

# Appendix D

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## Detailed assessment methodologies

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This Appendix presents the detailed assessment methodologies for:

- Local business impacts
- Sustainability, climate change and greenhouse gases.

Assessment methodologies for all other issues are provided in Chapter 4 (Methodology) of this Environmental Impact Statement and some are detailed in the Technical Papers where relevant. The legislative and policy context for all issues is provided in Appendix B (Legislative and policy context).

### Local business impacts

#### Overview

This assessment identifies and assesses the potential impacts on businesses located within or near this proposal. This includes a qualitative assessment of the likelihood and significance of these potential impacts on local businesses during operation and construction of this proposal. The methodology for the assessment included:

- definition of the local business study area consistent with Chapter 16 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a), and Chapter 12 of the *Sydney Metro West Environmental Impact Statement – Major civil construction between The Bays and Sydney CBD* (Sydney Metro, 2021a), and identification of business types to ensure that any changes to usage have been captured
- use of the local business profiles developed for Chapter 16 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a), and Chapter 12 of the *Sydney Metro West Environmental Impact Statement – Major civil construction between The Bays and Sydney CBD* (Sydney Metro, 2021a) (based on Census 2016 data for areas near each site). This profiling used the 'destination zone' data associated with the Australian Bureau of Statistics 'Place of Work' data set as relevant to each local business area. In most cases, more than one destination zone was relevant to a local business study area. This profiling also used information gathered from the City of Sydney floorspace, land use and business survey, and desktop review
- identification of the types of changes (both positive and negative) that could occur to businesses within each local business study area
- qualitative assessment of business impacts that may occur as a result of this proposal using the Objective Impacts Table options rating levels from the Australian Transport Assessment and Planning Guidelines (Australian Transport Council, 2018)
- identification of measures to manage and mitigate any potential impacts on local businesses as a result of this proposal.

#### Study area selection methodology

The local study area for the business impact assessment encompasses about 400 metres around each site (i.e. the area within an approximate five minute walk of the site), consistent with the Transport Performance and Analytics travel zone data.

The local business study area for each site is generally consistent with that considered in Chapter 16 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a), and Chapter 12 of the *Sydney Metro West Environmental Impact Statement – Major civil construction between The Bays and Sydney CBD* (Sydney Metro, 2021a), respectively. Due to the minor additional footprint areas at Westmead metro station, Sydney Olympic Park metro station, North Strathfield metro station and The Bays Station associated with this proposal, the 400 metre zone for consideration of local business impacts has been expanded. New figures reflecting this additional footprint are provided in Chapter 7 (Westmead metro station), Chapter 9 (Sydney Olympic Park metro station), Chapter 10 (North Strathfield metro station) and Chapter 13 (The Bays Station) of this Environmental Impact Assessment, respectively.

#### Qualitative impact assessment methodology

Each potential impact has been assessed using a qualitative and objective risk based assessment matrix which evaluates impacts based on the 'likelihood' of occurrence (defined in Table 1), and the 'significance' of the potential impact on local businesses in the event it does occur (defined in Table 2).

**Table 1 Likelihood categories**

| Likelihood category  | Description   |
|----------------------|---|
| Almost certain       | An estimated greater than 90 per cent chance of occurrence during this proposal; or the event is expected to occur in most circumstances                          |
| Likely               | An estimated 75-90 per cent chance of occurrence during this proposal; or The event will probably occur in most circumstances                                     |
| Possible             | An estimated 50-75 per cent chance of occurrence during this proposal; or The event could occur   |
| Unlikely             | An estimated 25-50 per cent chance of occurrence during this proposal; or The event could occur but is not expected   |
| Rare                 | An estimated 10-25 per cent chance of occurrence during this proposal; or The event may occur only in exceptional circumstances                                   |
| Almost unprecedented | An estimated less than 10 per cent chance of occurrence during this proposal; or not expected to ever occur during this proposal (less than once every 100 years) |

**Table 2 Significance categories**

| Significance category | Description   |
|-----------------------|---|
| Large negative        | Major negative impacts with serious, long-term and possibly irreversible effects leading to serious damage, degradation or deterioration of the physical, economic or social environment. Requires a major re-scope of concept, design, location and justification, or requires major commitment to extensive management strategies to mitigate the effect. |
| Moderate negative     | Moderate negative impact. Impacts may be short, medium or long-term and impacts would most likely reduce in response to management actions.   |
| Slight negative       | Minimal negative impact, probably short-term, able to be managed or mitigated, and would not cause substantial detrimental effects. May be confined to a small area.  |
| Neutral               | Neutral – no discernible or predicted positive or negative impact.  |
| Slight positive       | Minimal positive impact, possibly only lasting over the short-term. May be confined to a limited area.  |
| Moderate positive     | Moderate positive impact, possibly of short, medium or long-term duration. Positive outcome may be in terms of new opportunities and outcomes of enhancement or improvement.  |
| Large positive        | Major positive impacts resulting in substantial and long-term improvements or enhancements of the existing environment  |

Source: Australian Transport Assessment and Planning Guidelines (2018)

## Sustainability, climate change and greenhouse gas

### Sustainability

The sustainability assessment methodology has been included in Chapter 4 (Methodology) of this Environmental Impact Statement.

### Climate change

The climate change risk assessment has used the methodology outlined in the *TfNSW Climate Risk Assessment Guidelines* (TfNSW, 2021). These guidelines are based on the Australian Standard AS 5334-2013 Climate change adaptation for settlements and infrastructure – A risk-based approach (Standards Australia, 2013). This standard follows the International Standard ISO 31000, Risk Management – Principles and guidelines (ISO, 2018). Based on these standards, a Sydney Metro West Climate Change Risk Register has been prepared for the Sydney Metro program of work. This has been designed to standardise risk register fields and allow the traceability of risks throughout the proposal design and includes a gap analysis based on common risks linked between Sydney Metro and similar large-scale Sydney infrastructure projects.

A climate change workshop was undertaken in 2018 for Sydney Metro West, as described in *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a), where participants considered climate change projections for the region and the potential impact these would have on the long-term operation on a range of aspects.

The identified key risks in the workshop applied to the whole of Sydney Metro West, as climate projections are applied at a macro spatial and temporal scale. As the workshop outcomes applied to the whole of Sydney Metro West, the outcomes of that workshop were incorporated into the assessment undertaken for this proposal through a comprehensive Climate Change Risk Register. The Sydney Metro Climate Change Risk Register has been designed to standardise climate change risk tracking and treatments throughout Sydney Metro projects. This risk register was reviewed and updated to assess climate change risks associated with the design of this proposal.

The identification and assessment of climate change risks for this proposal involved consideration of hazards, potentially affected project elements, likelihood and consequence. The approach is summarised below:

- hazard – climate or climate influenced attributes with potential to influence the operation and maintenance of Sydney Metro West
- affected element – the component of the operation and/or maintenance of Sydney Metro West that would be impacted by the hazard. This may also include users of Sydney Metro West and affected elements of the surrounding environment
- risk rating – utilising a likelihood and consequence rating system, an assessment of the way hazards could influence the element is made and a risk rating assigned.

The severity or consequence of risks was assessed with reference to the following:

- health and safety impact
- environmental impact
- customer experience and operational reliability impact
- government, stakeholder and community trust
- regulatory impact
- managerial and organisational impact
- impact on the benefit realisation
- financial impact.

Risk likelihood was assessed cumulatively over the applicable asset life, rather than the chance of occurrence of the hazard-consequence combination in any given year.

To effectively manage potential climate change risks, each stage in the design and delivery of Sydney Metro West would consider the most up to date climate change projections. Design guidelines would be subject to ongoing review and response by designers and constructors.

Climate change projections relevant to Sydney Metro West (including this proposal) are outlined in Chapter 18 (Proposal-wide) of this Environmental Impact Statement. These have been based on climate change projections from the CSIRO and Bureau of Meteorology Climate Futures Tool for East Coast Cluster collated during the development of the Sydney Metro Climate Change Risk Register (2020).

Climate data and climate change projections were investigated for the following time periods to assess impacts over the design life of the project:

- Baseline climate, representing the 20-year average for the period 1986–2005
- 2030 (Near future), representing the 20-year average for the period 2020–2039
- 2070 (Far future), representing the 20-year average for the period 2060–2079
- 2090 (Late century), representing the 20-year average for the period 2090–2099.

The climate change projections are applicable to the region and, therefore, are applicable to all stages of Sydney Metro West (including this proposal) and include:

- potential increases in absolute maximum temperature and potential increases in average temperatures and the frequency of heatwaves
- potentially lower annual average rainfall, increased rainfall intensity during storm events and resultant surface water flooding
- potential sea level rise in the order of 0.19 metres by 2030 and 0.88 metres by 2090
- potential increased carbon dioxide concentrations in the atmosphere, together with increased temperature and periods of heavy rainfall.

### Greenhouse gas emissions

The greenhouse gas assessment was prepared following the principles and guidance outlined in AS ISO 14064-1:2018 Specification with guidance at the organisation level for quantification and reporting of greenhouse gas emissions and removal (ISO, 2018).

In addition, the following guidelines and tools were used for the assessment:

- *National Greenhouse Gas Accounts Factors* (DEE, 2021)
- *TfNSW Carbon Estimate and Reporting Tool* (TfNSW, 2017)
- *Greenhouse Gas Assessment Workbook for Road Projects* (TAGG, 2013).

Greenhouse gas emissions are reported as tonnes of carbon dioxide equivalent (tCO<sub>2</sub> -e) and categorised into three different scopes (either Scope 1, 2 or 3), in accordance with the Greenhouse Gas Protocol (World Resources Institute, 2014), Intergovernmental Panel on Climate Change and Australian Government greenhouse gas accounting/classification systems.

These scopes help differentiate between direct emissions from sources that are owned or controlled by a project, and upstream indirect emissions that are a consequence of project activities, but which occur at sources owned or controlled by another entity. The three greenhouse gas scopes are:

- Scope 1 – direct greenhouse gas emissions released into the atmosphere as a result of the project. These emissions consider construction and operational activities such as emissions from burning diesel fuel within trucks or equipment to build or maintain the project
- Scope 2 – indirect greenhouse gas emissions are released into the atmosphere from indirect consumption of energy. An example of these would be purchased grid electricity for the project activities such as construction activities or operational phase lighting, where actual emissions are generated elsewhere
- Scope 3 – other indirect greenhouse gas emissions that are indirectly influenced by the project but are generated within the wider economy. While these emissions are a consequence of the project, they are not controlled by the project operators. Scope 3 emissions would include greenhouse gas emissions associated with the extraction, production and transport of purchased materials, waste and fuels used during construction and operation.

The objectives of a greenhouse gas assessment is to:

- identify the likely sources of greenhouse gas emissions associated with construction of this proposal
- quantify the greenhouse gas emissions associated with each greenhouse gas source
- identify opportunities (mitigation measures) to reduce greenhouse gas emissions.

Using the scope definitions identified above, greenhouse gas impact assessment boundaries were determined to include all Scope 1 and Scope 2 greenhouse gas emission sources and significant Scope 3 greenhouse gas emission sources during the construction and operational phase of the proposed works. The identified construction GHG emissions sources included as part of this assessment are provided in Table 3.

**Table 3 Construction GHG emission sources broken down by scope**

| Scope   | Emission sources   |
|---------|--|
| Scope 1 | Fuel combusted on-site from light vehicles and mobile construction plant and equipment.  |
|         | Removal of vegetation (including the release of carbon existing within this vegetation when it is cleared and the loss of its potential to act as a carbon sink in the future).  |
| Scope 2 | Electricity generated offsite to power construction plant, equipment and site offices.   |
| Scope 3 | Emissions associated with the extraction and production of materials used during the construction of the Project (Embodied Energy). Scope 3 emissions from embodied energy were limited to concrete and steel volumes due to data limitations. |
|         | Transport emissions (Offsite fuel consumption) from light vehicle movements to and from the site associated with construction staff.   |
|         | Transport emissions (Offsite fuel consumption) associated with heavy vehicles the delivery of plant, equipment and construction materials and removal of construction and demolition waste from site.  |

Operational greenhouse gas emissions were limited to Scope 2 emissions from electricity generated offsite to power the operations of train stations and the Clyde stabling and maintenance facility and Rosehill services facility.

The greenhouse gas assessment undertaken for this proposal is preliminary estimate based on current design information and construction methods. Greenhouse gas emissions calculations would be validated and/or updated during further design development of this proposal. Estimates for fuel and electricity consumption and materials use (such as concrete and steel) during the construction and operation of the project were estimated based on the current design as detailed in this Environmental Impact Statement.

For onsite vehicle fuel combustion (Scope 1), these were estimated using the National Greenhouse Accounts Factors (2021) as well as the Greenhouse Gas Assessment Workbook for Road Projects (TAGG, 2013).

For vegetation clearing (Scope 1), the methodology outlined in the Greenhouse Gas Assessment Workbook for Road Projects (TTAGG, 2013) was used to calculate the carbon within the vegetation that would be cleared for this proposal and the loss of future carbon sequestration potential.

For electricity consumption during construction and operation (Scope 2), these were estimated using the National Greenhouse Accounts Factors (2021).

For embodied energy (Scope 3) these were estimated using the emission factors in the Greenhouse Gas Assessment Workbook for Road Projects (TAGG, 2013).

For offsite vehicle fuel consumption (Scope 3), these were estimated using the National Greenhouse Accounts Factors (2021).