project development corridor, a wide corridor that provides sufficient room for options for the road alignment. It also includes alignment definition, some options assessment and the development of plans that enable the successful planning of the Project.
Recycled	A used item is processed into a totally new product via an energy consuming process.
Reused	The practice of reutilising an item into same or a different use after the original purpose is filled.

Term	Definition
Target	A measurable and realistic level of performance for a specified performance indicator.
Vision	A sentence or short paragraph describing the aspirations for the Project that underpin strategic planning.