

Subject	Manuwarra Red Dog Highway Greenhouse Gas Estimate	Project Name	Manuwarra Red Dog Highway
Attention	Lisa Boulden	Project No.	IW217943
From	Alok Pradhan		
Date	30 March 2021		

Manuwarra Red Dog Highway – Response to EPA Request for Greenhouse Gas Emissions Estimate

1. Introduction

In April 2020, the Western Australian Environmental Protection Authority (EPA) released its Environmental Factor Guideline – Greenhouse Gas Emissions. As the construction of the Manuwarra Red Dog Highway (MRDH) project is an infrastructure development and a development that clears vegetation, it is an activity that may be considered under the Greenhouse Gas Emissions Factor. As a result of this, the MRDH project has been requested to provide an estimate of Greenhouse Gas (GHG) emissions as a result of the clearing, construction and operation of the project.

2. Methodology

2.1 Boundary and Emissions Sources

Jacobs has undertaken a high-level estimate of the project's GHG footprint, covering the most significant contributions. The assessment boundary is presented in Table 2-1.

Table 2-1: GHG Assessment Boundary

Source of GHG emission (construction)	Activity	Included in inventory?	Indirect		
			Direct Scope 1	Scope 2	Scope 3
Stationary fuel	Fuel consumed by generators for operation of site offices	✓	●		●
Transport fuel	Fuel consumed for use in site management vehicles (utility vehicles)	✓	●		●
Stationary Fuel	Fuel consumed by construction plant / equipment, as well as for maintenance plant.	✓	●		●

Source of GHG emission (construction)	Activity	Included in inventory?	Direct		Indirect	
			Scope 1	Scope 2	Scope 2	Scope 3
Transport fuel	Fuel consumed for construction materials delivery and spoil/rock removal and haulage.	✓				●
Carbon sinks	Land clearing / soil disturbance	✓	●			
Construction materials	Embodied emissions of materials used in construction and maintenance.	✓				●
Road use during operation	Fuel consumed for users of the road throughout its life following construction	✓				●
Landfill	Construction waste disposed at landfill.	✗				●
Transport fuel	Employee / business commute (vehicles) and air travel.	✗				●

Due to the greenfield nature of the project, construction waste is expected to be limited to small quantities of office waste, as well as offcuts, breakages or similar minor quantities of inert materials with little organics content. These are not considered to be greater than one per cent of the total emissions for the project and hence have not been included, however spoil management for cut, fill and export is included.

Employee commuting and air travel have been excluded as they are considered to be largely outside of the projects influence and are not considered to be greater than one per cent of the total emissions for the project.

No lighting, signalling or other notable operational electricity uses are present for the project and hence, this has not been included for the assessment.

2.2 Assumptions and Emissions Factors

Predictions of project quantities have been provided by the design team based on best available information at the time of design. These quantities have been used with the assessment methodology provided by the Transport Authorities Greenhouse Group (TAGG) Workbook (2013) and the associated Carbon Gauge Tool to prepare estimates of fuel use and construction materials, as well as land clearing emissions categories.

A breakdown of the land clearing allocations based on the TAGG Workbook (2013) classes is presented in Table 2-2, with all vegetation cleared being allocated as Biomass Class 1 (0-50 tonnes dry matter / hectare).

Table 2-2: Project land clearing breakdown

Vegetation Class	Emissions Factor (tCO ₂ e/ha)	Area Cleared (ha)
C	77	5
D	77	412
F	106	110
I	110	115

Operational fuel emissions associated with the use of the road over its lifetime (50 years) has been based on transport and traffic data. This traffic data has been used, along with state specific average fuel consumption data for various vehicle types sourced from the Australian Bureau of Statistics (2018), to generate annual fuel consumption data for vehicles using the road. Fuel consumption and traffic data has been assumed constant over the 50 year project life, with the emissions presented in Table 3-1 for the full 50 year period.

It is noted that the emissions associated with road users attributed to the project is based on the projected use of the project but is not mutually exclusive from a scenario in which the project was not undertaken. i.e. these emissions may still have occurred through existing road corridors and no comparison has been made between road user emissions scenarios with and without the construction of the project.

Emissions factor sources are presented in Table 2-3.

Table 2-3: Emissions Factors Sources

Emissions Source	Emissions Factors Source
Fuel consumption (stationary and transport)	National Greenhouse Accounts Factors (2019)
Land Clearing	Transport Authorities Greenhouse Group (TAGG) Workbook (2013) Appendix E
Construction Materials	Infrastructure Sustainability Council of Australia (2018) Infrastructure Sustainability (IS) Materials Calculator v2.0

3. Emissions Footprint Results

The project is expected to result in the following emissions over its life:

- Scope 1 = 139,138 tonnes CO₂e
- Scope 2 = 0 tCO₂e
- Scope 3 = 1,104,585 tCO₂e

The emissions source breakdowns are summarised in Table 3-1.

Table 3-1: Emissions breakdown from project activities

Source	Scope 1 Emissions (tCO ₂ e)	Scope 2 Emissions (tCO ₂ e)	Scope 3 Emissions (tCO ₂ e)	Total Emissions Proportion
Construction Fuel Consumption	51,735	0	2,673	4%
Maintenance (50-year life)	30,983	0	7,499	3%
Vegetation Clearance	56,419	0	0	5%
Construction Materials	0	0	79,415	6.4%
Haulage	0	0	9,896	0.8%
Road Users (50-year life)	0	0	1,005,103	81%
Total Emissions (tCO₂e)	1,243,723			

4. Conclusion

Based on an expected 30-month duration of construction, the annual Scope 1 emissions for the project's construction are 55,655 tCO₂e/annum (including land clearing). This is below the 100,000 tCO₂e/annum Scope 1 emissions threshold within the EPA Environmental Factor Guideline – Greenhouse Gas Emissions, which does not require this guideline to be applied for assessment.

5. References

Australian Government Department of the Environment and Energy (2019), Australian National Greenhouse Accounts Factors

Environmental Protection Authority (2020), *Environmental Factor Guideline – Greenhouse Gas Emissions*. EPA, Western Australia

Infrastructure Sustainability Council of Australia (ISCA), (2018), Infrastructure Sustainability v2.0 Materials Calculator

Transport Authorities Greenhouse Group (TAGG), (2013) Greenhouse Gas Assessment Workbook for Road Projects