

## 7.0 Environmental assessment

### 7.15 Greenhouse gases

Greenhouse gas (GHG) emissions generated by the construction and operation of the proposed modification are assessed in this section.

#### 7.15.1 Introduction

There were no specific requirements set out in the SEARs to address potential GHG impacts. Nonetheless an assessment of GHG impacts associated with the proposed modification is provided in **Appendix N** (Climate change risk and greenhouse gas assessment) and summarised in the sections below.

#### 7.15.2 Method of assessment

Transport's Carbon Estimate and Reporting Tool (CERT) was used to estimate GHG emissions associated with the proposed modification by assessing the data inputs and their potential impact.

CERT provides generic calculations to convert quantities of materials, fuel use, vegetation removal, etc. into mass of GHG emissions produced. CERT converts materials of all the major components for construction and operation of the Westlink M7. While the CERT sources emissions factors from the Australian National Greenhouse Accounts (Department of Industry, Science, Energy and Resources, 2016), the only relevant emissions factors that change significantly year-to-year are emissions from the electricity grid. For emissions from electricity use, an adjustment factor was applied to account for this change such that the GHG emissions reflect the most recent (2021) emissions factor for NSW grid electricity.

To calculate the potential GHG emissions, the following steps were followed:

- Define the study area and identify potential sources of GHG emissions associated with the proposed modification
- Determine the quantity of each emission source (e.g. construction-related vehicle movements, power consumption, materials used, waste generation, fuel consumption and vegetation impacts)
- Quantify the potential GHG emissions associated with each GHG source, using equations and emission factors specified in the Transport CERT
- Present the potential GHG emissions associated with the proposed modification.

GHG emission sources are categorised into three 'scopes':

- Scope 1 – direct emissions: GHG emissions generated by sources owned or controlled by the proposed modification, for example emissions generated by the use of diesel fuel in project-owned construction plant, equipment, or vehicles
- Scope 2 – indirect emissions: GHG emissions from the consumption of purchased electricity in owned or controlled equipment or operations for the proposed modification. These GHG emissions are generated outside the construction and operational footprint of the proposed modification, for example the use of electricity purchased from the electricity grid
- Scope 3 – indirect upstream/downstream emissions: GHG emissions generated in the wider economy due to third party supply chains and road users as a consequence of activity within the boundary of the proposed modification.

The primary source of emissions for the purposes of this assessment are associated with the construction phase and maintenance of the additional lanes during operation. Only emissions associated with the additional lanes under the proposed modification have been quantified. All emissions associated with existing Westlink M7 operations (including emissions from traffic along the motorway) are not included in the scope of the assessment, as assessment of this scope 3 GHG impact should be assessed at a broader planning level rather than a project-by-project basis.

The proposed modification remains subject to detailed design, and therefore assumptions have been made where detail on the exact material types, construction methodology and resource requirements are unknown. The CERT tool has been used for GHG estimation for the purposes of the modification report and further detailed assessment will be completed during design for any GHG credits that are pursued under the IS Rating for the project.

### 7.15.3 Study area

The study area for the GHG assessment includes the construction and operational footprints of the proposed modification as described in **Chapter 4.0** (Proposed modification).

### 7.15.4 Existing environment

GHGs are gases that are released into the atmosphere through natural processes (such as bushfires) and human activities (such as burning fossil fuels). When GHGs are emitted, the gas can trap heat in the atmosphere and can influence global temperatures.

In Australia, transport accounts for 17 per cent of total emissions in Australia (96 metric tons of carbon dioxide equivalent (MtCO<sub>2</sub>e) per year), making it the third largest contributor to GHG emissions in the nation (Australian Government Department of the Environment and Energy, 2017). Approximately half of those emissions are attributed to cars (43 MtCO<sub>2</sub>e) (Australian Government Department of the Environment and Energy, 2017).

In NSW, transport was responsible for 20.8 per cent of GHG emissions in 2015/16 (NSW Environment Protection Authority, 2018). GHG emissions in NSW across all sectors contributed to 136.58 MtCO<sub>2</sub>e in 2019 representing approximately 26 per cent of Australia's total emissions. (Australian Government Department of Industry, Science, Energy and Resources, 2019).

During the usual operation of the Westlink M7, the activities that generate GHG emissions include use of maintenance related equipment and materials, vehicles travelling on the motorway, and use of operational features that require energy such as lighting, communications, variable messaging signs and hydraulics.

### 7.15.5 Impact assessment

#### Construction

It is estimated that the proposed modification would generate approximately 130,701 tCO<sub>2</sub>e during construction. The breakdown of emissions by scope is summarised as:

- 28,101 tCO<sub>2</sub>e of Scope 1 (direct) GHG emissions
- 5,146 tCO<sub>2</sub>e of Scope 2 (indirect) GHG emissions
- 97,454 tCO<sub>2</sub>e of Scope 3 (indirect) GHG emissions.

The assessment undertaken found that most of the GHG emissions produced during construction would be associated with construction materials (51 per cent), followed by waste (22 per cent), and fuel use (21 per cent). This is mainly due to the large quantities of concrete required for the proposed modification. Emissions associated with concrete may be reduced if concrete mix designs with higher proportions of supplementary cementitious materials are used.

The high proportion of emissions associated with waste are due to disposal of timber and vegetation waste to landfill. If this waste material can be re-used onsite or on other projects, or processed for reuse by an appropriate facility rather than being taken to landfill, this can reduce the GHG emissions associated with this source.

Diesel consumption accounts for 21 per cent of the estimated GHG emissions for construction. Reducing GHG emissions from fuel use is an ongoing challenge across the broader construction industry. Minor reductions in emissions from fuel use can be made through the use of biodiesel and bioethanol and more efficient plant and equipment such as hybrid excavators.

The estimated total emissions from the construction component of the proposed modification are equivalent to 0.1 per cent of total NSW annual emissions in 2019. These emissions are anticipated to occur over the three-year construction period which is expected to run from 2023 to 2025.

## Operation

It is estimated that the proposed modification would generate approximately 10,162 tCO<sub>2</sub>e during the nominal 100-year operational life (excluding tailpipe emissions). The breakdown of emissions by scope is summarised as:

- 657 tCO<sub>2</sub>e of Scope 1 (direct) GHG emissions
- 0 tCO<sub>2</sub>e of Scope 2 (indirect) GHG emissions
- 9,505 tCO<sub>2</sub>e of Scope 3 (indirect) GHG emissions.

The scope of the assessment was to assess GHG impacts of the proposed modification that are in addition to regular operation of the Westlink M7. There are no anticipated major changes to electricity consumption or operational maintenance vehicles as a result of the proposed modification. As such, any change to operational electricity or fuel use for light vehicles (scope 2 emissions) is expected to be negligible.

The proposed modification would affect the number of vehicles on the Westlink M7, the amount of time those vehicles spend on the road and traffic flow dynamic. As mentioned in **Section 7.15.2**, the change in emissions from vehicles during operation as a result of the proposed modification compared to the scenario without the proposed modification were not included in the GHG assessment, due to the complexity and interrelatedness of the proposed widening's influence on traffic in the regional network. Nevertheless, while the forecast traffic volumes along the Westlink M7 would increase, the overall network performance would also improve. Higher tailpipe GHG emissions can generally be expected with higher traffic volumes, however lower congestion may contribute to lower emissions per car per kilometre travelled.

Emissions are anticipated to be produced as a result of maintenance activities throughout the asset life of the proposed modification. The estimated emissions from the maintenance of the proposed modification (scope 3 emissions) would be equivalent to 0.007 per cent of total NSW annual emissions in 2019. These emissions are anticipated to occur during scheduled maintenance, aligning with maintenance of the wider Westlink M7, which has been assumed to occur every 15 years over a nominal 100-year asset life.

### 7.15.6 Management and mitigation

Based on the assessment described above, the mitigation and management measures described in Table 7-110 are proposed to be implemented in order to manage potential impacts from GHG emissions during the construction of the proposed modification.

Refer also to **Section 7.3** (Air quality) and **Section 7.16** (Waste) for air quality and waste management related mitigation measures proposed, which will also contribute to managing greenhouse gas emissions.

**Table 7-110 Mitigation measures**

Impact	ID	Mitigation measure	Responsibility	Timing
Emissions from electricity consumption	GG1	GHG emissions will be reduced through the use of GreenPower and/or other renewable energy sources as part of the electricity procurement for the proposed modification. The proposed modification is targeting 100% renewable energy-sourced electricity for operations, and minimum 20% for construction	Construction contractor Westlink M7 Operator	Construction Operation
	GG2	Solar construction lighting and variable message signs (VMS) will be utilised during construction where feasible	Construction contractor	Construction

Impact	ID	Mitigation measure	Responsibility	Timing
Emissions from construction plant and materials	GG3	Opportunities to use low emission construction materials, such as recycled aggregates in road pavement and surfacing, and cement replacement materials will be investigated and incorporated where feasible and cost-effective	Construction contractor	Detailed design
	GG4	Construction plant and equipment will be well maintained to allow for optimal fuel efficiency	Construction contractor	Construction
	GG5	Raw materials will be managed to reduce energy requirements for their processing. For example, stockpiled materials will be covered or provided undercover storage where possible to reduce moisture content of materials, and therefore the process and handling requirements	Construction contractor	Construction
	GG6	Locally produced goods and services will be procured where feasible and cost effective, to reduce transport fuel emissions	Construction contractor	Construction
Emissions from fuel use	GG7	E10 bioethanol and B5 biodiesel will be utilised where feasible	Construction contractor	Construction
Emissions from maintenance (and construction) activities	GG8	Purchasing certificates to offset Scope 1 and 2 emissions for construction and maintenance activities will be considered	Transport	Construction Operation