Part B

Methodology

4

PART B ENVIRONMENTAL ASSESSMENT

4.0 Methodology

4.1 Secretary's environmental assessment requirements

This Environmental Impact Statement addresses all matters specified in the Planning Secretary's environmental assessment requirements dated August 2021, in accordance with Division 5.2 of the *Environmental Planning and Assessment Act 1979* (NSW) and other relevant legislation. The Secretary's environmental assessment requirements are provided in Appendix A (Assessment requirements), including a reference to where they have been addressed.

4.2 Assessment methodologies

Table 4-1 includes a summary of the assessment methodologies for the environmental assessments included in Chapter 7 (Westmead metro station) through to Chapter 18 (Proposal-wide) of this Environmental Impact Statement. The assessment methodologies are consistent with the Planning Secretary's environmental assessment requirements for this proposal. Where a more detailed methodology is required, this is either included in the respective technical paper or within Appendix D (Detailed assessment methodologies).

Where relevant, the baseline environment for each environmental assessment has considered the impacts described in the previous Sydney Metro West planning applications. For example, the construction sites established under the previous Sydney Metro West planning applications would be largely cleared and established prior to the commencement of this proposal, which forms the baseline environment for this assessment.

Table 4-1 Summary of assessment methodology

Environmental assessment issue	Summary of assessment methodology	Detailed methodology
Transport	The transport assessment included: • review of the construction methodology for this proposal • identification of the baseline transport environment, including the existing (year 2021) road network performance modelled using SIDRA Intersection software • identification of the transport study area • qualitative and quantitative assessment of the potential operational benefits and impacts of this proposal, including: - anticipated passenger demand at each station - integration with the surrounding active, public and road transport networks - the future (year 2036) road network performance modelled using SIDRA Intersection software based on development of future base year models using Strategic Traffic Forecasting Model forecasts - parking and property access changes • qualitative and quantitative assessment of the potential construction impacts of this proposal on: - the active and public transport networks - parking and property access - the road network performance in the year of peak construction activity (year 2026) modelled using SIDRA Intersection software based on development of future base year models using Strategic Traffic Forecasting Model forecasts - emergency vehicles - special events	Refer to Technical Paper 1 (Operational transport) and Technical Paper 2 (Construction transport)

Environmental assessment issue	Summary of assessment methodology	Detailed methodology
	• consideration of construction worker access and parking arrangements • assessment of the potential cumulative impacts during construction and operation of this proposal • identification of performance outcomes and mitigation measures to manage the potential impacts on transport. The operational and construction traffic assessments consider changes to the road network and forecast traffic to be generated as a result of the approved WestConnex M4-M5 Link project (including Rozelle Interchange) and the Western Harbour Tunnel and Warringah Freeway Upgrade project.	
Noise and vibration	The noise and vibration assessment included: • review of the construction methodology for this proposal • characterisation of the baseline noise environment based on unattended and attended noise monitoring at specific locations across this proposal • identification of receivers • determination of noise and vibration management levels in accordance with relevant guidelines and criteria • noise modelling using SoundPLAN software to quantify potential construction and operational noise and vibration impacts • a quantitative assessment of the potential operational noise impacts of this proposal, including: - below ground and above ground sections of the rail line in accordance with the *Rail Infrastructure Noise Guidelines* (Environment Protection Authority, 2013) - fixed facilities at station and ancillary infrastructure in accordance with the *Noise Policy for Industry* (Environment Protection Authority, 2017) • a quantitative assessment of the potential construction air-borne noise, ground-borne noise and vibration impacts of this proposal, including: - consideration of typical and worst-case scenarios - the magnitude and duration of potential impacts - impacts during different periods (daytime, evening and night-time) and potential sleep disturbance impacts - differentiation of activities within the enclosed tunnels, activities below ground but not enclosed and activities on the surface including a description of their impacts and the proposed hours of work - potential vibration impacts to human comfort, structural integrity and heritage items - construction traffic noise impacts on haul routes • assessment of the potential cumulative noise and vibration impacts during construction and operation of this proposal • identification of performance outcomes and mitigation measures to manage the potential noise and vibration impacts including consideration of receiver feedback.	Refer to Technical Paper 3 (Operational noise and vibration) and Technical Paper 4 (Construction noise and vibration)

Environmental assessment issue	Summary of assessment methodology	Detailed methodology
Non-Aboriginal heritage	The non-aboriginal heritage assessment included: • identification of a study area for the assessment of non-Aboriginal heritage impacts, taking into account the potential visual catchment of this proposal • identification of the baseline environment for each site • identification of heritage items within the study area for each site, through a search of relevant heritage registers in June 2021 including the EPBC Protected Matters Search Tool • assessing the significance of heritage items or potential archaeological resources in accordance with *The Burra Charter (*Australia International Council on Monuments and Sites, 2013) • undertaking a heritage impact assessment of potential impacts to heritage items in accordance with the *NSW Heritage Manual* (NSW Heritage Branch, 1996) and *Statements of Heritage Impact* (NSW Heritage Office, 2002) • consideration of the policies of relevant conservation management plans • assessment of archaeological potential at relevant sites which include areas of additional footprint for this proposal • identification of management and mitigation measures to minimise potential impacts.	Refer to Technical Paper 5 (Non-Aboriginal heritage)
Aboriginal heritage	The Aboriginal cultural heritage assessment included: • a desktop-based review of previous Aboriginal archaeological reports and relevant registers to identify known Aboriginal sites and places including: - a search of the Aboriginal Heritage Information Management System (AHIMS) register for known Aboriginal sites within 200 metres of the construction sites was carried out on 2 August 2021 to identify any new sites listed since *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) - a search of relevant local environmental plans for listed Aboriginal places • outlining the cultural values of specific locations along the corridor identified in targeted consultation with the local Aboriginal community, including targeted site inspections where additional footprint for this proposal is required. For the purposes of this assessment, the term 'site specific cultural heritage values' pertains to those values identified by Registered Aboriginal Parties associated specifically with the footprint at each station or ancillary facility precinct (including areas of additional footprint required or this proposal). Where cultural values were identified for the local environs of those precincts, these are discussed in more general terms. • assessing the potential direct and indirect impacts of this proposal, including for those locations with additional footprint beyond what was assessed for the previous Sydney Metro West planning applications • identifying mitigation measures to minimise the risk of potential impacts to Aboriginal heritage (where relevant).	N/A

Environmental assessment issue	Summary of assessment methodology	Detailed methodology
Landscape and visual amenity	The landscape and visual amenity assessment included: • a review of the relevant legislative and policy framework • identification of the baseline conditions • identification of representative viewpoints to assess visual impacts. The most representative viewpoints have been selected and presented in detail in Chapter 7 (Westmead metro station) through to Chapter 18 (Proposal-wide), where they present potential impacts to important places, public domain areas, heritage items or residential areas. Selection of these viewpoints considered their sensitivity, as well as the potential for impacts to be visible during operation and construction. All viewpoints are assessed in Technical Paper 6 (Landscape and visual amenity) • description of the components and character of this proposal during operation and construction • an assessment of potential landscape character impacts during operation and construction • an assessment of the potential daytime visual impacts during operation and construction • an assessment of potential night-time visual impacts during operation and construction • identification of management and mitigation measures to address potential landscape and visual impacts.	Refer to Technical Paper 6 (Landscape and visual amenity)
Soils, contamination and groundwater	The soils and contamination assessment included: • consideration of the relevant regulatory framework and guidelines, and publicly available data • identification of the existing soil landscapes and a review of previous contamination assessments and publicly available data (web-based information searches) • an assessment of potential contamination risks based on the previous contamination assessments carried out, potential impacts to existing contamination and exposure risks to environmental and human health receptors. This has included consideration of the remediation and management carried out for the work under the previous Sydney Metro West planning applications • identification of low, medium, and high risk sites including recommendations for additional investigations and/or management based on the site risk rating and with consideration to the intended land use/future exposure scenarios at the relevant location • identification of the potential to disturb acid sulfate and saline soils and the associated impacts during construction • consideration of the potential impacts associated with erosion and sedimentation during construction • identification of management and mitigation measures to address potential soils and contamination impacts.	Refer to Technical Paper 7 (Contamination) for detailed methodology for the soils and contamination assessment

Environmental assessment issue	Summary of assessment methodology	Detailed methodology
	The groundwater assessment included: • characterisation of the baseline environment including climate, topography, geology, groundwater occurrence, quality and use, existing groundwater users and groundwater dependent ecosystems. This included: - review of Chapter 18 and Technical Paper 7 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a), and Chapter 14 and Technical Paper 7 of the *Sydney Metro West Environmental Impact Statement –Major civil construction between the Bays to Sydney CBD* (Sydney Metro, 2021a), to identify the baseline environment at the commencement of this proposal - a review of registered groundwater bores located within proximity to the construction sites on 19 August 2021 using the Continuous Water Monitoring Network provided by the NSW Department of Primary Industries and Environment Office of Water, to identify groundwater users • assessment of the potential groundwater inflows to proposed untanked structures/elements during construction and operation. Groundwater predictive modelling (at two years post commencement of work) carried out for the previous Sydney Metro West planning applications was used as the basis for the assessment of potential operation and construction phase impacts on groundwater that may result from this proposal. The predictive modelling previously completed is considered suitable for carrying out an assessment of potential impacts on groundwater resulting from this proposal as the majority of activities (bulk excavation) would be completed prior to construction of this proposal. The predictive modelling is also considered acceptable for a conservative assessment of potential long-term impacts during operation, as the predicted impacts associated with operation would generally be similar to, or reduced in comparison to those identified for the construction phase • assessment of potential groundwater-related impacts due to estimated groundwater level drawdown associated with operation and cumulative impacts, including consideration of the assessment carried out for the previous Sydney Metro West planning applications • consideration of potential impacts including those related to groundwater dependent ecosystems, acid sulfate soils, groundwater contamination, groundwater quality • preliminary assessment of potential ground movement impacts at Westmead metro station and Parramatta metro station construction sites in accordance with the Rankin risk classification (Rankin, 1988), based on excavation volumes and predicted groundwater drawdown • assessment of the requirements for treatment of collected groundwater at each of the drained structures/elements during operation • identification of monitoring and management measures to address potential impacts.	

Environmental assessment issue	Summary of assessment methodology	Detailed methodology
Flooding	The flooding assessment included: • review of relevant existing flood study reports and description of flood behaviour for the existing conditions • update of existing flood modelling/assessments carried out for the previous Sydney Metro West planning applications • identification of any potential changes to flood levels (including flood affectation of other properties, assets and infrastructure) during construction and operation of this proposal, including discharges, velocities, duration of flood inundation and flood hazards for the five per cent and one per cent annual exceedance probability flood events, and the probable maximum flood. This included discharges, velocities, duration of flood inundation and flood hazards for these events. This assessment has taken into consideration the assessments carried out for the previous Sydney Metro West planning applications • identification of potential flooding impacts as a result of changes to flooding behaviour in response to climate change (sea level rise and rainfall intensity) • a review of consistency with the applicable council floodplain risk management study • a review of compatibility with the flood hazard and hydraulic functions of the land • identification of appropriate mitigation and management measures to address potential impacts.	Refer to Technical Paper 8 (Hydrology, flooding and water quality)
Social impacts	The social impact assessment was carried out in accordance with the NSW Department of Planning, Industry, and Environment's *Social Impact Assessment Guideline for State Significant Projects* (2021b) and included: • understanding the social locality of this proposal based on a review of: - the scale and nature of this proposal - the characteristics of surrounding communities and how likely impacts may be perceived or experienced - potentially affected built or natural community infrastructure that may have social value - relevant social or cultural demographic trends or social change processes - the history of this proposal and the area • identification of the likely social impacts for different groups within the social locality and considering the social impacts that this proposal may have on people's: - way of life - community - access to and use of infrastructure, services, and facilities - culture - health and wellbeing - surroundings - livelihoods - decision-making systems	Refer to Technical Paper 9 (Social impacts)

Environmental assessment issue	Summary of assessment methodology	Detailed methodology
	• consideration of the distributive equity of impacts and benefits • analysis of unmitigated and mitigated social impacts by predicting and assessing positive and negative social impacts against baseline conditions and then re-assessing them following the application of mitigation, enhancement or management measures • identification of potential measures to manage, mitigate and monitor residual social impacts during construction and operation, including the development of a framework for managing predicted impacts • identification of potential opportunities for positive social outcomes, including specific placemaking measures which may enhance wellbeing and sense of place • response to the Review Questions in Appendix C of the Guideline.	
Local business impacts	The local business assessment included: • identification of local businesses that could potentially be directly and indirectly impacted during construction and operation of this proposal • identification of the types of changes (both positive and negative) that could potentially occur to businesses during construction and operation of this proposal • qualitative assessment of local business impacts that may occur as a result of this proposal using the *Australian Transport Assessment and Planning Guidelines* (Australian Transport Council, 2018), including consideration of any previous feedback from local businesses • qualitative assessment of potential cumulative local business impacts during construction and operation • identification of measures to manage and mitigate any potential impacts and to enhance positive impacts on local businesses as a result of this proposal.	Refer to Appendix D (Detailed assessment methodologies)
Biodiversity	The biodiversity assessment included: • desktop review of all construction sites and operational facilities focused on the areas of additional footprint required for this proposal, including: - aerial photography and street view (where available) - Bionet records for threatened species and ecological communities for BC Act matters - Protected Matters Search Tool results for EPBC Act matters - vegetation mapping (The Native Vegetation of the Sydney Metropolitan Area VIS ID: 4489) - NSW Department of Primary Industries Key Fish Habitat mapping • field inspection by a qualified and experienced ecologist to confirm desktop results, focused on the areas of additional footprint required for this proposal. Due to the minor extent of clearing required for this proposal, no detailed surveys, including biometrics or fauna trapping, were carried out • assessment of potential direct and indirect biodiversity impacts based on the consideration of information derived as part of desktop and field assessment • identification of measures to manage and mitigate any potential biodiversity impacts as a result of this proposal.	N/A

Environmental assessment issue	Summary of assessment methodology	Detailed methodology
Property	The property assessment included: • review of recent information in the form of maps and aerial photography to confirm the baseline environment (for construction and operation) identified in the previous Sydney Metro West planning applications is reflective of the current and future planned property conditions • identifying the baseline environment for this proposal in the minor areas of additional land required for this footprint • assessing the anticipated impacts of construction and operation on properties, including potential land acquisition or leasing requirements for the areas of additional land required for this proposal • consideration of the potential future use of residual land following completion of construction • identifying mitigation and management measures relevant to property impacts for this proposal.	N/A
Air quality	The air quality assessment adopted the requirements outlined in the UK Institute of Air Quality Management (UK IAQM) document *Guidance on the assessment of dust from demolition and construction* (2014). The assessment identified: • potential impacts during operation of this proposal • potential impacts associated with the construction activities based on degree of risk expected at each construction site • mitigation and management measures relevant to air quality for this proposal.	N/A
Sustainability, climate change and greenhouse gas	Sustainability considerations for this proposal have been assessed by: • reviewing relevant legislative, policy and guidelines relating to infrastructure sustainability including previous Sustainability Plans, as relevant • understanding potential impacts to other relevant technical disciplines with regard to sustainable outcomes • reviewing the relevant sustainability initiatives, targets, goals and objectives as identified through technical reports and in alignment with the ISCA IS Design and As-Built Rating Tool v1.2 credit requirements to achieve a Infrastructure Sustainability Council Infrastructure Sustainability rating of at least 75 points (Version 1.2) (or equivalent level of performance using a demonstrated equivalent rating tool) or a 5-Star Green Star rating (or equivalent level of performance using a demonstrated equivalent rating tool), in accordance with Condition C-B7 of the Minister's Conditions of Approval. Climate change impacts for this proposal have been assessed by: • reviewing relevant legislative requirements and aligning to key risk assessment standards (*TfNSW Climate Risk Assessment Guidelines* (Transport for NSW, 2021) and the AS5334-2013 standard) • identification of climate change related risks • identification of components of Sydney Metro West that may be vulnerable to climate change impacts during operation • identification of possible current and future controls that may increase the resilience of components of this proposal to climate change impacts	Refer to Appendix D (Detailed assessment methodologies)

Environmental assessment issue	Summary of assessment methodology	Detailed methodology
	• identification of relevant mitigation measures and/or performance outcomes to meet Condition C-B11 of the Minister's Conditions of Approval, for the design of this proposal to withstand known impacts associated with climate change to the year 2100 • recommendations as to what should be considered, and how to establish if further information is needed, to adequately assess climate change risk. Greenhouse gas impacts for this proposal have been assessed by: • identifying the relevant greenhouse gas sources associated with both construction and operation of this proposal • quantifying the greenhouse gas emissions associated with each greenhouse gas source • identifying opportunities to mitigate or reduce emissions resulting from this proposal.	
Waste management and resource use	The waste and resource assessment included: • a review of the likely waste streams and volumes generated during construction (including spoil) and operation • a review of the likely resources required during construction and operation, including energy, fuel and steel • identification of the potential environmental impacts associated with resource use and the generation (and subsequent disposal) of waste materials • development of management strategies to adequately address waste and resource use during construction and operation, including: - measures for managing construction waste through the waste hierarchy established under the *Waste Avoidance and Recovery Act 2001* - targets for the beneficial reuse of wastewater and other construction wastes in accordance with the *Sydney Metro West Sustainability Plan* - an approach for the assessment, handling, stockpiling and disposal of potentially contaminated materials and wastewater, in accordance with the *Waste Classification Guidelines* (Environment Protection Authority, 2014) - identification of opportunities to reduce the demand on electricity and other resources.	Further detail on the legislative context for the assessment is provided in Appendix B (Legislative and policy context).
Hydrology and water quality	The hydrology and water quality assessment included: • identification of the existing water quality conditions and hydrological regime for surface water, including surface catchments and watercourses • identification and assessment of potential impacts on stormwater and surface water quantity (increases or decreases) during construction and operation, including an assessment of the sensitivity of downstream waters • broad assessment of the potential change in stormwater runoff (increase or decrease) • identification of potential impacts on surface water quality during construction and operation, including an indicative water balance • consideration of the relevant NSW Water Quality Objectives • identification of appropriate mitigation and management measures.	Refer to Technical Paper 8 (Hydrology, flooding and water quality)

Environmental assessment issue	Summary of assessment methodology	Detailed methodology
Hazard and risk	The hazard and risk assessment included: • desktop review of the relevant regulatory framework and guidelines • identification of the types of activities during construction and operation that may generate potential hazards and risks • identification of the potential environmental impacts associated with the potential hazards and risks • identification of mitigation measures to address potential hazards and risks, where appropriate.	Further detail on the legislative context for the assessment is provided in Appendix B (Legislative and policy context).

As described in Section 1.4 (Overview of environmental assessment approach) of this Environmental Impact Statement, this proposal has adopted a precinct-based approach to the environmental assessment of operational and construction impacts. For each station and ancillary facility, a chapter has been provided which describes the proposal in that specific precinct and provides the environmental assessment of potential operational and construction impacts.

The exception to the precinct-based approach includes:

- the assessment of those aspects that that would generally be applicable for the whole proposal and have been included in a proposal-wide chapter. These include property; air quality; sustainability, climate change and greenhouse gas; waste management and resource use; and hazard and risk
- the assessment of those aspects of transport, social impacts, and hydrology and water quality, that have otherwise been included in the precinct assessments, but are applicable proposal-wide. These aspects have also been included in a proposal-wide chapter.