Appendix J

Environmental risk analysis results

Appendix J Environmental risk analysis results

Chapter 21 (Environmental risk analysis) of this Environmental Impact Statement provides the risk matrix and methodology used for this environmental risk analysis, as well as a summary of the outcomes of this environmental risk analysis.

Potential environmental risks have been considered on balance at a proposal-wide level across the station precincts and ancillary facilities, however there may be differences in consequence and likelihood of potential risks at different locations. Further details regarding the existing environment and potential impacts associated with each environmental issue are provided in Chapter 7 (Westmead metro station) to Chapter 19 (Cumulative impacts) of this Environmental Impact Statement.

Table 1 Environmental risk analysis results

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Design, place and movement							
Improvement to public transport network capacity, efficiency and reliability	Positive						
Wider road network benefits by encouraging greater use of public transport	Positive						
Improved connectivity to major attractions and key precincts located along the corridor, including Parramatta, Sydney Olympic Park, The Bays, Pyrmont and the Sydney CBD	Positive						

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Regional social benefits such as increased accessibility to jobs, education and social facilities, reduced travel stress	Positive						
Placemaking benefits and activation of public domain at station precincts along the corridor, creating inviting public spaces with high amenity and accessibility	Positive						
Enhanced pedestrian and cyclist facilities including pedestrian plazas, improved pedestrian crossings, connections to the local network and bicycle parking	Positive						

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Operational transport							
Potential modifications to existing pedestrian and cyclist arrangements to enable safe and convenient access and egress to and from the new metro stations	Minor	Likely	Medium	Station and precincts would provide enhanced pedestrian and cyclist facilities including pedestrian plazas, improved pedestrian crossings, connections to the local network and bicycle parking. Opportunities to connect active transport measures with the wider existing or planned active transport network would be further investigated in consultation with relevant stakeholders. This would reduce the likelihood and consequence of potential impacts.	Insignificant	Very unlikely	Low
Changes to bus stop locations, routes and timetables to provide transport integration with metro stations	Minor	Likely	Medium	Infrastructure would be provided at stations to facilitate interchange to and from bus services. Sydney Metro West offers the opportunity to optimise the bus network by redirecting services to interchange at stations and remove duplicate services. This would provide benefits to customers through interchange and potentially improves travel times and comfort for remaining bus customers. This would reduce the likelihood and consequence of potential impacts.	Insignificant	Very unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential changes to existing transport infrastructure at key interchanges with Sydney Metro West including an increase in the number of customers in some locations	Minor	Likely	Medium	This proposal would include integration with the existing Sydney Trains network at Westmead and North Strathfield, and with other Sydney Metro lines at Hunter Street. It would also include integration with the existing Light Rail network at Westmead and Parramatta. Works to existing stations are proposed to cater for the anticipated increase in customers and provide efficient interchange between modes. This would reduce the likelihood and consequence of potential impacts.	Insignificant	Very unlikely	Low
Potential deterioration of traffic performance on surrounding road network due to permanent altered traffic arrangements, lane closures or traffic light phasing	Minor	Likely	Medium	Most intersections near stations would continue to operate at the same performance with or without this proposal. Where some deterioration is predicted, appropriate intersection upgrades to improve overall performance for vehicles would be investigated in consultation with relevant stakeholders, including local councils and Transport for NSW. Sydney Metro West may also improve local traffic conditions due to a potential mode shift from road to rail. This would reduce the likelihood and consequence of potential impacts.	Insignificant	Unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential changes to availability, location and number of parking spaces or loading zones	Minor	Likely	Medium	Some on-street parking would be removed to provide other transport interchange facilities such as kiss and ride and bus stops near stations. Strategies to address parking impacts as a result of potential park and ride in the vicinity of metro stations would be developed in consultation with relevant local councils. This would reduce the consequence of potential impacts.	Insignificant	Likely	Low
Potential for permanent changes to property access, particularly adjacent commercial and retail properties	Minor	Likely	Medium	Access would be maintained to neighbouring properties during operation. This would reduce the likelihood and consequence of potential impacts.	Insignificant	Very unlikely	Low
Potential impacts during special events and to emergency vehicle arrangements	Minor	Likely	Medium	Sydney Metro West would provide enhanced access to and from major events, particularly at Sydney Olympic Park, substantially improved transport choice and clearance times for customers. Operations would be tailored to cater for planned special events, for example major events at Sydney Olympic Park or New Year's Eve. To accommodate for planned special events, operating hours could be extended as required. Details for special event operations would be determined during the design development process.	Insignificant	Very unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
				This would reduce the likelihood and consequence of potential impacts.			
Construction transport							
Potential temporary reduced pedestrian and cyclist access or flows due to construction	Moderate	Likely	Medium	Where existing cyclist facilities (e.g. bicycle parking) would be temporarily unavailable to facilitate construction activities, suitable replacement facilities would be provided for this duration. Where footpaths are temporarily closed to facilitate construction activities, appropriate diversions would be established to safely guide pedestrians around work zones. This would reduce the consequence of impacts.	Minor	Likely	Medium

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential temporary impacts on reliability of light rail and bus services, including relocation of bus stops and diversions	Moderate	Likely	Medium	Opportunities to mitigate light rail and bus impacts (for example improving bus priority) would be investigated during detailed design and undertaken in consultation with relevant stakeholders. Any temporary closure or relocation of bus stops would be carried out in consultation with relevant stakeholders including the relevant local council and bus operators. Wayfinding and customer information would be provided to notify customers of relocated bus stops. These measures would reduce the consequence of potential impacts.	Minor	Likely	Medium
Potential temporary impacts on reliability of suburban and intercity rail services to allow for construction activities to occur safely within the rail corridor	Moderate	Likely	Medium	Work within the existing rail corridor at Westmead and North Strathfield would be carried out during scheduled Sydney Trains rail possessions where possible, and customers would receive advanced notification of proposed works and information on alternative travel options. Sydney Trains would be consulted to minimise potential disruptions to rail services. This would reduce the likelihood and consequence of potential impacts.	Minor	Unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential temporary reduced safety, access and amenity for traffic, pedestrians and cyclists due to construction activities, including within existing stations, and due to potential conflicts with construction vehicles	Major	Unlikely	Medium	The implementation of the mitigation measures as detailed in the Construction Traffic Management Framework (CTMF) would reduce likelihood of potential road safety impacts. Additional enhancements for pedestrian, cyclist and motorist safety near the construction sites would be implemented during construction to reduce the likelihood of impacts.	Major	Very unlikely	Medium
Potential temporary deterioration of traffic performance on surrounding road network, due to construction vehicles and temporary road or lane closures	Moderate	Almost certain	High	The implementation of the mitigation measures as detailed in the CTMF, particularly those related to minimising construction vehicle movements in peak periods and during school drop off and pick up times would reduce the likelihood and consequence of traffic conflicts and congestion.	Minor	Likely	Medium

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Temporary removal of parking spaces or loading zones potentially affecting accessibility to transport, services and/or businesses	Moderate	Almost certain	High	Parking Management Plans would be prepared in accordance with the CTMF. Where existing parking is removed to facilitate construction activities, consultation would occur with the relevant local council to investigate opportunities to provide alternative parking facilities. Workers would be encouraged to use public transport when travelling to and from sites, in accordance with the CTMF. This would reduce the likelihood and consequence or parking impacts.	Minor	Very likely	Medium
Potential temporary impacts on access to private (commercial and/or residential) property	Moderate	Likely	Medium	Access to existing properties and buildings would be maintained in consultation with property owners. This would reduce the likelihood and consequence of potential impacts.	Minor	Very unlikely	Low
Potential temporary delays to emergency vehicles and obstructions to emergency vehicle access	Major	Likely	High	Access to properties for emergency vehicles would be provided at all times. This would reduce the likelihood of potential impacts.	Major	Very unlikely	Medium

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential temporary transport impacts during major events	Moderate	Likely	Medium	During major special events, impacts to the transport and traffic network would be managed as necessary, for example by minimising the level of construction activity and maintaining appropriate access. For special events that require specific traffic measures, those measures would be developed in consultation with other parts of Transport for NSW, Sydney Olympic Park Authority and the organisers of the event. This would reduce the consequence and likelihood of impacts to major events.	Minor	Very unlikely	Low
Operational noise and vibration							
Potential exceedances of airborne noise criteria from the Clyde stabling and maintenance facility and aboveground track	Minor	Unlikely	Low	Predicted noise levels for the stabling and maintenance facility and the section of aboveground track connecting to the mainline tunnels would be compliant with the applicable noise criteria, meaning the likelihood of potential impacts would be reduced to very unlikely. The noise generated by the facility would be reviewed during further design development to confirm that the noise levels predicted are achievable based on the final design of the proposal.	Minor	Very unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential exceedances of airborne noise criteria from stations or other surface infrastructure for fresh air ventilation, mechanical and electrical equipment and substations	Minor	Likely	Medium	Airborne noise from most stations complies with the applicable noise criteria derived from the *Noise Policy for Industry* (EPA, 2017), meaning the likelihood of potential impacts would be very unlikely. Stations and ancillary facilities including train breakout noise from draught relief shafts would be designed to meet the applicable noise criteria.	Minor	Very unlikely	Low
Potential exceedances of human comfort vibration levels and ground-borne noise criteria from train operations	Minor	Very unlikely	Low	Potential vibration levels from train operations are well below the human comfort vibration levels, meaning the likelihood of potential impacts would be almost unprecedented. Track form would be confirmed as part of design development in order to meet the relevant ground-borne noise and vibration criteria from the *Rail Infrastructure Noise Guidelines* (EPA, 2013).	Minor	Almost unprecedented	Low
Potential exceedances of building or structure damage vibration levels from train operations.	Minor	Very unlikely	Low	Potential vibration levels from train operations are well below the human comfort vibration levels, meaning the likelihood of potential impacts would be almost unprecedented. Track form would be confirmed as part of design development in order to meet the relevant ground-borne noise and vibration criteria from the *Rail Infrastructure Noise Guidelines* (EPA, 2013).	Minor	Almost unprecedented	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Construction noise and vibration							
Potential temporary exceedances of airborne noise management levels from surface construction and tunnel fit-out during standard construction hours	Major	Almost certain	Very high	Application of feasible and reasonable noise mitigation measures, including use of low noise equipment, acoustic sheds and respite periods would reduce the likelihood and consequence of noise impacts.	Moderate	Very likely	High
Potential temporary exceedances of airborne noise management levels from surface construction and tunnel fit-out outside standard construction hours	Major	Almost certain	Very high	Minimising noisy activities at night-time and offering additional mitigation measures as outlined in the Sydney Metro Construction Noise and Vibration Standard (Appendix H) would reduce the likelihood and consequence of night-time noise impacts.	Moderate	Very likely	High
Potential temporary construction traffic potentially resulting in an increase in traffic noise greater than 2 dB	Moderate	Likely	Medium	Selection of traffic routes which minimise the movements past sensitive receivers and during night-time periods and restricting idling near sensitive receivers would reduce the likelihood and consequence of traffic noise impacts.	Minor	Unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential temporary exceedances of human comfort or damage vibration levels from tunnel fit-out or surface activities.	Moderate	Likely	Medium	Further assessment and monitoring of relevant structures to determine appropriate vibration levels with regard to human comfort and structural damage criteria would be undertaken. If required, work methods can be adjusted where required which would reduce the consequence of potential impacts.	Minor	Likely	Medium
Non-Aboriginal heritage							
Design of operational infrastructure that potentially impacts the visual setting and heritage significance of nearby heritage item(s) or conservation areas	Moderate	Almost certain	High	Sydney Metro West station and precinct design guidelines (Appendix E of this Environmental Impact Statement) have been developed to guide the design for this proposal, including heritage interpretation in line with the draft Heritage Interpretation Strategy prepared as part of this proposal (Appendix K of this Environmental Impact Statement). The design of above-ground station elements would look to enhance the setting of, and preserve significant views towards, heritage items and would also consider appropriate setbacks from adjacent heritage items, for example at Parramatta metro station and The Bays Station. This would reduce the consequence and likelihood of potential impacts.	Minor	Likely	Medium

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential direct impacts to heritage listed items	Moderate	Almost certain	High	Construction works would be located to avoid direct impacts to heritage items where possible (for example Kia Ora (Parramatta LEP item No. I716) at Parramatta metro station, the former White Bay Power Station (SHR # 01015) and White Bay Power Station (inlet) canal (Port Authority of NSW s170 4560062) at The Bays Station, and the former Skinners Family Hotel building (SHR Item no. 00584) at Hunter Street Station). This would reduce the consequence and likelihood of potential impacts. Heritage items that are directly impacted, for example the Convict Drain (Parramatta LEP Item No. I647) at Parramatta metro station, would be archivally recorded and as part of archaeological management the relevant recording provisions outlined in revised or new Archaeological Research Design(s) would be implemented.	Minor	Likely	Medium
Potential indirect impacts to views and setting of heritage items from temporary construction activities	Moderate	Likely	Medium	Visual impacts would be minimised by retaining significant view lines for heritage items where possible, and implementing landscape and visual mitigation measures. The likelihood and consequence would remain the same.	Moderate	Likely	Medium

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential damage to heritage items from vibration and settlement during construction	Moderate	Likely	Medium	Risks would be managed by implementing noise and vibration mitigation measures, including noise and vibration monitoring of heritage significant items in accordance with the Construction Noise and Vibration Standard. The potential for ground movement at Westmead and Parramatta is expected to be slight to negligible. During construction, where vibration levels or ground movement is predicted to exceed screening criteria, a more detailed assessment of the structure and monitoring would be carried out. This would reduce the likelihood and consequence of potential impacts.	Minor	Unlikely	Low
Potential impacts of temporary construction activities within the curtilage of listed items, but with no direct impacts to significant heritage elements	Moderate	Unlikely	Medium	Works would be located to avoid direct and indirect impacts to the significant elements of heritage items where possible, where works are within the curtilage of items (i.e. Western Sydney University (Parramatta LEP Item No. I628) at Westmead metro station, North Strathfield Railway Station Group (including ornamental garden fronting Queen Street) (Transport Asset Holding Entity s170 #4801029) at North Strathfield metro station, and the former White Bay Power Station (SHR # 01015) at The Bays Station).	Moderate	Very unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
				Potential indirect impacts within the curtilage of heritage items would be managed through implementation of landscape and visual and noise and vibration mitigation measures, which would reduce the likelihood of potential impacts.			
Potential impacts on unknown heritage items (e.g. archaeological items) during construction.	Moderate	Likely	Medium	Potential impacts to non-Aboriginal known areas of archaeology (i.e. the White Bay Power Station (inlet) canal (Port Authority of NSW s170 4560062) at The Bays Station and late nineteenth and early twentieth century road developments at Westmead metro station) would be managed in accordance with the Archaeological Research Design and Excavation Methodology. An addendum to the existing Archaeological Research Design or a new Archaeological Research Design would be prepared to identify the excavation methodology for predicted locally significant non-Aboriginal archaeological remains for the additional footprint areas. If suspected human skeletal remains are uncovered at any time during construction at any construction site, procedures outlined in the Sydney Metro Exhumation Management Plan, the Sydney Metro Unexpected Heritage Finds Procedure and Heritage Management Plan would be implemented.	Minor	Unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
				This would reduce the consequence and likelihood of potential impacts.			
Aboriginal heritage							
Potential impacts on areas of known Aboriginal cultural value and archaeological sensitivity	Minor	Very unlikely	Low	In recognition of potential impacts to the Aboriginal cultural values of the proposal area, the station and precinct design guidelines for this proposal and the line-wide Heritage Interpretation Strategy for Sydney Metro West would address Aboriginal cultural values and be prepared in consultation with the local Aboriginal community, knowledge holders and with reference to the Connecting with Country framework. This would reduce the likelihood of potential impacts.	Minor	Very unlikely	Low
Potential impacts on unidentified Aboriginal heritage items	Moderate	Likely	Medium	Archaeological test excavation (and salvage if required) would be carried out in areas with archaeological potential or if deposits are identified within The Bays PAD 01. Excavations would be undertaken in accordance with the methodology outlined in the Aboriginal cultural heritage assessment report (Artefact Heritage Pty Ltd, 2020).	Minor	Unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
				If Aboriginal archaeological site/s are recovered during test excavation (and salvage, if required), results would be incorporated into Aboriginal heritage interpretation in consultation with registered Aboriginal parties. If unexpected Aboriginal objects are identified during construction work at any location, the Sydney Metro Unexpected Finds Procedure would be implemented. This would reduce the likelihood and consequence of potential impacts.			
Landscape and visual amenity							
Potential impacts to landscape character during operation associated with the introduction of new stations, new public spaces, and other surface infrastructure (stabling facility, fresh air tunnel ventilation facilities, etc.)	Moderate	Likely	Medium	The operation of Sydney Metro West would provide placemaking benefits at station precincts. Stations are being designed to integrate with their surrounding areas, to make vibrant and attractive places that reflect the unique context and future aspirations for each place. The Sydney Metro West Station and precinct design guidelines (Appendix E of this Environmental Impact Statement) have been developed to guide the design of this proposal including for landscaping and heritage interpretation.	Minor	Unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
				This would reduce the likelihood and consequence of potential impacts.			
Potential impacts to visual amenity during operation due to the introduction of new stations, public spaces and other surface infrastructure	Moderate	Likely	Medium	The operation of Sydney Metro West would provide placemaking and amenity benefits at station precincts. Stations are being designed to create inviting public spaces with high amenity. Opportunities for revegetation and to provide vegetation screening at the Clyde stabling and maintenance facility would be investigated during design development, in accordance with mitigation measures under the previous Sydney Metro West planning applications. This would reduce the likelihood and consequence of potential impacts.	Minor	Unlikely	Low
Potential light spill from station precincts, the stabling and maintenance facility and other operational infrastructure during operation.	Minor	Very likely	Medium	Lighting at stations would be operated in accordance with AS4282-2019 Control of the obtrusive effects of outdoor lighting. This would reduce the likelihood of potential impacts.	Minor	Unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential temporary impacts on landscape character during construction due to construction activities associated with new stations, ancillary infrastructure, and the stabling and maintenance facility (e.g. loss of street trees, vehicle movements, traffic management measures, parking/use of plant and equipment etc.)	Major	Likely	High	Landscape character impacts during construction of this proposal would be managed in accordance with Sydney Metro's CEMF (refer to Appendix F (Construction Environmental Management Framework) of this Environmental Impact Statement). Design of construction sites, including location of structures and buildings, design of hoardings, public art opportunities, and retention and replacement of trees would reduce the consequence of impacts on landscape character. This would reduce the consequence of potential impacts.	Minor	Likely	Medium

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential temporary impacts on visual amenity from private/public places as a result of continued use of fencing, barricades, gates, acoustic sheds or other acoustic measures and hoardings associated with construction sites	Major	Likely	High	Visual amenity impacts during construction of this proposal would be managed in accordance with Sydney Metro's CEMF (refer to Appendix F (Construction Environmental Management Framework) of this Environmental Impact Statement). Design of acoustic measures and hoardings would seek to reduce the impact on views, would be maintained and kept free of graffiti, and would incorporate public art where appropriate to reduce consequence of impacts to visual amenity. This would reduce the consequence of potential impacts.	Minor	Likely	Medium
Potential temporary continued light spill from construction sites at night	Minor	Very likely	Medium	Lighting of construction sites would be orientated to minimise glare and light spill impacts on adjacent receivers. This would reduce the likelihood of potential impacts.	Minor	Unlikely	Low
Soils, contamination and groundwater							
Potential contamination of land and groundwater due to the presence of contaminated soils, groundwater inflows to untanked structures, spills and leaks during operation	Minor	Unlikely	Low	Ongoing management and monitoring measures would be documented in an appropriate form and implemented for any areas where minor, residual contamination remains following construction.	Minor	Very unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
				Groundwater collected in the stations and ancillary infrastructure would be transferred to a permanent water treatment plant at the Clyde stabling and maintenance facility for treatment prior to discharge. Standard mitigation measures would be implemented in relation to the maintenance and operation of equipment and storage of chemicals to mitigate risk of spills and leaks. This would reduce the likelihood of potential impacts.			
Disturbance of contamination (soil in areas of additional footprint, or groundwater) during construction potentially causing impact to human health or receiving environments	Major	Likely	High	Areas with a higher potential for contamination would be subject to a Detailed Site Investigation and, if necessary, a Remedial Action Plan to reduce contamination risks during and following completion of construction, reducing the consequence of contamination and the likelihood if impacts. An additional review of residual contaminant concentrations, including the risk of saltwater intrusion, and rates of inflow would be assessed to determine the need for additional groundwater remediation. This would reduce the likelihood and consequence of potential impacts.	Moderate	Unlikely	Medium

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Disturbance of contamination (soil in areas of additional footprint, or groundwater) potentially exacerbating existing contamination risks by mobilising otherwise stable contamination and causing onsite and off-site migration	Major	Likely	High	Areas with a higher potential for contamination would be subject to a Detailed Site Investigation and, if necessary, a Remedial Action Plan to reduce contamination risks throughout and following completion of construction, reducing the consequence of contamination and the likelihood of impacts. This would reduce the likelihood and consequence of potential impacts.	Moderate	Unlikely	Medium
Potential contamination of land or groundwater due to spills and leaks during construction	Moderate	Likely	Medium	New contamination of land or groundwater during construction of this proposal would be managed in accordance with the CEMF. Locating all fuels in a sealed bunded area, together with the use of spill kits, would reduce the likelihood of soil or groundwater contamination. This would reduce the likelihood of potential impacts.	Moderate	Very unlikely	Low
Potential exposure of acid sulfate soils or saline soils during construction resulting in off-site discharge of acidic or saline water	Moderate	Unlikely	Medium	Further assessment and/or investigation would be undertaken to assess whether an ASSMP is required where acid sulfate soils are disturbed during construction. If acid sulfate soils or saline soils are encountered, they would be managed in accordance with the CEMF, relevant guidelines and an ASSMP. This would reduce the likelihood and consequence of potential impacts.	Minor	Very unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential ongoing operational changes to groundwater flows and levels from underground stations and other untanked structures	Minor	Likely	Medium	Further groundwater modelling to confirm potential impacts and flow patterns would be carried out under the previous Sydney Metro West planning application in accordance with Condition of Approval D122 and, if required, reviewed and updated as part of this proposal. Monitoring of operation phase groundwater levels, including for relevant groundwater users would also be carried out. Groundwater quality, including monitoring of potential contaminants of concern would also be carried out. This would reduce the likelihood of potential impacts.	Minor	Unlikely	Low
Potential groundwater drawdown/ lowering of water table due to dewatering station excavations (at untanked stations) during station construction	Moderate	Likely	Medium	The Groundwater Modelling Reports for the previous Sydney Metro West planning applications would be reviewed and updated for this proposal, as required, to confirm potential impacts. Monitoring of groundwater levels and quality would occur before, during and after construction. This would reduce the likelihood and consequence of potential impacts.	Minor	Unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential loss or changes to baseflow of surface water features due to groundwater drawdown during construction	Moderate	Likely	Medium	The Groundwater Modelling Reports for the previous Sydney Metro West planning applications would be reviewed and updated for this proposal, as required. Where local conditions and predicted groundwater drawdown are likely to cause surface water-groundwater interaction, design responses would be implemented to reduce potential baseflow loss. This would reduce the likelihood and consequence of potential impacts.	Minor	Unlikely	Low
Potential impacts as a result of ground movement/settlement due to excavation	Moderate	Likely	Medium	Further investigation of potential ground movement impacts of this proposal at Westmead metro station and Parramatta metro station would be carried out as part of design development. Where required, condition surveys of buildings and structures would be carried out prior to the commencement of excavation. This would reduce the likelihood and consequence of potential impacts.	Minor	Unlikely	Low
Potential impacts on groundwater users due to reduced groundwater yields, reduced groundwater quality and/or direct impacts and damage to existing groundwater bores	Moderate	Unlikely	Medium	Groundwater monitoring would occur during construction and include consideration of any private water supply bores potentially affected by this proposal.	Insignificant	Unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
				Make good provisions for groundwater users would be provided in the event of a material decline in water supply levels, quality or quantity from registered existing bores as a result of this proposal. This would reduce the consequence of potential impacts.			
Potential impacts of groundwater dependent ecosystems during operation and construction	Minor	Unlikely	Low	Additional investigations and assessment would be completed for this proposal to confirm the potential for impacts to groundwater dependant ecosystems due to groundwater drawdown, and to identify any required mitigation through design and during construction. This would reduce the likelihood of impacts.	Minor	Very unlikely	Low
Flooding							
Potential impacts on existing flood emergency management arrangements during operation	Major	Unlikely	Medium	Emergency management arrangements would be developed to manage flood risks to people and vehicles accessing stations and ancillary facilities. Egress arrangements would consider flood hazard in nearby streets particularly where active flood measures are employed. They would be designed so that the inclusion of flood barriers at relevant access points does not interfere with the egress strategy.	Major	Almost unprecedented	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
				Emergency management arrangements would also be integrated across this proposal and consider such matters as the relative degree of isolation of stations or ancillary facilities due to inundation by floodwaters. Ongoing consultation would occur with State Emergency Services and relevant councils in relation to potential impacts to existing community emergency management arrangements for flooding. This would reduce the likelihood of potential impacts.			

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential impacts to flood behaviour and floodplain storage during operation due to the establishment of infrastructure, including resulting impacts to adjacent properties and drainage infrastructure	Moderate	Likely	Medium	As part of design development, including for drainage infrastructure, consideration would be given to the flood risk at all sites. Design development would include consideration of relevant best practice guidelines and include: • identification of measures to not worsen flood impacts on the community and on other property and infrastructure, up to and including the one per cent AEP flood event • provide flood protection for the nominated station or facility entry threshold level. Flood protection would be integrated into the architectural/urban design strategy for this proposal. This would reduce the consequence and likelihood of potential impacts.	Minor	Unlikely	Low
Potential flooding impacts on project infrastructure	Moderate	Likely	Medium	Stations would be designed to be protected from the one per cent AEP with climate change flood event, with the exception of Parramatta metro station and Clyde stabling and maintenance facility which would be designed to be protected from the PMF flood event. This would reduce the consequence and likelihood of potential impacts.	Minor	Very unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential temporary impacts on existing flood emergency management arrangements during construction	Major	Unlikely	Medium	The majority of construction sites are not anticipated to result in impacts to major road or rail routes listed in emergency management plans. At sites with the potential to impact flood evacuation routes, or where no emergency management plan was available, emergency flood planning would be carried out in consultation with the NSW State Emergency Service and the relevant local council, reducing the likelihood of impacts on flood evacuation routes.	Major	Almost unprecedented	Low
Potential temporary impacts on flood-prone areas, and to stormwater and overland flows during construction (e.g. increase in flood risk outside the construction sites) due to new structures or displacement of flood storage areas	Moderate	Likely	Medium	Potential flooding risks at most construction sites are anticipated to be minor or negligible due to low flood affection and risk during the five per cent AEP climate change and one per cent AEP climate change flood events. Detailed construction planning would consider flood risk at construction sites. Drainage at construction sites would be designed, where feasible and reasonable, to mitigate potential alterations to local runoff conditions due to construction sites. This would reduce the consequence and likelihood of potential impacts.	Minor	Unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential temporary flooding impacts on construction activities, including due to changes to flooding regimes	Minor	Unlikely	Low	Potential flood affection and flood hazard is predominantly low at all construction sites in flood events up to and including the one per cent AEP with climate change event. Detailed construction planning would consider flood risk at construction sites, including identification of measures to not worsen flood impacts, flood-proofing and a review of site layout and staging of construction activities to avoid or minimise flood impacts. This would reduce the likelihood and consequence of potential impacts.	Minor	Very unlikely	Low
Social impacts							
Potential community concern with proposed changes to the community character of local areas, including the sense of place and way of life	Major	Likely	High	During operation, the character and visual amenity surrounding station precincts is expected to improve as a result of this proposal, and the associated accessibility and placemaking outcomes. These improvements would also result in social benefits associated with health and wellbeing, way of life, accessibility, community and surroundings. This would reduce the likelihood and consequence of potential impacts.	Minor	Unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Permanent amenity impacts to local residents from nearby operation of stations and ancillary infrastructure, including to receivers who are more sensitive to such impacts	Moderate	Likely	Medium	The operation of this proposal would provide amenity benefits at station precincts. Stations are being designed to integrate with their surrounding areas, to make vibrant and attractive places. Station and precinct design guidelines (Appendix E of this Environmental Impact Statement) have been developed to guide the design of this proposal including for landscaping and heritage interpretation. Predicted noise levels for the Clyde stabling and maintenance facility and Rosehill services facility, including the section of aboveground track connecting to the mainline tunnels, would be compliant with the applicable noise criteria at the nearest sensitive receivers during all periods for the year of opening and the year of design. This would reduce the likelihood and consequence of potential impacts.	Minor	Unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential temporary impacts on the way of life for local communities, local employees visitors and vulnerable communities due to travel disruptions and changes to routines during construction	Moderate	Likely	Medium	Potential construction transport impacts would be managed in accordance with the CTMF. Access would be maintained to local services, business and public transport infrastructure during construction. Consultation with the relevant councils, Department of Education and public transport service operators, and use of wayfinding signage would minimise disruptions, reducing the consequence of impacts. This would reduce the consequence of potential impacts.	Minor	Likely	Medium
Potential temporary community concern with proposed changes to the character of local areas during construction	Moderate	Likely	Medium	The Sydney Metro West Community Benefit Plan for the previous Sydney Metro West planning applications would be updated for this proposal. The plan guides the development of community benefit initiatives (by Principal Contractors) during construction to make a positive contribution to the potentially affected community and reduce likelihood of potential impacts. This would reduce the likelihood of potential impacts.	Moderate	Unlikely	Medium

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential temporary impacts on community facilities or open space due to construction activities including changes to access and amenity during construction	Moderate	Likely	Medium	Consultation would be carried out with managers of social infrastructure located near construction sites about the timing and duration of construction works and management of potential impacts, with the aim of minimising potential disruptions to the use of the social infrastructure from construction activity. Noise, traffic, access and local amenity mitigation measures would reduce the consequence and likelihood of impacts affecting the useability of social infrastructure.	Minor	Unlikely	Low
Business impacts							
Potential adverse business impacts during operation such as altered traffic and access arrangements and changes in amenity	Moderate	Likely	Medium	This proposal would result in potential opportunities for local businesses at station precincts including increased passing trade for businesses, improved accessibility for customers and workers and improved amenity resulting in improved customers experiences for a range of business types. Transport, landscape and visual and noise and vibration mitigation measures would be implemented during operation to reduce potential access and amenity impacts for businesses. This would reduce the	Minor	Unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
				likelihood and consequence of potential impacts.			
Potential temporary continued disruptions to servicing, deliveries and customer access during construction (including from traffic congestion and loss of parking)	Major	Likely	High	Access to businesses would be maintained for customers, servicing and deliveries, reducing the likelihood of business disruption.	Major	Unlikely	Medium
Potential temporary continued loss of power and utilities by planned or accidental shutdowns during construction	Moderate	Likely	Medium	Planned power and utility interruptions would be scheduled to outside of typical business hours where feasible and reasonable, reducing the likelihood of impacts	Moderate	Very unlikely	Low
Potential temporary reduced business visibility through the presence of construction activities, hoardings and other structures	Major	Likely	High	Appropriate design and location of hoarding, clear pathways, signage and lighting would maximise visibility of businesses. Engagement with small business owners adversely impacted by construction would be undertaken. These measures would reduce the likelihood and consequence of reduced business visibility.	Minor	Unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential temporary continued reduced amenity (particularly due to noise, vibration, visual and air quality impacts) during construction	Moderate	Likely	Medium	Noise, visual and air quality mitigation measures would minimise local amenity impacts of construction, reducing the consequences of these impacts for businesses. Engagement with small business owners adversely impacted by construction would reduce the consequence of the potential impact.	Minor	Likely	Medium
Biodiversity							
Disturbance of fauna species due to impacts such as light and noise during operation	Minor	Unlikely	Low	Lighting at stations would be operated in accordance with AS4282-2019 Control of the obtrusive effects of outdoor lighting. Operational noise and vibration mitigation measures would also be implemented. These measures would reduce the likelihood and consequence of potential impacts.	Insignificant	Very unlikely	Low
Potential removal of vegetation	Insignificant	Likely	Low	This proposal would involve the removal of planted trees or naturally propagated native and exotic plant species at some station precincts during construction, none of which constitute threatened ecological communities, threatened flora species, or Matters of National Environmental Significance. The removal of this vegetation is anticipated to have a minor to negligible impact on	Insignificant	Likely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
				biodiversity of the locality because the habitat value of the vegetation for threatened fauna is considered to be low and there are limited threatened fauna records in the vicinity of station precincts.			
Potential temporary indirect impacts to fauna and flora species during construction such as light and noise impacts, sedimentation, spread of weeds	Minor	Unlikely	Low	The implementation of measures such as those to control light spill, erosion and sedimentation and to minimise construction noise would reduce the likelihood and consequence of impacts.	Insignificant	Very unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Property							
Potential changes to, and incompatibility with, existing land uses as a result of new metro rail infrastructure	Minor	Likely	Medium	Sydney Metro West supports planned growth and future land use planning in a number of precincts along the proposal corridor. Design development for this proposal has and will continue to be informed by consultation with key stakeholders including feedback on integration with the local areas and future land use plans. The operation of Sydney Metro West provides the opportunity for placemaking and amenity benefits at station precincts. The station precincts would support growth, activation and urban renewal opportunities along the corridor, creating inviting public spaces with high amenity and accessibility. This would reduce the likelihood of potential impacts.	Minor	Very unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential incompatibility of residual land use follow construction	Minor	Likely	Medium	The use of some residual land following construction (so far only identified at Clyde stabling and maintenance facility and Rosehill services facility) is subject to further consideration and consultation with relevant stakeholders. This consideration includes the existing zoning of the land, the nature of the surrounding uses, the recreational needs of the local population and the necessary work and remediation to make the land suitable for potential public use. This would reduce the likelihood of potential impacts.	Minor	Unlikely	Low
Temporary or permanent property acquisition where additional land is required for construction of this proposal	Minor	Likely	Medium	Most additional land required for this proposal involves the temporary use of NSW Government or local council owned land such as the existing rail and road corridors to facilitate construction of transport interchange elements. If additional privately owned property is required for this proposal, property acquisition would be managed in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* and the land acquisition reforms announced by the NSW Government. This would reduce the likelihood of potential impacts.	Minor	Unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Air quality							
Potential impacts on local air quality around stations, services facilities (release of exhaust emissions from fresh air ventilation shafts in very low concentrations) and at the stabling and maintenance facility from train operations (brake wear and metal wear), routine maintenance activities and emergency conditions (e.g. in-tunnel fire)	Insignificant	Unlikely	Low	Potential air quality impacts during operation are considered to be negligible and would be manageable through the design of this proposal, including through ventilation systems. The operation of this proposal could contribute to long-term improvements in air quality associated with a potential mode shift by customers from road to rail. This would reduce the likelihood of potential impacts.	Insignificant	Very unlikely	Low
Potential temporary impacts on local air quality due to construction plant and equipment and increase in vehicle movements during construction	Minor	Likely	Medium	Vehicles, plant and equipment would be maintained in a proper and efficient manner, reducing the likelihood of air quality impacts from plant.	Minor	Very unlikely	Low
Potential temporary impacts on local air quality during construction due to dust generation from exposed surfaces, spoil stockpiles	Moderate	Likely	Medium	Best practice dust management measures would be implemented during all construction works, reducing the likelihood and consequence of air quality impacts from dust.	Minor	Unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential temporary mobilisation of airborne hazardous materials, odours or vapours as a result of uncovering contaminated soils or hazardous materials during earthworks or minor demolition	Moderate	Unlikely	Medium	Best practice odour management measures would be implemented, including minimising the disturbance of contaminated soil, use of odour suppression agents, and regular monitoring. These mitigation measures would reduce the consequence and likelihood of mobilising airborne hazardous materials, odours or vapours.	Minor	Very unlikely	Low
Sustainability, greenhouse gas and climate change							
Emissions associated with electricity consumption to power the proposal including metro trains, station facilities, tunnel ventilation, stabling and maintenance facility	Minor	Unlikely	Low	100 per cent of the greenhouse gas emissions associated with the consumption of electricity during operation would be offset. 10 per cent of the low voltage electricity required at above ground stations and the stabling and maintenance facility would be sourced from onsite renewable energy source. An iterative process of greenhouse gas assessments and design refinements would be carried out during detailed design and construction such as implementing passive design and maximising energy efficiency of train systems. This is to identify further opportunities to minimise greenhouse gas emissions.	Insignificant	Unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
				This proposal could also contribute to a long-term reduction in greenhouse gas emissions associated with a potential mode shift by customers from road to rail. This would reduce the consequence of potential impacts.			
Impact of climate change, including increase in average temperatures, sea level rise and higher tides, and frequency of extreme weather events on rail operations and infrastructure	Moderate	Likely	Medium	To address this risk, climate change risk treatments for very high and high climate risks would be confirmed and incorporated into the detailed design. This proposal would be designed to withstand known impacts associated with climate change to year 2100. This would reduce the likelihood and consequence of impacts.	Minor	Very unlikely	Low
Impact of climate change on customer and staff comfort	Moderate	Very unlikely	Low	Potential climate change impacts have been considered through design development and would be managed through the implementation of appropriate design standards and adaptation measures as well as maximisation of green infrastructure to reduce urban heat island effect. This would reduce the consequence of potential impacts.	Minor	Very unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Emissions of greenhouse gases from embodied energy in construction materials	Minor	Likely	Medium	Sustainability initiatives, including a sustainable procurement strategy, recycling or beneficially reusing at least 95 percent of construction and demolition waste, minimising the embodied impact of concrete through supplementary cementitious materials and beneficially reusing 100 per cent of reusable spoil. would reduce the consequence of impacts.	Insignificant	Likely	Low
Emissions of greenhouse gases from construction activities such as combustion of fuel in construction equipment and electricity used at construction sites	Minor	Likely	Medium	Sustainability initiatives, including offsetting 25 per cent of the greenhouse gas emissions associated with consumption of fuel and electricity during construction would reduce the potential consequence of this impact.	Insignificant	Likely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Climate change risks including increased intensity of rainfall events placing increased pressure on stormwater controls during construction	Moderate	Very unlikely	Low	Climate change risks during construction would primarily be associated with the occurrence of severe weather events, such as the increased frequency and severity of rainfall events placing increased pressure on erosion and sediment control measures and/or resulting in the flooding of the tunnels and/or construction sites. These risks are anticipated to be adequately managed with standard management measures, such as increasing the capacity of erosion and sediment controls and minimising construction impacts on the capacity of existing stormwater drainage systems, reducing the potential consequence.	Minor	Very unlikely	Low
Waste management and resource use							
Potential impacts associated with inappropriate management of waste during construction and operation	Minor	Unlikely	Low	Waste would be assessed, classified, managed and disposed in accordance with the *Waste Classification Guidelines* (Environment Protection Authority, 2014a), reducing the likelihood of impacts.	Minor	Very unlikely	Low

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	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Potential increased demand on electricity, water supply or other materials (such as concrete, steel) during construction and operation	Minor	Likely	Medium	Sustainability initiatives including reusing at least 80 percent of train wash water at the stabling and maintenance facility, harvesting and reusing rainwater at permanent and temporary facilities and integrating water sensitive urban design solutions would be incorporated into the detailed design and construction to minimise demand for water and electricity, reducing the likelihood of the potential impacts.	Minor	Very unlikely	Low
Potential temporary increased demand on local and regional resources including sand, aggregate and fuel during construction	Minor	Unlikely	Low	Sustainability initiatives would be incorporated into the detailed design and construction to minimise demand for resources, reducing the likelihood of the potential impacts.	Minor	Very unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Hazard and risk							
Potential incidents associated with transport and storage of hazardous substances and dangerous goods during operation	Moderate	Very unlikely	Low	All hazardous substances required for operation would be stored and managed in accordance with the Storage and Handling of Dangerous Goods Code of Practice (WorkCover NSW, 2005), the Hazardous and Offensive Development Application Guidelines: Applying SEPP 33 (Department of Planning, Industry and Environment, 2011) the *Work Health and Safety Act 2011* (Commonwealth and NSW) and the requirements of the *Environmentally Hazardous Chemicals Act 1985* (NSW).	Moderate	Very unlikely	Low
Potential incidents associated with transport and storage of hazardous substances and dangerous goods during construction	Moderate	Very unlikely	Low	All hazardous substances required for construction would be stored and managed in accordance with the Storage and Handling of Dangerous Goods Code of Practice (WorkCover NSW, 2005), the Hazardous and Offensive Development Application Guidelines: Applying SEPP 33 (Department of Planning, Industry and Environment, 2011) the *Work Health and Safety Act 2011* (Commonwealth and NSW) and the requirements of the *Environmentally Hazardous Chemicals Act 1985* (NSW).	Moderate	Very unlikely	Low
Potential rupture or interference with utilities	Moderate	Very unlikely	Low	Dial before you dig searches and non-destructive digging would be carried out to identify the presence of underground utilities	Moderate	Almost unprecedented	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
				in areas where additional footprint is required, and ongoing consultation would be carried out with utility providers for high pressure gas or petroleum pipelines to identify appropriate construction methodologies, reducing the likelihood of impacts to utilities.			
The on-site handling and transport of contaminated soil and hazardous waste, including asbestos	Moderate	Very unlikely	Low	Potential risks would be managed in accordance with NSW guidelines including the Storage and Handling of Dangerous Goods Code of Practice (WorkCover NSW, 2005) and Applying SEPP 33 (Department of Planning, 2011).	Moderate	Very unlikely	Low
Hydrology and water quality							
Potential water quality impacts on nearby watercourses due to runoff from construction sites containing sediments, fuels or hazardous materials, discharge of treated groundwater or contaminated water during construction and operation	Major	Unlikely	Medium	Prior to discharge, water would be treated to comply the performance criteria for 95 percent and 99 per cent species protection for toxicants that bioaccumulate for aquatic ecosystems in accordance with ANZECC (2000) and ANZG (2018) guidelines. The wastewater treatment plants would be configured so that treated water is compliant with the NSW Water Quality and River Flow Objectives and ANZECC/ANG guideline values, which would either maintain or improve the water quality of waterways and the marine environment. Operational monitoring would be carried out to show	Major	Very unlikely	Medium

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
				compliance with the discharge criteria. This would reduce the likelihood of potential impacts.			
Potential temporary erosion of soils resulting in off-site sedimentation of waterways during construction, potentially resulting in exceedances of water quality criteria	Moderate	Unlikely	Medium	Erosion and sediment measures would be implemented at all construction sites in accordance with the CEMF and relevant guidelines. Additionally, any water collected from construction sites would be appropriately treated and discharged to avoid any potential contamination or local water quality impacts. Temporary sediment basins would be designed in accordance with relevant guidelines. This would reduce the consequence of potential impacts.	Minor	Unlikely	Low
Potential exposure of soil salinity/saline soils during construction resulting in off-site discharge of saline water, potentially resulting in exceedances of water quality trigger levels	Minor	Likely	Medium	Prior to ground disturbance in high probability salinity areas, testing would be carried out to determine the presence of saline soils. If salinity is encountered, excavated soils would not be reused or would be managed in accordance with Book 4 Dryland Salinity: Productive Use of Saline Land and Water (NSW DECC, 2008). Erosion controls would be implemented in accordance with the CEMF and the 'Blue Book' (Landcom, 2004). This would reduce the likelihood of potential impacts.	Minor	Unlikely	Low

Potential impact	Initial risk rating			Effect of proposed mitigation measures and proposal design	Residual risk rating (with mitigation)		
	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
Cumulative impacts							
Potential temporary continued/prolonged cumulative construction noise, traffic and social and business impacts associated with this proposal and previous Sydney Metro West planning applications, resulting in potential construction fatigue	Moderate	Likely	Medium	The staged planning approval process for Sydney Metro West has allowed earlier commencement of critical construction activities, supporting efficiencies in construction and facilitating earlier realisation of the benefits of Sydney Metro West. Sydney Metro will continue to work with key local communities to provide regular updates throughout construction, and implement a community complaints and response management system. Mitigation measures for each Sydney Metro West application would be also implemented to manage potential noise, traffic, social and business impacts. This would reduce the consequence of potential impacts.	Minor	Likely	Medium
Potential temporary cumulative construction impacts (such as noise, traffic and social and business impacts), including potential construction fatigue,	Major	Almost certain	Very high	Coordination and consultation with relevant agencies and stakeholders would occur to manage the interface of projects under construction at the same time, including identifying conflicts and strategies to manage conflicts, such as making adjustments to construction program, work	Moderate	Almost certain	High

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	Unmitigated consequence	Unmitigated likelihood	Unmitigated risk rating		Residual consequence	Residual likelihood	Residual risk rating
associated with other major projects				activities or haul routes, and coordination of traffic management arrangements between projects. This would reduce the consequence of potential impacts.			