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WESTERN AUSTRALIA

Great Northern Highway Muchea to Wubin Stage 2 Upgrade: Annual Project Sustainability Report 2018



This annual report covers the period from July 2017 to June 2018. A previous annual sustainability report was prepared for the project for the 2014/15, 2015/16 and 2016/17 financial years.

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About this Report

This report has been prepared by the Great Northern Highway Muchea to Wubin Stage 2 Upgrade (GNHM2W) Integrated Project Team (GNH IPT) on behalf of Main Roads Western Australia (Main Roads). This report is linked to Main Roads' Annual Financial Report and Annual Sustainability Report. The content of this report has been collected and aligned with Infrastructure Sustainability Council of Australia (ISCA) Design and As Built Rating frameworks and the report content is prepared in accordance with Global Reporting Initiative (GRI) principals.

Introduction

GNHM2W project is a program of works to upgrade sections of highway to improve road safety; increase freight efficiency; improve network reliability; enhance travel wellbeing; contribute to sustainable and viable communities; and enhance the environment. Sustainability has been incorporated into the project by identifying key priority areas in safety, ecology, community and resources during the planning stage of the project.

The sustainability focus for the 2017/2018 financial year has been twofold: to continue to seek out sustainability opportunities through the final design and tender of packages; and to support contractors to execute sustainability on site during construction of the packages to meet the GNH project objectives and effectively contribute to an IS As Built Rating. This has been achieved through the development and trial of contractual specifications and procurement initiatives particularly around Aboriginal Participation, Buy Local, Revegetation and Rehabilitation and Sustainability Management Systems.

Highlights

On the GNHM2W project, the GNH IPT has set out to improve social, economic and environmental outcomes through the construction phase of the project. A number of procurement initiatives have been developed and trialled. These include:

- 1) New Engineering Contract (NEC3) contracting model is being trialled to promote collaboration
- 2) A sustainability specification has been established to communicate requirements for sustainability during construction
- 3) Aboriginal participation targets for businesses, personnel and trainees are being trialled
- 4) Revegetation and rehabilitation documentation have been developed

The GNHM2W project is tracking well with sustainability objectives and targets. The highlights are listed in *Table 1 GNH Sustainability Highlights*.

Table 1 GNH Sustainability Highlights

Highlight	Total for Project
Replace 20% (as a minimum) of potable water use demand with suitable quality non-potable water sources	>99%
Diversion of waste from landfill: <ul style="list-style-type: none"> • Spoil - 70-80% by volume • Inert and non-hazardous waste - 25-50% by volume • Office waste - 25-40% by volume 	>99%
To scope and implement three energy efficiency initiatives to achieve (as a minimum) a 5% energy use reduction from the Energy Use Reference Footprint - GHG Emissions (tCO ₂ -e) avoided through initiatives to date	263.97
Optimise local and indigenous employment and business engagement:	
Number of Aboriginal Trainees	5
Total number of suppliers engaged	348

Overview

In 2014, the Australian and Western Australian governments announced that detailed planning was underway for a \$384.75 million upgrade of the 218 km section of Great Northern Highway (GNH) between Muchea and Wubin. The current budget is \$344.75 million. An additional \$29.8 million was funded separately for the New Norcia Bypass. The Great Northern Highway Muchea to Wubin Stage 2 Upgrade (GNHM2W) project is a planning, design and construction program being delivered collaboratively by an Integrated Project Team (IPT), comprised of Main Roads and industry partner, the Arup Jacobs Joint Venture (ASJV).

The project is a program of works that has prioritised a series of road upgrade packages over a 218km stretch through the Western Australian Wheatbelt, to be delivered by 2019, with several of these construction packages already completed or underway. The scope of the GNHM2W includes contract packages for upgrades for New Norcia Bypass, Miling Straight, Miling Bypass, Pithara, Dalwallinu to Wubin, and Walebing.

Key stakeholders have been identified for this project and are listed in *Appendix 3 – List of Stakeholders to the project*.

- This program of works will improve road safety, increase freight efficiency, improve network reliability, enhance travel wellbeing, contribute to sustainable and viable communities and enhance the environment. The GNH IPT has set objectives to measure the success of the project. These are listed in

Table 2 below. In delivering these objectives, the GNH IPT and construction contractors are pursuing sustainable and environmentally sensitive initiatives that achieve the best value for money and meet community expectations.

Table 2 GNHM2W Project Objectives

Project Objectives for GNHM2W	Measure
Improve road safety	Safer route that reduces the risk of death, serious injury and damage
Increase freight efficiency	Increased efficiency in terms of vehicle loads (mass and size) and reduced delays for all traffic
Improve network reliability	Improved reliability with more consistent and predictable travel times and improved network access
Enhance travel wellbeing	Improved roadside amenities for rest and driver information
Contribute to sustainable and viable communities	Balance community concerns against the economic, community safety and network access issues
Enhance the environment	Undertake practices to help retain and enhance the environmental values of roadsides

The project webpage can be found at www.m2w.com.au.

Overall approach to Sustainability

The GNH IPT has developed a sustainability strategy for the project that centres on the application of the ISCA Infrastructure Sustainability (IS) rating tool, which provides a framework for integrating sustainability across the project. The project is registered with ISCA as a program of works, for an IS rating for both Design and As Built phases. This rating will incorporate all of the individual construction packages to be delivered under the project. The project is the first registered rating for Main Roads that is applying the IS rating framework to ‘construct only’ contracts as part of an overall program. The targeted rating is 48 (commended), and project tracking indicates that the program is on track to achieve this rating.

The project’s sustainability strategy recognises and aligns with the Main Roads’ Sustainability Policy and the GNHM2W project objectives (*Table 2 GNHM2W Project Objectives*).

The GNHM2W project objectives were used in early project planning to identify key areas of focus. The GNHM2W project has focussed on achieving sustainable outcomes through:

- Incorporation of efficiencies into design and material selection;
- Developing and implementing sustainability clauses for construction contracts;
- Trialling of Aboriginal employment targets;
- Engagement with local communities; and
- Investing in local businesses during the construction phase.

From this early planning, the GNH IPT developed a Sustainability Management Plan with targets and objectives mapped to GNHM2W project objectives. (*Appendix 4 – Sustainability Objectives and Targets*)

No rating submission has been undertaken to date on the project, with the rating application and evidence collection still ongoing for the design phase of the project. At the time of writing, one construction package has been completed, a second construction package is open to traffic and nearing completion, and another two construction packages having started construction in April 2018. Detailed design is complete for a further three packages. The three active construction packages are working to Sustainability Management Plans that meet specific contractual requirements for sustainability.

Environmental Aspects Performance

At a glance

Table 3 Environmental aspects performance at a glance

Aspect	Year to 30 June 2018	Total for Project
Clearing planned (ha)*	-	130.1
Actual clearing to date (ha)*	17.3	33.2
Rehabilitation/revegetation planned (ha)	-	446.6
Actual rehabilitation/revegetation to date (ha)	-	23
Environmental offset via Monetary contribution actual (\$)	-	\$333,372.00
Total Water Consumption to date (kL)	118,288,221	282,840,421
Total GHG emissions (scope 1 & 2) to date (t CO ₂ e)	4,906	9,804
Total energy consumption to date (mj)	69,204,793	137,655,122
Total quantity of recycled content used in project (t)	-	-
Total imported materials used in project (t) (Sand, gravel, aggregate, steel)	564,867	1,381,298
Total waste generated by project (t)	61,050	63,446

* Native vegetation clearing only

- Data not available

Environmental context

The GNHM2W project extends into the Western Australian Wheatbelt between Muchea and Wubin, which has been traditionally subject to high rates of historic clearing, therefore elevating the ecological values of remnant habitat. These ecological communities are protected by both State and Commonwealth legislation via the Environmental Protection (EP), and Environmental Protection and Biodiversity Conservation (EPBC) Acts. Some clearing of this remnant vegetation is required for the project, however impacts have been minimised. The significant species and habitats that will be impacted by works are listed at *Appendix 2 - Protected fauna and flora species and habitat*. The highway is adjacent to a number of protected area, as listed in *Appendix 1 - List of Protected Areas Project interfaces with*. The remnant vegetation of the WA Wheatbelt that is in good or better condition is generally considered to have high biodiversity value.

Direct impacts to the protected areas listed are not anticipated. Indirect impacts may occur due to storm water run-off and potential contamination of runoff, dust generation during construction and accidental clearing within the boundary of the protected area.

The highway spans a number of waterways, however direct impacts are considered low. Beds and Banks permits have been obtained from DWER for areas located within proclaimed water source areas in Muchea North, Miling Straight and Pithara package areas.

Potential indirect impacts are being considered and managed via the asset design (i.e. drainage design) and application of environmental management systems during construction.

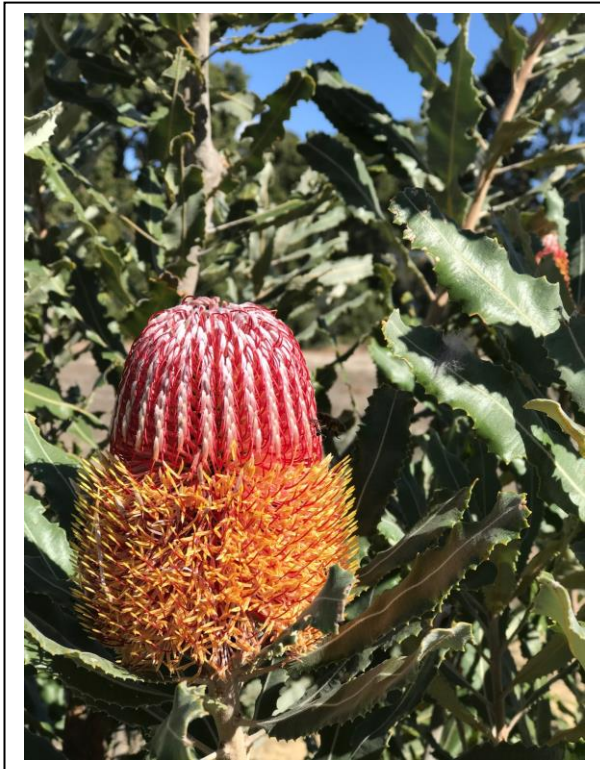


Figure 1 Flowering Banksia

Environmental Management

The importance of Environmental Management to the GNHM2W project is reflected through the project objective of 'Enhance the Environment - Undertake practices to help retain and enhance the environmental values of roadsides'. Environment is a key part of the project delivery structure and has been an integral part of the design development. The GNH IPT has been involved in driving optimal environmental outcomes through the following:

- Integration of all disciplines to achieve project environmental objectives;
- Establishment of due diligence practices to ensure that ecological values were maintained through early works, environmental studies and geotechnical investigations;
- Identification of environmental constraints to inform route selection;
- Designing offline sections of road to reduce clearing of roadside vegetation (including protected flora, threatened native vegetation and protected species habitat);

- Liaison with environmental regulators and other stakeholder to inform planning inputs and management;
- Establishment of rehabilitation and revegetation documentation;
- Development of specifications and Environmental Management Plans for inclusion in Contract documents; and,
- Establishment of a compliance advisory role within the GNH IPT to support construction through the provision of technical advice, auditing and statutory reporting.

Preliminary Environmental Impact Assessments (PEIA's) have been prepared for all contract packages in planning stages of the project. Detailed Environmental Impact Assessments (EIA) were also completed for each contract package as detailed environmental studies were concluded. Targeted EIAs have supported approval applications under the EPBC Act and applications for Permits to Clear Native Vegetation (EP Act Part V) for the New Norcia Bypass, Miling Straight, Muchea to Wubin (includes Dalwallinu to Wubin, Walebing, Pithara and Miling Bypass) and Muchea North contract packages.

The EIAs undertaken to support the referral under the EPBC Act of the New Norcia Bypass, Miling Straight, Muchea to Wubin and Muchea North packages are publically available via the Commonwealth Department of the Environment and Energy website - <http://epbcnotices.environment.gov.au/referralslist/>

A key environmental success of the GNHM2W project to date has been the integration and consideration of environmental values in both selecting preferred upgrade alignment options and in finalising the detailed design scope for each contract package. This has resulted in a smaller native vegetation clearing footprint for the project to date and reduced levels of impact to key biodiversity values such as Carnaby's Black Cockatoo breeding and foraging habitat, leading to more sustainable environmental outcomes. Further sustainable outcomes were achieved with the establishment of adaptive environmental management practices within Muchea to Wubin, and Muchea North package areas. These were agreed in consultation with regulators to ensure that offset management criteria were achieved for the establishment of revegetated Carnaby's Black Cockatoo foraging habitat, and to monitor and reassess the breeding success associated with the installation of artificial nesting boxes.

Table 4 Vegetation Clearing Statistics

Activity	Site	Year to 30 June 2018	Total for Project
Native Vegetation Clearing (ha)	New Norcia Bypass	N/A	4.19
	Miling Straight	7.1	18.85
	Miling Bypass	5.9	5.9
	Pithara	4.3	4.3
	Muchea North	Not Started	Planned: 53
	Dalwallinu to Wubin	Not Started	Planned: 9
	Walebing	Not Started	Planned: 10

Landscape and revegetation designs have been prepared for each contract package. New Norcia Bypass has completed 23ha of rehabilitation in 2017 and is currently being monitored. Miling Straight has begun approximately 121ha of revegetation with the arrival of winter rains.

Monetary and habitat environmental offsets have been identified for the GNHM2W program of construction. The details are listed in *Table 5 Environmental Offsets* below.

Table 5 Environmental Offsets

Site	Environmental Offset
New Norcia Bypass	Monetary Contribution to Department of Water and Environmental Regulation (DWER): \$157,263 (actual)
Miling Straight	Monetary Contribution to DWER - \$98,109 (actual)
Walebing to Wubin (Global approval) (proposed)	Monetary Contribution to DWER - \$78,000 Carnaby Black Cockatoo Habitat – 130ha
Muchea North (proposed)	Carnaby Black Cockatoo Habitat – 381ha Revegetate 19.69ha of foraging and breeding habitat Carnaby Black Cockatoo Nesting boxes - 39

Water Management

Managing water consumption across the program is critical, particularly due to the limited availability of potable water in the Wheatbelt region. In aligning to the GNHM2W project objective to 'contribute to sustainable and viable communities', contractors are required to scope and implement water efficiency initiatives. Contractors report monthly on their water usage, including sources of water for their contract.

To support water efficiency and use of suitable water sources during the construction phase, early water source investigation was undertaken by the GNH IPT. The investigation report which was shared with contractors as an information document to assist their water source investigation and selection.

Water balance estimates have also been completed by the GNH IPT for each contract, to establish a benchmark and reference case from which to measure contractor improvement of water use. The main water uses on the project are:

- Embankment and pavement construction; and
- Dust suppression.

The water balance calculations are provided as information to contractors to inform their water source and use planning in the construction phase.

On the Miling Straight construction contract, a reduction in freshwater use for pavement construction has been achieved by blending locally available saline water to freshwater stored in Turkey nests. This extended the use of fresh water while still complying with contract specifications. Another initiative implemented on Miling Straight was to use Geogrid fabric to minimise requirements for imported fill (and associated water required for placement and compaction).

Table 6 Water source statistics

Source	Construction Package	Year to 30 June 2018	Total for Project
Water purchased from the scheme in litres (L)	New Norcia Bypass	N/A	512,500
	Miling Straight	107,015	202,021
	Pithara	360,000	360,000
	Miling Bypass	30,900	30,900
Water pumped from bores in litres (L)	New Norcia Bypass	N/A	82,914,000
	Miling Straight	96,073,000	144,430,000
	Pithara	8,548,000	8,548,000
	Miling Bypass	8,792,000	8,792,000
Water pumped from rivers, lakes or harvested in litres (L)	New Norcia Bypass	N/A	0
	Miling Straight	4,295,000	37,051,000
	Pithara	0	0
	Miling Bypass	0	0

Carbon Emissions & Energy

The GNHM2W IPT and construction contractors have sought to reduce carbon emissions and energy use across the infrastructure lifecycle. Main Roads identified the need to improve the freight efficiency of the GNH. Improving freight efficiency through road design will have the flow on effect of reducing emissions associated with freight movements for the life of the asset.

The energy footprint of the GNHM2W project has been assessed. The main energy uses (and sources of greenhouse gas emissions) identified to date for the construction and operational phases of the project include:

- For construction: Fuel use by vehicles, stationary generation (i.e. diesel generators), lost carbon sink from vegetation removal/clearing and energy use for site offices (i.e. grid electricity, generators); and,
- For operation: Vehicles using the road.

A significant focus on minimising vegetation clearing during the design of GNHM2W has reduced the lost carbon sink from vegetation removal during construction. The design aims to achieve reductions in operational carbon emissions and energy use by designing for a maximum desirable grade of 3% over longer uphill distances, which improves road user fuel efficiency. Additionally, should GNH be approved for future RAV10 network, the 53.5m road train will reduce the number of truck movements between Muchea and Wubin.

Energy reduction initiatives have been identified by contractors during the construction phase to reduce their energy footprint. The contractors are achieving energy reductions by carpooling workers, locating worker accommodation closer to the worksite, using local borrow pits to reduce haulage of construction material and using technical solutions to address unsuitable material used in construction. The technical solutions remove the need to excavate and transport unsuitable material to landfill. On Miling Straight, their combined initiatives achieved a saving of 79,447L of fuel, which equates to 214.83 t CO₂-e for scope 1 and 3 emissions.

The total carbon emissions for the construction of the GNHM2W project to date is 9,804 t CO₂-e for scope 1 emissions.

Table 7 Energy Use and Savings Statistics

Source	Construction Package	Year to 30 June 2018	Total for project
Energy usage by source in mega joules (MJ)	New Norcia Bypass	N/A	30,056,807
	Miling Straight	51,400,247	89,793,769
	Pithara	6,735,275	6,735,275
	Miling Bypass	11,069,271	11,069,271
From fuel (MJ)	New Norcia Bypass	N/A	30,056,807
	Miling Straight	51,239,223	89,579,638
	Pithara	6,735,275	6,735,275
	Miling Bypass	10,999,533	10,999,533
From electricity (MJ)	New Norcia Bypass	Diesel generation (incl fuel use above)	
	Miling Straight	161,024	214,132
	Pithara	Not reported to date	
	Miling Bypass	59,648	59,648
Energy saved (MJ) through initiatives including Scope 3 emissions savings	New Norcia Bypass	Not quantified	
	Miling Straight	Total: 3,066,654	
	Pithara	Not reported to date	
	Miling Bypass	Total to date: 705,029	

Materials & Recycling

Sourcing of construction materials is a key consideration for the GNHM2W project due to the rural location of the construction sites and associated haulage distances. The use of naturally occurring / locally sourced materials is a key consideration in all contracts on the project.

Estimates of material use (footprint) have been developed for each concept/reference design in order to guide the development of materials-saving initiatives during the detailed design and construction phases. A key focus of the design phase is achieving an earthworks cut to fill balance for each contract package to minimise either material import requirements or waste generation. The materials estimates are being provided as information to contractors to inform their selection and sourcing of materials. Requirements are also being written into tenders for the project for contractors to assess opportunities for materials use reduction, types, sources and transport.

Construction contractors have developed initiatives to reduce the haulage of materials used on site and divert waste from landfill. Some of the initiatives included:

New Norcia – excess concrete was used for construction of pedestrian pathways accounting for approx. 50m³. Locally sourced embankment and fill materials reduced vehicle haulage, with 40% of gravel coming from within 3km of the site, and the remainder coming from within 15km of the site. 1,776 m³ of unsuitable material was used for rehabilitation on a private property.

Miling Straight – Geogrid fabric was used as an engineering solution to unsuitable material under the road. Use of the fabric avoided excavation of 7,067m³ material that would have been disposed of and replaced with virgin material. 36,048m³ of unsuitable material was diverted from landfill and used to rehabilitate borrow pits on farmer's properties. The contractor was able to reuse excavated rock onsite

for drainage protection. To reduce haulage, basecourse material was blended from two sources, one 3km from site with lower quality material and the other 20km from site with higher quality material. Redundant sections of highway will form part of the rehabilitation within the construction area if it does not become local access roads.

Table 8 Material Use Statistics

Material	Construction Package	Year to 30 June 2018	Total for Project
Sand (t)	New Norcia Bypass	N/A	381,400
	Miling Straight	65,099	232,332
	Pithara	15,597	15,597
	Miling Bypass	54,109	54,109
Gravel (t)	New Norcia Bypass	N/A	145,600
	Miling Straight	412,672	534,448
	Pithara	0	0
	Miling Bypass	13,762	13,762
Aggregate (t)	New Norcia Bypass	N/A	-
	Miling Straight	3,577	4,000
	Pithara	33	33
	Miling Bypass	0	0
Asphalt	New Norcia Bypass	N/A	997 m ²
	Miling Straight	-	-
	Pithara	0	0
	Miling Bypass	0	0
Concrete (m ³)	New Norcia Bypass	N/A	1,300
	Miling Straight	175	1,739
	Pithara	88	88
	Miling Bypass	68	68
Steel (t)	New Norcia Bypass	N/A	180 (estimate)
	Miling Straight	-	-
	Pithara	9	9
	Miling Bypass	8	8
Precast reinforced concrete (t)	New Norcia Bypass	N/A	-
	Miling Straight	636	1,963
	Pithara	190	190
	Miling Bypass	487	487
Emulsion (L)	New Norcia Bypass	N/A	-
	Miling Straight	99,274	153,724
	Pithara	0	0
	Miling Bypass	0	0
Bitumen cutter (L)	New Norcia Bypass	N/A	-
	Miling Straight	90,747	98,260
	Pithara	0	0
	Miling Bypass	0	0
Bitumen (L)	New Norcia Bypass	N/A	-
	Miling Straight	374,042	381,555
	Pithara	0	0
	Miling Bypass	0	0

- Data not available

Table 9 Waste Statistics

Waste	Year to 30 June 2018	Total for Project
Landfill (t)	32	57
Diverted From Landfill* (t)	61,018	63,390

**Includes avoidance of waste generation, re-purposing and recycling*

Economic Aspects Performance

At a glance

Table 10 Economic aspects performance at a glance

Economic Aspect	Year to 30 June 2018	Total for Project
Budget	\$63.91m	\$344.8m
<i>Workforce and Supply Chain</i>		
Number of new starter inductions	443	1,061
Total number of suppliers engaged	149 (Major Works Contractors)	130 (ASJV only) 218 (Major Works Contractors)
Total number of Indigenous Enterprise	1 (ASJV only) 6 (Major Works Contractors)	2 (ASJV only) 6 (Major Works Contractors)
Total Spent on Indigenous Enterprise	\$365,039 (Major Works Contractors)	\$538,506 (Major Works Contractors)
Buy Local Spend (to date)	\$309, 223 (Miling Bypass Contract) \$1.08m (Pithara Contract)	\$1.8m (ASJV only) \$309, 223 (Miling Bypass Contract) \$1.08m (Pithara Contract)

Economic context

The GNH alignment traverses the Wheatbelt region of Western Australia, which is host to key transport networks of State and National significance. GNH forms part of the Perth to Darwin National Highway (a major transport route from Perth to Darwin that experiences heavy usage by road freight trains, tourists and the local community).

The GNHM2W project alignment is 218 km in length between the towns of Muchea and Wubin. Other regional towns along the alignment include Bindoon, New Norcia, Miling, Pithara and Dalwallinu.

The project delivery to date has spanned across key phases of planning including statutory approvals, pre-construction (design, procurement, land acquisition) and construction (major and minor works (including a program of early works)). The different phases of works have variable delivery models, including key activities, stakeholders and procurement procedures.

The GNHM2W project has provided opportunities for multiple suppliers, subcontractors and businesses to be engaged in delivery, including:

- Major construction work management and delivery;
- Minor construction work management and delivery (such as fencing or service relocation);
- Supply of specialist technical services (i.e. geotechnical investigations);
- Supply of materials, plant and equipment;
- Office support services (i.e. printing, catering); and
- Construction support services (e.g. waste management).

Delivery of the main construction phases of the project is being undertaken via the procurement and execution of individual construct only contracts using the Main Roads Major Works (incorporating AS2124) contract model. The project is trialling the New Engineering Contract (NEC3) on the Pithara package. The NEC3 model aims to promote collaborative working between the Employer (Main Roads) and Contractor and brings a collaborative contract style to smaller contractors whereas traditionally this type of model only exists in larger alliance style contracts.

Employment opportunities also exist in the construction phase of the project for:

- Site based roles for construction management; and,
- Employment of local personnel (including Indigenous personnel and trainees/apprentices) through operating Contractors delivering the construction works.

A Sustainable Procurement Initiative (SPI) has been established by the GNH IPT where local suppliers have been able to register their services. The GNH IPT has also been delivering a program of 'early works' managing smaller construction lead items such as service relocations, fencing and farm accommodation works. This has increased local engagement, with local contractors identified through the SPI having been invited by the GNH IPT to tender for early works scopes.



Figure 2 OSOM transport south of Miling

vehicles increasing to approximately 60% of traffic at Wubin. A key driver for the GNHM2W project is to upgrade the highway to cater for 53.5m vehicles travelling to the proposed de-coupling area at Muchea, on the outskirts of Perth.

The project has also been targeting increased Aboriginal engagement of both personnel and businesses, with Indigenous employment targets being incentivised in the Major Works contracts.

Key Economic Outcomes

The upgraded road between Muchea and Wubin will provide for better network connectivity for heavy freight travelling between the north and south of Western Australia, along with improved safety for the community. Traffic and freight volumes on GNH - a major freight route between Perth and the state's North-West - have continued to increase.

Approximately 30% of traffic at Muchea is heavy

Key economic outcomes of the Program include:

- Upgrade to the National Highway Network
- Improved freight efficiency (including catering for 53.5m vehicles)
- Local job creation
- Opportunities for local contractors and businesses.

Sustainable Procurement and Buy local

By adopting the Western Australian Buy Local Policy and implementing a sustainable procurement approach, the project has prioritised sourcing local products and services; not just from Western Australia but from the local communities neighbouring the project sites.

The main works contractors are constantly encouraged to seek and propose initiatives that could have social, economic and environmental benefits. These initiatives are also taken into consideration for the program's IS rating with the Infrastructure Sustainability Council of Australia (ISCA).

The contractors regularly explore new opportunities for utilising local resources. A number of benefits have been identified by sourcing labour, plant, and materials locally, such as:

- Providing work opportunities to the local workforce;
- Minimising the transport overheads associated with mobilising/demobilising equipment by hiring local plant;
- Minimising travel time for the workers and stimulating the local economies by building camps close to the project sites; and,
- Sourcing construction materials (e.g. gravel) locally, benefiting local supplies and improving efficiency by minimising haulage time and cost.

The sourcing of local labour is also driven by the Aboriginal Participation targets set in the contract, which aim to increase the number of local Aboriginal persons, local Aboriginal trainees and non-local Aboriginal persons on the project. The targets have been tailored to each specific contract and have evolved since the first contract was awarded, based on feedback received and lessons learnt during the execution of the project. The Aboriginal Participation targets also comprise a minimum level of expenditure with Local Aboriginal and Non-Local Aboriginal businesses.

Specific examples of local business engagement/opportunities on the GNHM2W project, for the reporting period, include:

- the Pithara workforce is being housed in a camp constructed adjacent to the local hotel, providing synergies to the single private business operating within the town; and,
- the construction contractor worked with the local concrete supplier to improve the quality of their product to ensure ongoing supply of local concrete for the Miling Straight package.

Climate Change Assessments

The GNHM2W project undertook a climate change risk assessment in project planning. This has subsequently influenced the design for each package being delivered under the project. Key climate change adaptation measures implemented via the project are:

- Corridor wide safety improvements that will assist in reducing risk of collisions in periods of reduced visibility due to bushfire;
- Implementation of a clear zone strategy, with vegetation set-back from the road edge; and,
- Factoring of climate change projections for increased rainfall intensity into drainage design parameters.

These adaptation measures as reflected in asset design are now being delivered via the ongoing construction program.

Sustainable Transport

Given the rural nature of the road corridor, requirements or opportunities for sustainable transport initiatives through design are limited. Specific design responses have been developed in response to issues



or opportunities for each package. Footpaths are being upgraded in several towns as part of the project. Additionally, pedestrian facilities have been developed at the scenic lookout on the New Norcia Bypass.

There is limited public transportation and nil public rail transportation in the project area. Where there are public transport facilities, opportunities have been taken to make it accessible to users. This includes a regional bus parking area in Pithara and on the Muchea North section, allowances have been made to incorporate existing informal school bus stopping areas (with appropriate pull-off distances and turn-around areas where necessary).

In delivery of the construction works, the contractors have been establishing local camps and accommodation facilities in proximity to work sites. This is reducing travel time/length of journey to the project site. In addition, contractors have been encouraged to consider carpooling initiatives to reduce the number of vehicles travelling to site. The contractor for Miling Straight provided a minibus to transport workers to the site.

Social Aspects Performance

At a glance

Table 11 Social aspects performance at a glance

Social Aspect	Total for Project
No. of traffic safety incidents within project boundary (public vehicle traffic incidents within controlled area)	4
% of women in workforce	16%
% Aboriginal in workforce (Main works)	12.1%
Lost Time Injury Frequency Rate (LTIFR)	0
No. of development employees and apprentices on the project	5

Social context



Figure 3 Miling Primary School excursion to Miling Bypass

The 218km length of the project area ensures that a large number of different communities are potentially affected by the GNHM2W project. These range from the smaller land holdings, remnant vegetation areas and mixed agricultural businesses surrounding Bindoon at the southern end of the project, just 60km from Perth. The northern end of the project encompasses smaller communities surrounded by broadacre pastoral and cropping properties. The project area is stretched across five Local Governments: Shire of Chittering, Shire of Moora, Shire of Gingin, Shire of Victoria Plains and Shire of Dalwallinu. The various communities along the project area vary greatly in employment opportunities, indigenous populations, type of work found locally, concern for the environment and desire

to upgrade GNH. An indicative list of community stakeholders is provided in *Appendix 3 – List of Stakeholders to the project*.

Common concerns raised by stakeholders across the project areas include consideration of environmental impacts such as noise, light, water runoff and vegetation clearing, consideration of social impacts due to land acquisition and property severance, potential Local Government road maintenance costs, potential ongoing viability of towns that may be bypassed, and opportunities for local and aboriginal employment on the projects. The communities have a good understanding of the potential benefits of the highway construction. However, as individuals, are challenged with balancing the potential impacts to their property and lifestyle with the wider community benefits of improved road safety and freight efficiency.

Community & Stakeholder Engagement

Consultation and Stakeholder engagement is vital to all public infrastructure projects. For the GNHM2W project early consultation was undertaken with a number of stakeholders to obtain input and feedback to inform the initial review and planning activities. The purpose of many of the early consultation activities was to identify issues of importance to the community and other stakeholders.

A program wide communication and stakeholder management strategy has been established for the project. This identified key stakeholders, mitigation strategies for stakeholder risk, and the identification of key communication strategies. In addition to a regularly updated webpage detailing key project objectives, milestones and progress, regular updates are provided to different communities along the alignment through development of brochures, council meetings, and targeted stakeholder meetings.

The type of engagement processes has evolved significantly over the last several years as different packages of upgrades progress from concept through design to construction and ultimately completion and handover of the upgrades. Accordingly, different community groups across the length of the project area have widely different expectations for communications depending on the status of the road upgrades in the vicinity of their communities.

The GNH IPT is currently liaising with local community groups in Miling to determine possible improvements to the main street of Miling as part of the maintenance works planned prior to handover of the road to the Shire of Moora.

Addressing community concerns

During the design of the road for each of the packages, the GNH IPT worked closely with the local communities to understand the community concerns and listen to their ideas. The GNH IPT has collaborated with the local community and the shires, to identify opportunities for improving town infrastructure, including additional roads being proposed and upgraded, additional footpaths, community parks and other facilities.

As an example, the completion of the New Norcia Bypass has resulted in significant improvements to the community of New Norcia through the reduction of noise, vibration and visual impact of the heavy vehicles passing through the monastic centre. The new lookout area, complete with interpretation panels, on GNH provides a stunning view for tourists and local residents.

Issues raised by the community and stakeholders are considered as part of the design process to minimise potential impacts. Community concerns are often similar across the various highway upgrade packages, including potential impacts on lifestyle due to noise, light and visual impacts, potential viability concerns associated with bypasses of small towns, concerns with the land acquisition process, and concerns regarding the environmental impacts such as vegetation clearing and water runoff. Key concerns raised by the wider community on this project focus on ongoing access to GNH, including placement of intersections and driveways to facilitate ongoing farm vehicle and stock movements. Ongoing liaison continues with all stakeholders (landowners, local shires, government agencies) to make sure that individual impacts are minimised during design and construction.

Liaison activities are undertaken to mitigate impacts to the community where possible. Possible impacts include: reducing the number and impacts of severance; accommodation works to replace affected infrastructure; protection or replacement of government and privately owned utilities and services; and, planning for changes of access to properties and towns.

Heritage

The GNH IPT has conducted regular meetings and engagement with the Whadjuk and Yued Traditional Owners through the South West Aboriginal Land and Sea Council (SWALSC) coordinated claimant group meetings. The topics discussed at meetings and engagement sessions reflect common issues raised by the traditional owners, i.e. preservation of documented heritage sites, opportunities for indigenous advancement through contracting and work opportunities, participation in future heritage studies, Section 18 approvals progress and project updates and progress reports.

The New Norcia Bypass bridge name, *Mourin Bwoora*, was endorsed by the Yued Working Party after a period of engagement in December 2016. Consultation has also been undertaken with the Yued Working Party and New Norcia Aboriginal Corporation regarding the development of Interpretation panels at the New Norcia Bypass scenic lookout.

An Aboriginal Heritage Management Plan has been established to streamline the engagement of heritage monitors during construction of the Walebing package (for ground disturbing activities in proximity to the Walebing Reserve).

Road Safety

Safety in Design

Road safety is a key part of the GNHM2W project and is reflected in the project objective to 'Improve road safety'. Improving road safety has been an integral part of the planning and design phase. On a project wide basis, a number of strategies and design approaches impacting road safety have been developed

Safety in Design workshops are held for each contract package at each stage of design (15%, 85% and 100%). Constructability workshops are undertaken for each package to consider constructability aspects and potential design optimisation. Road Safety Audits at 15%, 85% and post construction are a requirement for each package.

The design elements that have been adopted for the upgrade of the GNHM2W project include: alignment improvements; wide centreline treatment; truck stopping bays/rest areas; overtaking lanes; pavement marking; access to properties adjacent to GNH; and stock crossings of GNH.

Workforce Safety

The GNHM2W project has a Health Safety and Environmental (HSE) management plan that covers all activities and staff / subcontractors to deliver the project, including designated project HSE

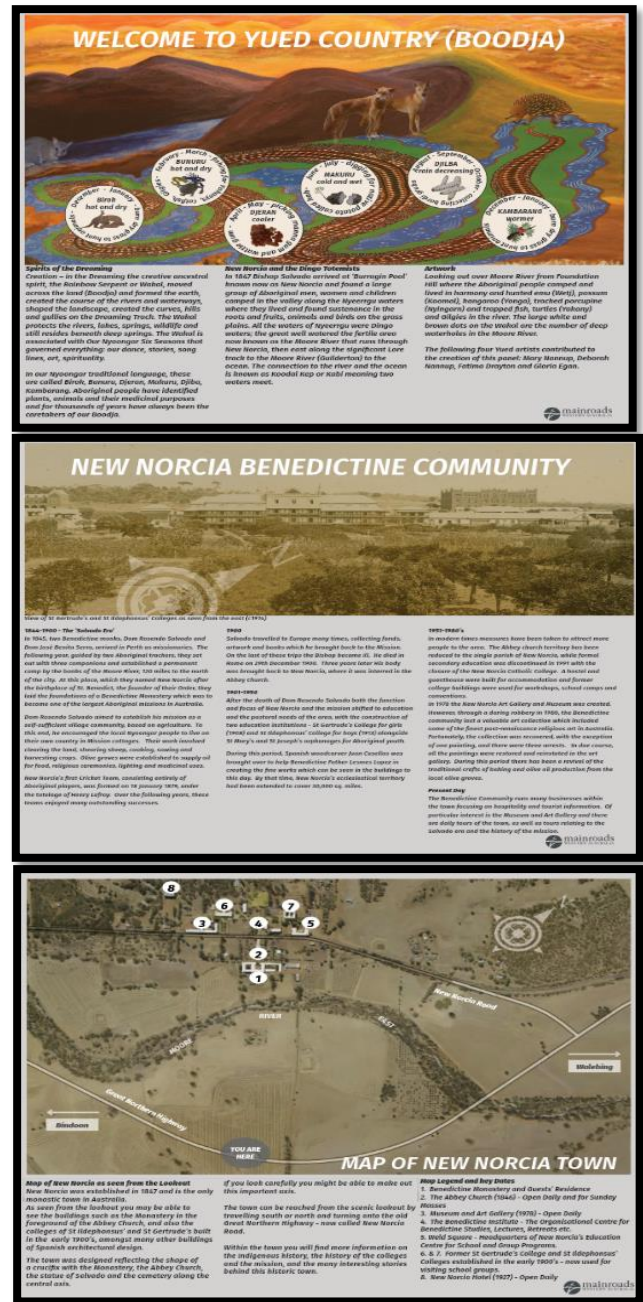


Figure 4 New Norcia Bypass scenic lookout interpretive panels

representatives from all parties, weekly toolbox talks on safety, regular safety forums e.g. every 6 months, HSE audit schedule, Leadership Safety Walks to observe behaviours and encourage safety conversations, monitoring of incidents, formal investigation of incidents, lessons learnt, and training for high risk activities. All members of the GNH IPT are represented in formal health and safety committees through the respective parent organisations.

Safety during project construction works is managed by the Contractor in accordance with the applicable Main Roads Major Works (AS2124 and NEC3) contract, including traffic management.

Safety Stand-downs have been held with the superintendents' and project manager's teams to raise overall awareness of safety on-site.

The GNH IPT have implemented safety practices to ensure safety of personnel driving to/from site, and while visiting onsite. A new induction package for the GNH IPT and contractors has been developed and rolled out. The StepBack tool has been introduced to the GNH IPT for use on site. Driving is one of the most critical risks on the project. The GNH IPT management must review and approve all journey management plans. Safety measures on the project include driver fatigue management (minimum two drivers) and provision of emergency communication devices (satellite and Telstra phones). The GNH IPT ran a Wellbeing Challenge for the duration of May 2018 to promote healthy lifestyle choices.

Community Amenity

The GNHM2W project developed a project wide strategy for rest areas and landscaping aimed at enhancing the landscape form, local characteristics along the alignment and providing inviting stopping areas. A rest area design strategy has been developed for new rest areas to increase natural surveillance at rest areas. Further to this the project was able to accommodate a scenic lookout at the New Norcia Bypass to provide views back to the New Norcia town. The area contains parking for light vehicles, benches/seating and interpretive material on the town's European and Aboriginal history.

Diversity

GNH has committed to promoting workforce diversity with regard to increasing opportunities for Aboriginal personnel and businesses (local and non-local), local labour and businesses and women in the workforce.

Targets and incentives for construction contractors have been developed to hire and retain Aboriginal workers and trainees, which were based on collaboration with Nudge, a 'not for profit' organisation, early in the project planning phase to identify the skill base available in the local community. This has been progressively implemented over the GNHM2W project, incorporating learnings from earlier contracts, leading to a trial of updated contractual specification requirements for Aboriginal Participation for the Miling Bypass and Pithara contracts. This has had a positive outcome so far, with Aboriginal employment significantly increasing throughout the GNHM2W project. In the Miling Bypass section, the Aboriginal workforce represents 22% of the total workforce, of which 9% are local Aboriginal persons (as at 30th June 2018).

Table 12 Workforce Statistics - Aboriginal

Activity	Site	Total for Project
% Aboriginal Workforce	Miling Straight	13%
	Miling Bypass	21.5%
	Pithara	3.6%
% Local Aboriginal Workforce	Miling Straight	5.4%
	Miling Bypass	9.5%
	Pithara	2.8%

Women in the workforce are well represented in the GNH IPT with 40% of positions held by women. Notably on the Pithara worksite, the Main Roads Project Management Site Team consists of 50% women. The breakdown of women involved on the project by % is listed below.

Table 13 Workforce Statistics - Women

Measure	Site	Total for Project
Number of Women inducted to site	New Norcia Bypass	8
	Miling Straight	23
	Miling Bypass	13
	Pithara	9
Number of positions held in GNH IPT		25
Number management / senior positions held by women		2
% management / senior positions held by women (GNH IPT)		17%
% Women in Workforce	New Norcia Bypass	-
	Miling Straight	10%
	Miling Bypass	13%
	Pithara	10.50%*
	GNH IPT	40%

* Includes Main Roads Project Management Site Team

Workforce Development

All employees engaged on the project are part of the larger organisations of Main Roads, Jacobs or Arup. As part of their respective home companies, 100% of personnel engaged in the GNH IPT have access to career development pathways, appraisals and training opportunities. In addition, training has been provided for specific project requirements i.e. first aid course, 4WD course and NEC3 contract training.

Miling Bypass and Pithara contractors have incorporated training programs to provide work opportunities to local Aboriginals new to the workforce. These training programs are being delivered with the support of organisations such as Nudge and Midwest Training Group. The program participants are mentored and supported by colleagues on the project, as well as the support organisations.

The GNH IPT has embraced an opportunity for providing a career development opportunity within the Perth Office, offering an undergraduate traineeship through CareerTrackers Indigenous Internship Program within the GNH IPT supporting communications and stakeholder management.

Table 14 Workforce Development Statistics

Activity	Site	Total for Project
Number Aboriginal Trainees	Miling Bypass	2
	Pithara	2
	GNH IPT	1

Appendix 1 - List of Protected Areas

Project interfaces with

- Barracca Nature Reserve (A Class reserve managed by the Department of Parks and Wildlife);
- Reserve 209 (C Class reserve managed by the Shire of Chittering);
- Nugadong Nature Reserve (A Class reserve managed by the Department of Parks and Wildlife);
- Buntine-Marchagee Recovery Catchment (not formally protected);
- Crown Reserves 248, 24671 and 17262 (C Class reserve managed by the Department of Water);
- Nugadong Nature Reserve (Class A);
- Crown Reserve 248;
- Crown Reserve 4484;
- Crown Reserves 24671 and 17262.

Appendix 2 - Protected fauna and flora species and habitat

Protected fauna species and habitat:

- Carnaby's Black Cockatoo breeding and foraging habitat;
- Forest Red-tailed Black Cockatoo foraging habitat;

Protected flora species and habitat:

- *Acacia isoneura* subsp. *nimia* (P3);
- *Acacia scalena* (P3);
- *Chamelaucium* sp. Wongan Hills (P3);
- *Frankenia glomerata* (P3);
- *Grevillea asparagoides* (P3);
- *Stylidium squamellosum* (P2);
- *Acacia drummondii* subsp. *affinis* (P3);
- *Verticordia serrata* var. *linearis* (P3);
- *Verticordia lindleyi* subsp. *lindleyi* (P4);
- *Acacia drummondii* subsp. *affinis* (P3);
- *Eucalyptus caesia* (Caesia) (P4);
- *Haemodorum loratum* (P3);
- *Eremophila pinnatifida* (Critically Endangered);
- *Acacia isoneura* subsp. *nimia* (P3);
- *Chamelaucium* sp. Wongan Hills (P3);
- *Chamelaucium* sp. Wongan Hills (P3);
- *Chamelaucium* sp. Wongan Hills (P3);
- *Frankenia glomerata* (P3);
- *Grevillea asparagoides* (P3)
- Eucalypt Woodlands of the Western Australian Wheatbelt Threatened Ecological Community (Critically Endangered).
- Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community (Critically Endangered)

Appendix 3 – List of Stakeholders to the project

Great Northern Highway Upgrade Project: Stakeholder List	
Minister for Transport, Western Australia	<ul style="list-style-type: none"> • Through Strategy and Communications Directorate
Main Roads Western Australia	<ul style="list-style-type: none"> • Commissioner • Infrastructure Delivery Directorate • Strategy and Communications Directorate • Planning and Technical Services • Heavy Vehicle Operations • Property Management Branch • Wheatbelt Region
State and Federal Elected Members	<ul style="list-style-type: none"> • Agricultural Region
Local Governments (CEOs and Presidents) and Associations	<ul style="list-style-type: none"> • Shire of Chittering • Shire of Gingin • Shire of Dalwallinu • Shire of Moora • Shire of Victoria Plains • WALGA Avon-Midland Country Zone
Local Environmental Advocacy Groups	<ul style="list-style-type: none"> • Chittering Landcare Group • Wildflower Association
Transport Industry	<ul style="list-style-type: none"> • Heavy Vehicle Liaison Group • Western Roads Federation • Arc Infrastructure • Selective Individual Transport companies
Landowners	<ul style="list-style-type: none"> • Directly and indirectly affected
Community Groups	<ul style="list-style-type: none"> • Bindoon Bypass Reference Group • Wheatbelt Development Commission • Chittering Tourist Association • Safe Roads Committee
Selective Major Businesses	<ul style="list-style-type: none"> • CBH • Feedlots • Higher intensity agriculture
State Government Agencies	<ul style="list-style-type: none"> • Department of Planning/WAPC • Department of Water and Environmental Regulation • Environmental Protection Authority • Department of Primary Industries and Regional Development • Public Transport Authority
Federal Government Agencies	<ul style="list-style-type: none"> • Department of Infrastructure, Regional Development and Cities • Department of Industry, Innovation and Science

	<ul style="list-style-type: none"> • Department of Environment and Energy
Traditional Owners	<ul style="list-style-type: none"> • SWALSC • Yued Working Group
Emergency Response Agencies	<ul style="list-style-type: none"> • Council Emergency Management Groups • Police • Department of Fire and Emergency Services/Bushfire Control • Ambulance
Construction Companies	<ul style="list-style-type: none"> • Various

Appendix 4 – Sustainability Objectives and Targets

Sustainability Objective	Associated Targets	Key Metrics
Design		
Improve road safety and network reliability	To optimise both the area of upgrade and design standards of the GNH road alignment to meet safety requirements for the road user profile, including 53.5 m vehicles.	Safety in Design process application. Comprehensive program of community and user safety audits for design and as built stages. Length (km) of road upgraded.
	To manage asset resilience under future climate change projections	Climate change risk assessment undertaken. Adaptations actions assessed and implemented as suitable for medium risks and above (i.e. documented adaptation action plan).
	To adequately consult and involve stakeholders in the road design process to inform outcomes that meet highway upgrade goals and the needs to the local community.	Strategy documented and implemented for stakeholder engagement. Stakeholder engagement effectiveness audits.
Increase freight efficiency	Improve operational vehicle greenhouse gas emissions profile	Length (km) of alignment less than 3% gradient
Enhance travel wellbeing	Provide suitable rest area facilities for road users	Rest area strategy implemented Rest area orientation implemented to consider crime prevention risks
	Deliver a project urban and landscape design that considers the needs and of multiple road users and the local community.	Contextually relevant urban and landscape framework established for the GNHM2W program. Urban and landscape design developed per contract package
Contribute to sustainable and viable communities	Net improvement to noise levels associated with the alignment and adequate management of any noise related impacts	Noise modelling study and suitable mitigation measures implemented
	To provide a positive contribution to at least two community wellbeing priority issues	Development and implementation of at least 2 community wellbeing initiatives
	To identify and promote local heritage values	Heritage surveys undertaken for the alignment upgrade, with suitable engagement of traditional owners. Consideration in landscape design via implementation of signage and interpretive material along the project alignment.
Enhance the environment.	To minimise disturbance to native vegetation along the alignment	Estimate of area (ha) saved via options assessment process. Amount (%) of pre-existing project land use not classed as native vegetation.

	To provide a net benefit to site ecological values and biodiversity values	IS Ecological Impact Assessment and Management Plan developed and implemented (net change measure).
Construction		
Improve road safety and enhance travel wellbeing	To deliver the construction program in compliance with management system requirements (i.e. AS/NZS4801) for both occupational health and safety and traffic management.	Safety and traffic management audits during construction.
Contribute to sustainable and viable communities	To track, manage and report on usage and management of energy, water, materials and waste	Monthly sustainability progress reporting Sustainability Management Plan (Contractor's) Audit reports (internal and external) Waste tracking data
	To scope and implement three energy efficiency initiatives to achieve (as a minimum) a 5% energy use reduction from the Energy Use Reference Footprint	Energy reference footprint Energy management plan (identification of initiatives) Energy use reporting Sustainability initiative cost benefit summary
	To scope and implement three water efficiency initiatives to achieve (as a minimum) a 5% water use reduction from the Water Use Reference Footprint	Water reference footprint Water efficiency management plan (identification of initiatives) Water use reporting Sustainability initiative cost benefit summary
	Replace 20% (as a minimum) of potable water use demand with suitable quality non-potable water sources	Water use reporting Sustainability initiative register Sustainability initiative cost benefit summary
	To predict and quantify waste types expected for the duration of the Contract and to develop and implement a project waste management plan demonstrating application of the waste hierarchy.	Waste management plan
	Diversion of waste from landfill: <ul style="list-style-type: none"> • Spoil - 70-80% by volume • Inert and non-hazardous waste - 25-50% by volume • Office waste - 25-40% by volume 	Waste tracking and reporting Sustainability initiative register Sustainability initiative cost benefit summary
	Sourcing of water and materials with reduced haulage distances	Sourcing of local natural gravels Material types used Sustainability initiative register Sustainability initiative cost benefit summary
	Optimise local and indigenous employment and business engagement	Amount (%) of local and indigenous businesses or personnel engaged on the project
Enhance the environment	All subsoil and topsoil impacted by the construction works is separated and protected from degradation, erosion or mixing with fill or waste. 95% of all topsoil (by volume) retains its productivity and is	Topsoil tracking and stockpiling procedure Monthly sustainability reporting Audit reports Revegetation implementation

	beneficially re-used on or nearby to the project or asset.	
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