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# NorthLink WA Southern Section: Annual Project Sustainability Report 2018



# About this Report

This report has been prepared by the NorthLink WA Southern Section (NLSS) project team on behalf of Main Roads Western Australia. This report forms part of Main Roads' annual sustainability reporting which is integrated into its Annual Report. The report content is prepared in accordance with GRI principles. Main Roads' processes determine which aspects are material and to be reported on by the project.

## Overview

NLSS is a \$180m project located on a 6km length of Tonkin Highway between Guildford Road and Reid Highway. It is one of 3 projects to deliver the overall [NorthLink WA](#) program which will provide a vital, state of the art transport link between Morley and Muchea. It will reduce travel times and congestion, and provide significant productivity benefits to the economy, industry, motorists and local communities. This project is being delivered via a design and construct contract.

NLSS has upgraded Tonkin Highway to a freeway standard with six lanes between Guildford Road and Reid Highway with new interchanges at Collier Road and Morley Drive, and a flyover at Benara Road. The project works now completed includes:

- Upgrading Tonkin Highway to a six lane freeway between Guildford Road and Reid Highway.
- Constructing a new interchange at Collier Road (Collier Road will be realigned and raised to go over Tonkin Highway, with on and off ramps connecting the two roads).
- Constructing a new interchange at Morley Drive (this includes a roundabout at ground level on Morley Drive that will connect with a raised Tonkin Highway).
- A flyover at Benara Road over the Tonkin Highway.
- New cycling and pedestrian facilities including a 4m wide shared path alongside Tonkin Highway.

Undertaking these works will improve freight capacity, efficiency and productivity and reduce urban congestion now and in the future benefiting both local commuters and the economic health of Western Australia. The upgrade will also improve road safety along this route in line with the State's 'Towards Zero' policy. The project aims to maximise sustainability through economic, social and environmental responsibility and improve amenity for the community, tourists and road users.

### Overall approach to sustainability

This project is committed to sustainability and creating lasting benefits through an integrated consideration of social, environmental, and economic aspects in all its activities. It is registered for an Infrastructure Sustainability rating and obliged to achieve at least an IS Design Rating and IS As-Built Rating of Excellent. The project has developed a Sustainability Management Plan which specifies the sustainability requirements the project must meet in order to enhance its sustainability performance. Overall responsibility for Sustainability sits with the Project Manager with responsibility delegated to a number of area leads including Sustainability, Commercial, Design, Construction, Community and Stakeholder Engagement, and Environment.

NorthLink WA southern section achieved a leading ISCA design rating of 93, the highest ever in WA and the highest score for a design and construct project in Australia. The score was the second highest IS rating to date and the highest for a road project. It won an ISCA Outstanding Achievement Award and an Australian Engineering Excellence Award.

# Environmental Aspects Performance

## At a glance

Due to the project staging being at completion the below information is provided as a total to date, without a fiscal year breakdown.

Aspect	Total for Project
Clearing planned (ha)	33
Actual clearing to date (ha)	29
Rehabilitation/revegetation planned (ha)	35.6
Actual rehabilitation/revegetation to date (ha)	30*
Total Water Consumption to date (kL)	398,579kL
Total GHG emissions (scope 1 & 2) to date (t CO <sub>2</sub> e)	165,879.07^
Total energy consumption to date (mj)	2,038,968#
Total quantity of recycled content used in project (t)	12,000 (RAP)
Total imported materials used in project (t)	1,194,138
Total waste generated by project (t)	32,017.66kg

\*seasonal planting is currently underway and it is anticipated that the total planned area will be reached in 2018

^Total GWP (tCo2e) for materials and construction (A1-A5) and asset Use Stage (B1-B7) over a 100-year life cycle.

# based on 566,380 kWh (1kWh =3.6MJ) consumption from grid during construction.

## Environmental management

The NLSS project area identified 14.27 ha of suitable foraging habitat for the Forest Red-Tailed Black Cockatoo (*Calyptorhynchus banksii naso*) and the Carnaby’s Cockatoo (*Calyptorhynchus latirostris*). 106 potential Black Cockatoo breeding trees were also identified within the project boundary, the majority of which were young Marri (*Corymbia calophylla*).

To manage the legislated environmental conditions that construction projects are subject to, an ISO 14001 certified Environmental Management System (EMS) has been implemented. This includes a detailed Environmental Management Plan to manage significant environmental aspects of the project.

The project also commissioned an Ecological Impact Assessment. This assessment suggested that project construction activities would result in 33ha of vegetation being cleared and 35.6ha of vegetation being planted. Due to the collaborative approach during pre-clearing hold point inspections the project managed to retain 4.2 Ha of mature vegetation.

In addition, the project has a planned habitat offset of 45 Ha.

NLSS has been referred to the Environmental Protection Authority and further information is available [here](#).

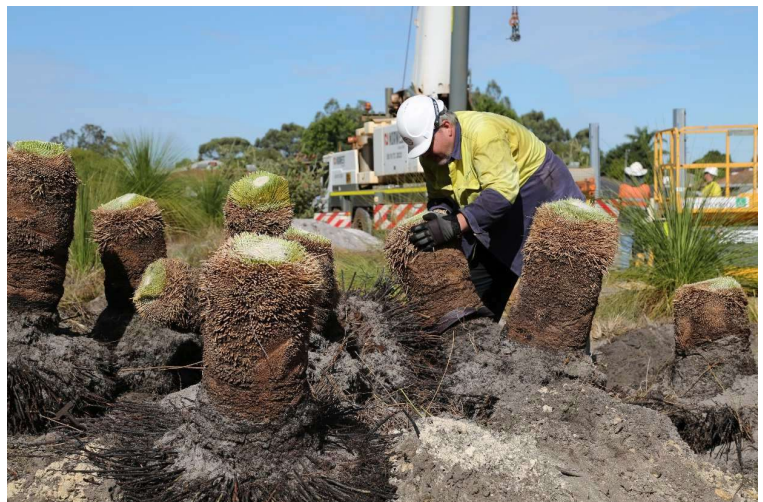


Image: Grasstree salvage for transplanting in final works



Image: vegetated infiltration basins

## Water Management

NLSS has developed a water sensitive approach to carrying out project activities. Water used by the project for material compaction and dust suppression must be obtained from sources other than scheme water, existing wetlands or the Swan River, unless it is not practical or feasible for the project to do so. Additionally, the project is legally obliged to obtain a license to extract any water required from Department of Water under the Rights in Water and Irrigation Act 1914.

To identify an approach to reducing the built infrastructure's dependence on water use a full lifecycle analysis was undertaken in accordance with ISO14044 and EN 15978. Part of the water demand minimisation included the designing out reticulated landscape treatments within all Main Roads estate. Water modelling indicates improvements between the reference design and the as constructed volumes has resulted water being reduced 24% with 99.9% of this being supplied from non-potable groundwater sources.

Due to the project staging being at completion the below information is provided as a total to date, without a fiscal year breakdown.

Source	Total for Project
Water purchased from the scheme in litres	2,978,500
Water pumped from bores in litres	424,153,000
Water pumped from rivers, lakes or harvested in litres	0
Recycled or waste water use (typically from another industry) in litres	0

## Carbon emissions & energy

NLSS has been actively reducing its impact on carbon emissions and energy throughout the infrastructure lifecycle. A full lifecycle analysis was undertaken in accordance with ISO14044 and EN 15978 to identify elements that could lead to significant reductions. This process identified the three most significant contributors as follows:

- operational energy associated with lighting is the biggest direct environmental impact from the project.
- energy use associated with road users i.e. traffic, is very significant, and is the biggest indirect environmental impact from the project.
- Construction energy from diesel combustion is also significant.

A number of initiatives have been implemented that target reducing energy use in the three areas above. For operational energy adaptive lighting and dimming have been installed and are currently being commissioned, Main Roads will be able to collect information on these installations to realise the energy savings. Use of a single point urban interchange, roundabout interchange and flyover have been incorporated into infrastructure design to address traffic flow and congestion which will also reduce energy use from the road user. At the project level, a minimum specification of emission standards for construction plant and equipment was implemented, the implementation of this This is the first time this has occurred on a project in WA and had various rates of success and the learnings have been shared within Main Roads.

Emissions modelling indicates significant reductions have been achieved between the reference design and the as constructed quantities. Overall, it is estimated that lifecycle emissions have been reduced by 19% or 35,000 t CO<sub>2</sub><sup>e</sup>.

A small quantity of renewable energy is used on the project. Solar powered lighting and variable message signs have been utilised. It is only expected to be a fraction of overall energy usage but are providing Main Roads valuable feasibility information should variable message signs be sought to be installed in remote areas.

Source	Total for Project
Energy usage by source in mega joules	
From fuel use (mj)*	88,958,703.33
From electricity (mj)	2,038,968 <sup>#</sup>
Electricity produced (mj) <sup>^</sup>	46,839.6
Energy saved (mj)	A mega joule metric is not easily obtainable, however combined lifecycle assessment indicated a 19% energy saving (35,000 t CO <sub>2</sub> <sup>e</sup> ) over base case.

\* Calculated based on 38.6MJ/L for 2,304,629.6L of diesel

# based on 566,380 kWh (1kWh =3.6MJ) consumption from grid during construction.

<sup>^</sup> based on 13,011 kWh (1kWh =3.6MJ) production from onsite solar powered lighting towers.

## Materials

Managing environmental impacts associated with materials is important to NorthLink WA due to the significance of those impacts. The project has focused on managing asphalt, concrete and steel. These materials also form a significant portion of the costs associated with this project.

In an effort to understand the opportunity to reduce environmental impacts of the significant materials consumed by the project, a full lifecycle analysis was undertaken in accordance with ISO14044 and EN 15978. This provided direction on where to focus efforts to reduce material use. In all cases initiatives were pursued to reduce demand for materials through lean design and the use of site won materials, seeking alternative lower impact materials via suppliers and to increase the durability of installed materials beyond the specified design life.

Taking into consideration the projects monitoring and as constructed quantities it is considered that a 24% reduction in material lifecycle impacts has been achieved.

### Material and Waste Statistics

<b>Imported Materials</b>	<b>Total for Project</b>
Sand (t)	0
Gravel (t)	11,728.91 (laterite)
Limestone (t)	262,225.5 (sub-base)
Crushed Rock (t)	21,508 (road base)
Aggregate (t)	Not part of project tracking.
Asphalt (t)	153,406.8
Concrete (t)	90,424.53
Steel (t)	12,300.3
Reinforced concrete (t)	18,636.4
Emulsion (t)	Not part of project tracking.
Bitumen cutter (t)	Not part of project tracking.
Bitumen (t)	7,902.4 (back calculated from total asphalt tonnage)
Other (t)	127.5 (retaining wall blocks – reconstituted limestone)

<b>Waste</b>	<b>Total for Project</b>
Unsuitable fill moved offsite (t)	See below m <sup>3</sup> quantity
Landfill (t)	318.24
Sewage (t)	Not metered, connected to mains.
Concrete rubble (m <sup>3</sup> )	29,924.79 (separation of waste streams not available)
Pavement rubble (m <sup>3</sup> )	
Unsuitable material (m <sup>3</sup> )	1,094.25 (ACM impacted)
General/Green Waste (t)	150.78
Unsuitable fill used for rehabilitation purposes (t)	N/A
Recycled (t)	32,017.66

<b>Imported recycled content</b>	<b>Total for Project</b>
Sand (t)	0
Road Base (t)	8,104

Asphalt/Profiling (t)	12,000 (RAP, this is included in asphalt figure)
Steel (t)	0
Concrete (t)	0
Other (t)	191.3 (retaining wall blocks – recycled C&D reconstituted)

## Recycled materials

Recycling materials is important in conserving non-renewable materials that road projects utilise. It is a project policy that all asphalt will include 10% recycled asphalt pavement and all site won eligible topsoil and mulch will be reused on site. In addition, John Holland works with Main Roads and the appointed asphaltting contractor to achieve a mix approval for the use of 20-25% recycled asphalt pavement content, the highest ever approved in WA.

It is standard practice of road projects to utilise on site road building resources. This is done through balancing the amount of material that needs to be 'cut' away, with the amount of material that is required to 'fill' depressions in the road profile. A total of 595,000m<sup>3</sup> of cut was reused onsite.

NLSS imbedded the following targets that are aimed at minimising waste generated from the project:

- 100% of spoil will be reused
- >90% of C&D waste will be diverted from landfill
- >60% of Office waste will be diverted from landfill

The above targets were exceeded, with the project recycling 99.02% of C&D wastes and 74.1% of office wastes. This equated to 32,017,660kg of wastes being diverted from landfill.

# Economic Aspects Performance

## At a glance

Following is a snapshot of the economic impact and performance of NorthLink WA Southern Section.

Economic Aspect	Total for Project
<i>Workforce and Supply Chain</i>	
Number of people employed by supply chain at various stages of project	2785 personnel were inducted to site during the delivery of the works.
Total number of suppliers engaged	325
Total number of Indigenous Enterprise	2
Total number of Disability Enterprise	1
Buy Local Spend (to date)	100% of expenditure on local suppliers (Local being Perth, WA)

## Cost benefit analysis

Economic Aspect	Impact
<i>Preliminary cost benefit analysis of all sustainability initiatives.</i>	
Capital expenditure savings	approximately \$12,000,000
Expected operational expenditure reductions	\$42,744,631

## Climate change

Climate change has been considered in project design. Climate change risks were identified by Main Roads’ processes. Through design, all extreme and high risks have been mitigated and moderate risks have been suitably addressed. There are no residual risks greater than moderate.

## Sustainable transport

There are a number of features included in the road design which support sustainable transport. These include the ultimate design allowing for rail infrastructure within median and the existing bus routes/stops being maintained. NLSS has provided additional and larger underpasses, shared paths, principal shared paths and connections compared to existing and reference scenarios.



Image: Pedestrian Underpass



# Social Aspects Performance

## At a glance

Social Aspect	Total for Project
Community Satisfaction to Project	98.88% resolved
No. of complaints	623
No. of traffic safety incidents within project boundary	Not part of project tracking. A total of 69 safety incidents
% of women in workforce	4.2%
% indigenous in workforce	2.26%
LTIFR	0

## Community & stakeholder engagement

To ensure the impacts of the project on the community were appropriately managed a Community and Stakeholder Engagement Plan has been implemented on Northlink WA Southern Section. The plan aims to foster communication and co-operation with the community and stakeholders, including the Construction Reference Group, Local Government Authorities, government departments and people with disabilities. The plan is aligned with Main Roads' Community Engagement Policy and Western Australian Government's Sustainability and Citizenship Strategies.

NLSS routinely surveys its identified stakeholders and community. The top topics or themes raised by the community related to access, nuisance or design queries. As at October 2017 the performance statistics suggest:

- awareness of NorthLink WA is remains very high with almost 9 in 10 people surveyed aware
- Compared to the previous research intakes, more feel that they have received sufficient information about NorthLink WA and those who need more information would like details on timing and roadworks.
- Most perceive information as objective, useful, relevant, easily accessible and timely.
- More than 8 in 10 feeling positive about NorthLink WA
- More than 6 in 10 feel they have received enough information thinking that information received was useful, timely, objective and easily accessible
- 97% of community interactions had been satisfactorily resolved.
- 1.07% were overdue, with the remainder in progress.



Image: Completed nesting boxes

## Heritage assessments

The project has been informed by a number of heritage assessments which include a desktop Aboriginal Heritage Report, Ethnographic Report and an Archaeological Assessment of the NorthLink WA Project. As part of NLSS commitment to promoting Whudjuk Noongar cultural heritage, the project has seen the following initiatives undertaken:



Images: pre-painting smoking ceremony and final underpass artwork



- Artwork at Collier Underpass and approach walls is considered by local elder Lance Chadd. The artwork coincides directly with WA Govt. Site 3178, which only exists as 'stored data', but was known to have ochre artefacts, prior to artefacts being removed during the Swan Area Archaeological Survey in the 1970's. The interpretative artwork aims to communicate the existence and significance of Site 3178, where without it there would be little prospect of others appreciating the existence of the Site.
- In addition educational information is provided on an accompanying sign at the underpass providing further information on the artwork, its interpretation and history of the surrounding area. The sign associated with the artwork is one of several signs that exist across the NorthLink WA Southern Section Project (note, not all signs relate to heritage) helping to create a 'trail', a 'sense-of-place', a 'journey-experience', and enhance social benefits.

## Road safety

A key project priority is Roads Safety. NLSS aims to improve road safety along the route and contribute to the State's 'Towards Zero' policy. To support this the overall infrastructure design is subject to road safety audits in accordance with Austroads' Guide to Road Safety – Part 6: Road Safety Audit. These audits were undertaken at the following stages:

- I. completion of 15% of design;
- II. completion of 85% of design;
- III. completion of 100% of design for any elements that change from the 85% design;
- IV. immediately prior to opening to the public of any section of road for the continuous unrestricted passage of vehicles; and
- V. within two weeks after the road being opened to the public for continuous passage of vehicles.

To date the design has been audited and approved from a road safety perspective as per project commitments. Examples of specific road safety treatments along the route include:

- the selection of a single point urban interchange and the use of RAB.
- additional barriers and segregation in the road design.
- Crime Prevention through Environmental Design principles have been used to inform all designs.



Image: Morley RAB beam lift and post completion

### Legacy aspects

Through a process of research, opportunity scanning and consultation, priority issues of impacted communities and stakeholders were determined. The priority issues and treatments identified included:

Issue	Treatment
Tree canopy retention in the local area	Conservation of additional trees over and above the permitted clearing envelope
Water quality of drainage to Swan River	Focus on on-site infiltration and vegetated treatment systems
Improving walkability, cycling facilities, active transport and liveability	Additional and larger underpasses, shared paths, principal shared paths and connections compared to existing and reference scenarios
Noise and air quality	Additional noise barriers, achievement of State Planning Policy Noise Goals for 2040 traffic and improvement compared to reference scenario

### Diversity

NLSS is committed to building, valuing and promoting diversity and inclusiveness across our business. We know that diverse perspectives result in greater innovation and will help us to remain one of Australia's most recognised and respected construction brands.

#### Key statistics

- approximately 4.2% of site personal inducted were female. It is noted however >20% of JH project staff were female.
- approximately 2.26% of site personal inducted were indigenous.

### Workforce safety

John Holland's AS/NZS 4801 certified Workplace Health and Safety Management System manages workplace safety on site which is informed by a detailed Safety and Health Management Plan. The project is committed to having 1 health and safety representative per work group. There has been no Lost Time Injuries to date.