Transport for NSW

Appendix K
Consolidated mitigation measures

NSW GOVERNMENT

Impact/issue	ID	Mitigation measure	Timing
Transport and traffic			
Design			
Impacts on existing transport and access	TT1	The design will continue to be refined to avoid or minimise impacts on the surrounding road and transport network and property accesses as far as reasonably practicable.	Design
	TT2	Input will be sought from relevant stakeholders (including local councils, Sydney Olympic Park Authority, bus and ferry operators) prior to finalising the design of those aspects of the project that affect the operation of road and other transport infrastructure under the management of these stakeholders. This will include confirming ongoing operation and maintenance arrangements.	Design
Maintaining permanent access to properties	TT3	Where the project permanently affects access to and from a public road, input will be sought from relevant property owners and occupants regarding alternative access arrangements prior to finalising the design. Where any legal access to a property is permanently affected and a property has no other legal means of access, alternative access to and from a public road will be provided to an equivalent standard, where feasible and reasonable. Where an alternative access is not feasible or reasonable, and a property or part of a property is left with no access to a public road, consideration will be given to acquisition of the property or part of the property in accordance with the provisions of the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW).	Design
Road user safety	TT4	Road safety audits will be undertaken where changes to the road network are proposed, in accordance with relevant Austroads guidelines, to ensure the safety of all road users is considered during design development.	Design
Impacts on on-street parking	TT5	Opportunities to reduce the loss of on and off street parking will be reviewed during design development.	Design
	TT6	Opportunities to provide further alternative parking at Ermington boat ramp will be reviewed during design development to offset the impacts to existing boat trailer parking.	Design
	TT7	A parking management strategy will be prepared to provide an overarching framework for parking management during construction and operation. The strategy will include measures to manage: • the reduction in on-street parking availability, such as provision of alternative parking arrangements for accessible and service spaces, staged removal, resident parking schemes, and managed staff parking arrangements • construction worker parking, such as provision of designated parking areas within the project site, encouraging use of public transport, and shuttle bus arrangements.	Design

Impact/issue	ID	Mitigation measure	Timing
Construction			
Potential for traffic, transport and access impacts during construction	TT8	A traffic and access management plan will be prepared prior to construction and implemented as part of the CEMP. The plan will detail processes and responsibilities to minimise traffic and access delays and disruptions, and identify and respond to changes to road access and on-street parking arrangements. The plan will include, as appropriate, additional reasonable and feasible measures identified as an outcome of consultation (in accordance with mitigation measure TT12)	Pre-construction, construction
	TT9	The traffic and access management plan will include measures to manage staging of construction works to ensure that satisfactory capacity and minimum levels of service are maintained for all users.	Pre-construction, construction
Impacts on navigation and recreational use of Parramatta River	TT10	A maritime works and navigation management plan will be prepared prior to construction and implemented as part of the CEMP. The plan will detail processes and responsibilities to manage marine construction vessels and impacts on navigation during construction of the bridges over the Parramatta River. The plan will include, as appropriate, additional reasonable and feasible measures identified as an outcome of consultation (in accordance with mitigation measure TT12).	Pre-construction, construction
	TT11	Opportunities to minimise impacts to recreational use of the Parramatta River will be considered during construction planning, based on a review of the usage of the facilities at Ermington Boat Ramp and at other existing boat ramps in the vicinity of the project site.	Pre-construction
Consultation and communication	TT12	Consultation with relevant stakeholders will be undertaken regularly to facilitate the efficient delivery of the project and to minimise impacts on road, river and transport infrastructure customers and users. Stakeholders will include the City of Parramatta and City of Ryde councils, Sydney Olympic Park Authority, bus and ferry operators, emergency services, and recreation groups. Additional measures identified as an outcome of consultation will be implemented during construction, where reasonable and feasible. This will include modifying work areas, activities and construction access arrangements to address traffic flow and access issues identified by key stakeholders, where practicable.	Pre-construction, construction
	TT13	The Community Communication Strategy (mitigation measure SE1) will include mechanisms to inform the community of the dates and durations of changes to transport services and access arrangements (including access restrictions for the Parramatta River) and proposed alternative services and access provisions.	Construction
Property, cyclist and pedestrian access	TT14	Access to properties, including residences, businesses and community infrastructure, will be maintained. Where temporary disruption to access cannot be avoided, consultation will be undertaken with the owners, occupants and managers of affected properties and infrastructure, to confirm their access requirements and determine alternative arrangements.	Construction
	TT15	Safe pedestrian and cyclist access will be maintained around and/or through work areas. Where disruption to access cannot be avoided, alternative routes that comply with relevant accessibility standards and guidelines will be provided, signposted and communicated. Alternative access arrangements will be established prior to implementing restrictions on existing routes.	Construction

Impact/issue	ID	Mitigation measure	Timing
Changes to public transport services	TT16	Modifications to existing bus stops and Rydalmere Wharf, implementation of new stops and services, and alterations to service patterns, will be undertaken in consultation with relevant key stakeholders, including Customer Journey Management, bus and ferry operators, the City of Parramatta and City of Ryde councils, and Sydney Olympic Park Authority. Advance notification of changes to services will be provided to affected customers.	Construction
Special events management	TT17	Traffic management for special events in the Parramatta CBD, at Rosehill Gardens Racecourse and Sydney Olympic Park (including Sydney Showground) will be considered during construction. Where special events require specific traffic and pedestrian management, measures will be developed and implemented in consultation with relevant stakeholders, including event organisers, venue managers, City of Parramatta Council and Sydney Olympic Park Authority.	Construction
Managing the potential for cumulative transport and traffic impacts	TT18	The potential for cumulative construction transport and traffic impacts will be reviewed and coordinated with other projects, in consultation with relevant stakeholders, including Customer Journey Management, Customer Journey Planning, Traffic and Transport Liaison Group, City of Parramatta Council and Sydney Olympic Park Authority. The review will include: • other projects with the potential to affect access and capacity • reviews of programs for traffic staging, lane, footpath, cycleway and road closures for all projects • coordinating works and identifying efficient re-routing options as appropriate.	Construction
Operation			
Operational road network performance	TT19	A review of operational network performance will be carried out 12 months and three years from the opening of the project to confirm the operational impacts of the project. Appropriate changes that balance the performance outcomes for light rail and general traffic will be considered to address identified issues along the alignment. For surrounding arterial roads, feasible and reasonable mitigation measures will be identified in consultation with the Department of Planning and Environment and other relevant stakeholders (including City of Parramatta Council and Sydney Olympic Park Authority) to manage identified traffic performance impacts.	Operation
Noise and vibration			
Design			
Confirming the approach to operational noise mitigation as part of the design process	NV1	An operational noise and vibration review of the developed design will be undertaken to review the potential for operational impacts and confirm feasible and reasonable mitigation measures to be incorporated in the design. The review will include: • reviewing compliance monitoring for Parramatta Light Rail Stage 1 to refine the assumptions used and confirm the effectiveness of the mitigation that has been implemented • surveying relevant buildings to determine appropriate internal noise trigger levels • a road traffic noise assessment for the reconfiguration of South and Boronia streets conducted in accordance with the *Noise Criteria Guideline* (Roads and Maritime, 2015a) and the *Noise Mitigation Guideline* (Roads and Maritime, 2015b) • consideration of feedback from, and preferences of, directly affected landowners/landholders.	Design

Impact/issue	ID	Mitigation measure	Timing
		The operational noise and vibration review will be undertaken in consultation with relevant council(s) and the NSW EPA. The review will be developed in accordance with the *Rail Infrastructure Noise Guideline* (NSW EPA, 2013), the *Noise Policy for Industry* (NSW EPA, 2017) and the *Road Noise Policy* (DECCW, 2011).	
	NV2	Public address systems at stops will be designed to comply with the *Noise Policy for Industry* (NSW EPA, 2017) intrusiveness and sleep disturbance noise trigger levels at all locations.	Design
Construction			
Managing the potential for construction noise and vibration	NV3	Consideration will be given to implementing operational noise mitigation early in the construction program to reduce the potential for construction noise impacts, where the mitigation will not be impacted by future works	Pre-construction, construction
	NV4	A noise and vibration management plan will be prepared as part of the CEMP and implemented during construction. The plan will detail processes, responsibilities and measures to manage noise and vibration and minimise the potential for impacts during construction, aligned with the results of community consultation and consistent with the management approach and mitigation measures in the *Construction Noise and Vibration Strategy* (Transport for NSW, 2019a). Measures that mitigate potential noise and vibration at the source will be prioritised.	Pre-construction, construction
	NV5	Location and activity specific construction noise and vibration impact assessments will be undertaken • prior to works with the potential to generate noise levels above 75 dBA and/or exceed relevant human response and cosmetic damage criteria for vibration • prior to works that need to occur outside the primary project working hours • where any changes to heavy vehicle routes affect local roads not considered by the noise and vibration assessment (Technical Paper 3 (Noise and Vibration)). The results of the assessments will be documented in construction noise and vibration impact statements. Where potential exceedances are identified, the statements will define feasible and reasonable mitigation and management measures, developed in accordance with the *Construction Noise and Vibration Strategy* (Transport for NSW, 2019a). The measures will be implemented for the duration of the activity.	Pre-construction, construction
	NV6	A minimum of 2.4 metre high solid hoarding will be provided around construction compounds located close to residential areas, where construction noise is predicted to exceed noise management levels during recommended standard hours, including those compounds currently proposed near sensitive receivers on/around: • John Street • Broadoaks Park • Ken Newman Park west and east • Hope Street • Wharf Road • Wentworth Point north • Hill Road north • Dawn Fraser Avenue east and west.	Construction

Impact/issue	ID	Mitigation measure	Timing
	NV7	Appropriate respite periods will be identified, in consultation with the community and in accordance with the *Construction Noise and Vibration Strategy* (Transport for NSW, 2019a), for work: • with the potential to result in noise levels above 75 dBA • that need to occur outside the primary project working hours. The following will be taken into account when determining appropriate respite: • the need to efficiently undertake construction • the communities' preferred noise and vibration management approach • the construction schedules of other major projects in close proximity to the project works.	Construction
	NV8	Where construction activities are predicted to exceed noise management levels at sensitive receivers, no work would be permitted in that area one weekend per month, unless it is otherwise agreed by a substantial majority of the sensitive receivers impacted by the proposed works.	Construction
Cumulative impacts	NV9	The potential for cumulative construction impacts will be reviewed during construction planning in consultation with the proponents of other projects. Where the potential for cumulative impacts is identified, feasible and reasonable mitigation and management measures will be developed and included in the noise and vibration management plan (mitigation measure NV4).	Construction
Out of hours work	NV10	An out-of-hours work protocol will be developed to define the process for considering, approving and managing out-of-hours work that is not regulated by an environment protection licence. The protocol will include implementing feasible and reasonable measures and communication requirements in accordance with the *Construction Noise and Vibration Strategy* (Transport for NSW, 2019a). Measures will focus on proactive communication and engagement with potentially affected receivers, provision of respite periods and/or alternative accommodation for defined exceedance levels.	Construction
	NV11	All work outside the recommended standard hours defined by the *Interim Construction Noise Guideline* (DECC, 2009) will be scheduled using the hierarchy of preferred working hours described by Chapter 7 (Project description – construction) (section 7.5) as far as practicable, and in consultation with the community and key stakeholders (including the NSW EPA). Highly noise and vibration intensive works as defined in the *Construction Noise and Vibration Strategy* (Transport for NSW, 2019a) will be limited to recommended standard hours as far as practicable.	Construction
Construction vibration impacts	NV12	Where buildings or structures are predicted to exceed the screening criteria for structural damage, a dilapidation survey will be undertaken prior to any construction works. Where required, the vibration management level will be refined based on the type and condition of the building or structure. For heritage buildings and structures, the dilapidation survey will consider the heritage value of the structure in consultation with a structural engineer and heritage specialist.	Pre-construction

Impact/issue	ID	Mitigation measure	Timing
	NV13	A survey will be undertaken to identify vibration sensitive receivers (including buildings, structures, utilities, remediation infrastructure, heritage items or sites and equipment) within 200 metres of the project site. Vibration criteria will be identified based on relevant standards or manufacturer's data. Where vibration criteria are not available, conservative criteria will be used. Appropriate measures will be developed and implemented where potential exceedances of the criteria are identified.	Pre-construction
	NV14	Vibration generating activities will be managed to minimise the potential for impacts on vibration sensitive receivers, (identified in accordance with mitigation measure NV13). Prior to the commencement of vibration-intensive works within the minimum working distances for cosmetic damage, the potential for impacts will be assessed. This will include a more detailed assessment of potentially affected receivers to assess the susceptibility to damage from vibration. Where there is potential for damage, alternate methods that generate less vibration will be investigated and substituted where feasible and reasonable. For heritage items or sites, the more detailed assessment will consider the sensitivity of the receiver in consultation with a heritage specialist to ensure susceptible components are adequately monitored and managed. Where residual risks remain, vibration monitoring will be undertaken. Vibration monitors will provide real-time notification of exceedances of levels approaching cosmetic damage. Any identified vibration-related damage to the receivers will be rectified, including as recommended by a heritage specialist for heritage items.	Construction
Operation			
Operational noise and vibration impacts	NV15	Monitoring of noise and vibration will be undertaken within 12 months of the commencement of operation to compare actual noise and vibration performance against that predicted by the operational noise and vibration review (mitigation measure NV1). The results of monitoring will be documented in an operational noise and vibration compliance report. Additional feasible and reasonable mitigation measures will be considered where any additional receivers are identified as qualifying for consideration of noise mitigation in accordance with the relevant guidelines.	Operation
Aboriginal heritage			
Design			
Avoiding and minimising impacts on Aboriginal heritage	AH1	The design will continue to be refined to avoid direct impacts on identified places of Aboriginal heritage as far as reasonably practicable.	Design
Consultation	AH2	Aboriginal consultation will continue to be undertaken through the life of the project in accordance with the *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (Roads and Maritime Services, 2012) and the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010b). This includes managing potential impacts on objects/aspects of cultural significance in consultation with registered Aboriginal parties.	Design, pre-construction, construction

Impact/issue	ID	Mitigation measure	Timing
Interpretation	AH3	A heritage interpretation strategy will be developed to guide incorporation of appropriate interpretation and integration of Aboriginal and non-Aboriginal heritage in the design. The strategy will be prepared and implemented in accordance with *Interpreting Heritage Places and Items: Guidelines* (NSW Heritage Office, 2005) and the *Heritage Interpretation Policy* (NSW Heritage Council, 2005). The strategy will include measures to ensure a meaningful design response to Aboriginal heritage and cultural values. It will be developed in consultation with relevant stakeholders, including registered Aboriginal parties. The design will include appropriate interpretation of Aboriginal heritage in accordance with the heritage interpretation strategy.	Design
Consultation during design	AH4	Aboriginal stakeholders will continue to be consulted and involved during design development in accordance with Transport for NSW's Aboriginal Culture and Heritage Framework, *Draft Connecting with Country* (Government Architect NSW, 2020c) and *Designing with Country* (Government Architect NSW, 2020d) and in consultation with the Design Review Panel.	Design
Cultural values	AH5	An offer to conduct detailed interviews with cultural knowledge holders will be made to confirm the cultural values associated with the project site and surrounds, and the potential impacts of the project on these values. Interviews will be undertaken by a suitably qualified anthropologist. Targeted interview questions will be developed based on a review of ethnographic and archaeological literature. Where practicable, and in a culturally acceptable way: • data collected during the literature review and interviews will be mapped and collated into a report • specific sites recorded as being significant to Aboriginal people (for spiritual, social, aesthetic or historical reasons) will be identified. Outcomes and recommendations of the cultural values assessment will be considered as part of the design (mitigation measures AH3 and AH4) and preparation of the Aboriginal cultural heritage management plan (mitigation measure AH8).	Design
Aboriginal archaeology	AH6	A survey will be undertaken of previously identified areas of Aboriginal archaeological sensitivity in the project site at Melrose Park (subject to arranging property access) in accordance with the requirements of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010a). Test excavations will be undertaken to confirm the nature and extent of any potential archaeological deposits in accordance with the excavation methodology prepared for the project (Appendix C of Technical Paper 4 (Preliminary Aboriginal Cultural Heritage Assessment Report)). Where testing confirms that Aboriginal objects are present, options to modify the project will be investigated in accordance with mitigation measure AH1. Unavoidable impacts will be managed in consultation with registered Aboriginal parties. Any salvage required will be undertaken in accordance with the salvage methodology (mitigation measure AH7).	Design

Impact/issue	ID	Mitigation measure	Timing
Management of salvaged objects	AH7	A detailed salvage methodology will be prepared (if required) as part of the Final Aboriginal Cultural Heritage Assessment Report following test excavations. The methodology will be prepared by a suitably qualified archaeologist in consultation with registered Aboriginal parties. The salvage methodology will include: • the process for consultation with Heritage NSW and registered Aboriginal parties in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010b), and *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011) • requirements in relation to the short and long-term management of Aboriginal objects recovered during testing and salvage, including care agreements, where relevant. Where salvage is required, registered Aboriginal parties will be engaged to assist the salvage process, which will be managed by an appropriately qualified archaeologist. Detailed analysis and reporting of cultural material collected will be provided to Heritage NSW in accordance with section 89A of the *National Parks and Wildlife Act 1974*. This will include recording salvaged objects on the NSW Aboriginal Heritage Information Management System (AHIMS) register and updating site records.	Design
Construction			
Protecting Aboriginal heritage and minimising impacts during construction	AH8	An Aboriginal cultural heritage management plan will be prepared prior to construction and implemented as part of the CEMP. The plan will include measures to minimise the potential for impacts and manage Aboriginal heritage, including: • outcomes of further investigations (mitigation measures AH5 and AH6) • salvage methodology (mitigation measure AH7) • requirements for an induction and cultural awareness training for construction workers and supervisors (mitigation measure AH9) • unexpected finds procedure (mitigation measure AH10) • measures to protect sites from inadvertent impacts from vehicles and equipment.	Pre-construction, construction
Protecting Aboriginal heritage and minimising impacts during construction	AH9	A requirement for cultural and historic heritage awareness training will be included in the Aboriginal cultural heritage management plan. Cultural heritage awareness training will be provided by an Aboriginal representative at the commencement of substantial works for the project.	Pre-construction, construction
Unexpected finds	AH10	Where previously unidentified Aboriginal objects are encountered during construction, this will be managed in accordance with Transport for NSW's *Unexpected heritage items procedure* (2022), included in the heritage interpretation strategy (mitigation measure AH3) and Aboriginal cultural heritage management plan (mitigation measure AH8), and recorded on the AHIMS register.	Construction

Impact/issue	ID	Mitigation measure	Timing
Non-Aboriginal heritage			
Design			
Avoiding and minimising impacts on non-Aboriginal heritage	NAH1	The design will continue to be refined to avoid direct impacts on items/sites of non-Aboriginal heritage significance and archaeological sites of State significance, and to minimise impacts on archaeological sites of local significance, as far as reasonably practicable.	Design
	NAH2	For areas of archaeological significance where harm cannot be avoided, a Research Design and Excavation Methodology will be prepared to ensure there is appropriate management informed by significance and relevant research questions. A management rating system will be adopted based on the approach provided in Technical Paper 6 (Historical Archaeological Assessment), which will be further refined following the outcomes of test excavations and site-specific research.	Design
	NAH3	Test excavations will be undertaken to clarify significance, extent and integrity of deposits in accordance with the Archaeological Research and Excavation Framework (see Appendix B of Technical Paper 6 (Historical Archaeological Assessment)). Where testing confirms that archaeological resources are present, additional site-specific research will be undertaken to refine the understanding of significance to ensure future management is in line with research values.	Design
Visual impacts and heritage setting	NAH4	The design will be prepared in accordance with the urban design requirements and recommendations in Technical Paper 5 (Statement of Heritage Impact – Built Heritage). The design will minimise the potential for visual impacts on heritage items by incorporating sympathetic form, fabric and colour, where feasible.	Design
Impacts to Bulla Cream Dairy (Willowmere)	NAH5	Design refinement will be undertaken to minimise potential impacts on Bulla Cream Dairy (Willowmere) (Parramatta LEP Item No. I64) as far as practicable. This will include minimising encroachment of the curtilage, retaining significant heritage fabric (i.e. Billiards Room in addition to the Main House), and retaining or relocating significant tree plantings where practicable. Adaptive reuse options for Bulla Cream Dairy (Willowmere) will be investigated and implemented in accordance with *New Uses for Heritage Places: Guidelines for the Adaptation of Historic Buildings and Sites* (Heritage Council of NSW and Royal Australian Institute of Architects NSW Chapter, 2008). This will be undertaken in consultation with the property owner and the City of Parramatta Council.	Design
Heritage interpretation	NAH6	A heritage interpretation strategy will be developed to guide incorporating appropriate interpretation and integration of heritage in the design. The strategy will include interpretation requirements for specific parts of the project, particularly where heritage items will be impacted, or archaeological sites are proposed to be excavated. The strategy will be prepared and implemented in accordance with *Interpreting Heritage Places and Items: Guidelines* (NSW Heritage Office, 2005) and the *Heritage Interpretation Policy* (NSW Heritage Council, 2005) and developed in consultation with relevant stakeholders, including City of Paramatta Council and City of Ryde Council, and Sydney Olympic Park Authority.	Design

Impact/issue	ID	Mitigation measure	Timing
		The strategy will provide a framework for interpreting the heritage items impacted by the project, set out the key interpretative themes and identify communication strategies, and the location and form of interpretation. These may include approaches such as interpretative signage, historical/artefact displays at local museums or visitor centres, and online media about heritage items and the history of surrounding suburbs. The design will include appropriate interpretation of non-Aboriginal heritage in accordance with the heritage interpretation strategy.	
Construction			
Archival recording of built heritage items	NAH7	Photographic archival recording will be carried out for affected sections of the following items: • Bulla Cream Dairy (Willowmere) (Parramatta LEP Item No. I64) • House at 46 John Street, Rydalmere (unlisted). Photographic archival recording will be carried out prior to works commencing in the vicinity of the item, and in accordance with *How to Prepare Archival Records of Heritage Items* (Heritage Office, 1998a) and *Photographic Recording of Heritage Items Using Film or Digital Capture* (Heritage Office, 2006). Once complete, a report will be prepared detailing the history and significance of the item, relevant findings from the archival recording and an overview of the project.	Pre-construction
Avoiding impact to non-Aboriginal heritage (including archaeological resources) during construction	NAH8	A heritage management plan will be prepared and implemented as part of the CEMP. The plan will include measures to manage non-Aboriginal heritage and minimise the potential for impacts during construction. The plan will be prepared in consultation with relevant heritage agencies (Heritage NSW, Sydney Olympic Park Authority, City of Parramatta Council and City of Ryde Council) and take into account the outcomes of further investigations, including test excavations and the Research Design and Excavation Methodology. The heritage management plan will define a requirement for non-Aboriginal historical heritage awareness training for site workers prior to commencement of construction works. The awareness training will promote an understanding of heritage items that may be impacted during the works.	Pre-construction, construction
	NAH9	An unexpected finds procedure for land and maritime based archaeological resources will be developed as part of the heritage management plan, consistent with Transport for NSW's *Unexpected heritage items procedure* (2022) and *Skeletal remains: guidelines for the management of human skeletal remains under the Heritage Act 1977* (Heritage Office, 1998b).	Pre-construction, construction
	NAH10	Significant heritage fabric at the Bulla Cream Dairy (Willowmere) that is proposed to be retained and the fenced preservation area of Ermington Wharf/Wharf/Former Pennant Hills Wharf (and visible remnants) will be fenced and marked on site plans within the CEMP and heritage management plan as areas to be avoided/protected during construction.	Pre-construction, construction
Potential vibration impacts on built heritage items	NAH11	Potential vibration impacts on items of heritage significance will be managed in accordance with the *Construction Noise and Vibration Strategy* (Transport for NSW, 2019a) and mitigation measures NV12 to NV14.	Construction

Impact/issue	ID	Mitigation measure	Timing
Land use and property			
Design			
Impacts on land use and property	LP1	The design will continue to be refined to minimise land requirements and potential impacts on land uses and properties as far as reasonably practicable. Consultation with landowners/landholders will be ongoing to confirm feasible and reasonable measures to minimise impacts on their operations/properties.	Design
Integration and interface with surrounding land uses and properties	LP2	Consultation with key stakeholders (including City of Parramatta Council, Sydney Olympic Park Authority, the Department of Planning and Environment, and relevant developers) will be ongoing to ensure that the design of the project is integrated as far as practicable with adjoining developments, proposed developments and urban renewal areas (including those subject to the *Draft Camellia-Rosehill Place Strategy* (DPIE, 2021), structure planning for Melrose Park North and Melrose Park South, and the *Carter Street Precinct Development Framework* (DPIE, 2020)). This will include identifying measures and design responses to manage the interface between the project and adjoining land uses and properties as far as reasonably practicable.	Design
Residual land	LP3	A residual land management plan will be prepared to define the proposed approach to managing residual land, including consulting on proposed future uses with key stakeholders, and required actions in relation to the identified land.	Design
Construction			
Impacts on land use and property	LP4	Construction planning will minimise the duration that land is required to the shortest possible duration, particularly where the land requirements affect recreation/open space areas.	Pre-construction
Land requirements and property acquisition	LP5	All property acquisitions will be undertaken in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991*, the land acquisition reforms announced by the NSW Government in 2016, and the recommendations of the Auditor General's 2021 review of Transport for NSW's acquisition practices.	Pre-construction
	LP6	Transport for NSW will appoint Personal Relationship Manager(s) to assist residential landowners and tenants who may be affected by acquisition. The Personal Relationship Manager(s) will maintain regular contact with these individuals to provide assistance with the acquisition process, including updates on the project, and respond to queries. The Personal Relationship Manager(s) will work with the landowners and tenants to offer assistance and support throughout the acquisition process.	Pre-construction
Property impacts	LP7	Transport for NSW will seek to secure agreements with affected landowners/landholders, to guide property-level design requirements and the management of construction on, or immediately adjacent to, private properties. Property adjustment plans will be prepared in consultation with impacted landowners/landholders. The plans will define the works required to properties affected by acquisition and those requiring adjustments as a result of the project. Works will include, but not be limited to, adjustments to driveways, fences, trees and landscaping.	Pre-construction
Impacts on utilities	LP8	The location of all utilities and services, and requirements for access to, diversion, protection and/or support, will be confirmed prior to construction. This will include (as required) undertaking utilities investigations, including intrusive investigations, and consultation and agreement with service providers.	Pre-construction

Impact/issue	ID	Mitigation measure	Timing
Rehabilitation of land subject to temporary use during construction	LP9	A rehabilitation strategy will be prepared to guide rehabilitation planning, implementation, monitoring and maintenance of disturbed areas outside the operational footprint following the completion of construction. The strategy will have regard to Appendix G (Rehabilitation recommendations) of *Managing Urban Stormwater – Soils and Construction – Volume 1* (Landcom, 2004). The strategy will be consistent with the residual land management plan for land owned by Transport for NSW.	Pre-construction
	LP10	Land subject to temporary use will be rehabilitated as soon as practicable to the pre-construction condition (or as agreed with the landowner/landholder), taking into consideration the existing condition, location and land use characteristics. Rehabilitation will be undertaken in consultation with the relevant landowner/landholder, and in accordance with the rehabilitation strategy.	Construction
Socio-economic impacts			
Construction			
Socio-economic impacts, communication and engagement	SE1	Transport for NSW will prepare an overarching Community Communication Strategy to guide the management and delivery of community and stakeholder engagement in the lead up to and during construction, and ensure that: • accurate and accessible information about the project is provided • feedback from the community is encouraged • opportunities for input are provided • community members and stakeholders with the potential to be affected by construction activities are notified in a timely manner about the timing of activities and potential for impacts • enquiries and complaints are managed (see mitigation measure SE3), and a timely response is provided for concerns raised. In relation to the potential for socio-economic impacts, the strategy will include approaches and protocols to: • communicate with potentially affected residents, other community members, businesses and other key stakeholders to provide information about the project, and the likely nature, extent and duration of changes during construction • identify and engage with vulnerable persons that might be affected by the project • communicate information about potential access changes and delays (including changes to public and active transport facilities) • engage with owners and tenants of properties that will be impacted by acquisition. Engagement plans will be developed and implemented to define the specific requirements for engagement consistent with the Community Communication Strategy. The engagement plans will define tools and activities, timing and responsibilities, and monitoring requirements.	Pre-construction, construction
	SE2	Dedicated place managers will be available in the lead up to, and during, construction to listen to concerns and answer questions from the community and businesses. Place managers will provide a single point of contact for people (including business owners/operators) wanting to find out more about the project, including the impacts of construction, and the measures that will be implemented to minimise these impacts as far as possible.	Pre-construction, construction

Impact/issue	ID	Mitigation measure	Timing
	SE3	Enquiries and complaints management systems will be developed, outlined in the Community Communication Strategy, and implemented before and during construction. The complaints management systems will be maintained throughout the construction period and for a minimum of 12 months after construction finishes.	Construction
	SE4	A social impact management plan (SIMP) will be prepared, in accordance with Section 5.2 of the *Social Impact Assessment Guideline for State Significant Projects* (DPIE, 2021f), to manage the implementation of the proposed socio-economic mitigation measures, and detail the specific management actions and targets that will be developed in response to these measures. The SIMP will define specific actions, roles and responsibilities, and a monitoring, reporting and adaptive management framework for construction.	Construction
Impacts on community facilities and infrastructure	SE5	Access to community facilities and infrastructure will be maintained during construction as far as practicable. Where alternate access arrangements need to be made, including changes to access for public and active transport facilities, these will be developed in consultation with relevant stakeholders and service providers, and communicated to users in accordance with the engagement plan. Changes to access arrangements will be managed in accordance with the traffic and access management plan (mitigation measure TT8).	Construction
	SE6	Transport for NSW will continue to consult with relevant key stakeholders (including facility managers) in relation to community infrastructure with the potential to be directly affected (by the project's land requirements) and/or indirectly affected (for example, as a result of amenity impacts or access changes). Consultation will be undertaken in accordance with the engagement plan and will assist with identifying measures to minimise the potential impacts of the project on community infrastructure as far as possible. Stakeholders to be consulted will include, but not be limited to, City of Parramatta Council, City of Ryde Council, NSW Maritime, Melrose Park Public School and the Department of Education, and Sydney Olympic Park Authority.	Pre-construction, construction
	SE7	Transport for NSW will continue to consult with relevant councils and Sydney Olympic Park Authority to offset the direct impacts of the project's land requirements on open space (parks and reserves) through the provision of active transport infrastructure, new and improved open spaces and recreation facilities, and repurposing some residual land.	Pre-construction, construction
Employment and training benefits	SE8	A project-specific social procurement and workforce development strategy will be developed and implemented to • nominate workforce development and social procurement targets and outcomes • define approaches to achieve nominated targets and outcomes • support job creation and skill development opportunities for the project.	Pre-construction, construction

Impact/issue	ID	Mitigation measure	Timing
Impacts on businesses	SE9	A business management and activation plan will be prepared and implemented for businesses with the potential to be affected by the project, including those located on roads impacted by construction. The plan will identify businesses with the potential to be impacted by the project. It will detail feasible and reasonable measures, developed in consultation with affected business owners/operators to: • minimise disruption for customers and deliveries as far as possible • maintain vehicular and pedestrian access during business hours, including alternative arrangements for times when access cannot be maintained • maintain visibility of the business to potential customers during construction, including alternative arrangements for times when visibility cannot be maintained • respond to other identified impacts as far as possible, including specific measures to assist small businesses with the potential to be adversely affected during construction. The plan will also include: • measures identified as an outcome of the small business support program (measure SE11) • maintaining a phone hotline that enables businesses to find out about the project or register any issues • establishment of business reference groups to provide information on the project and assist with the development of management measures • a feedback and monitoring mechanism to assess the effectiveness of measures.	Pre-construction, construction
Impacts on access to businesses	SE10	Alternative arrangements, including for pedestrian and vehicular access will be developed in consultation with affected businesses and implemented before any changes are made to existing access. Adequate wayfinding to businesses will be provided before, and for the duration of, any disruption. Wayfinding will be provided in consultation with the City of Parramatta Council, City of Ryde Council, Sydney Olympic Park Authority and/or relevant road authority, and as outlined in the business management and activation plan (mitigation measure SE9).	Pre-construction, construction
Supporting small business during construction	SE11	A small business support program will be established to provide assistance to small business owners with the potential to be impacted by construction. The program will assist local businesses develop proactive business strategies, including: • marketing and promotion • business diversification and business planning • engagement of specialists to provide training.	Pre-construction, construction

Impact/issue	ID	Mitigation measure	Timing
Landscape and visual impacts			
Design			
Minimising visual impacts	LV1	The urban design requirements will be finalised in accordance with the vision, principles and outcomes defined in Technical Paper 1 (Design, Place and Movement), to provide detailed urban design guidelines and key requirements for the project, including individual design elements. The urban design requirements will be finalised in consultation with key stakeholders, the operator, the rail regulator, and the Design Review Panel.	Design
	LV2	Design development will be undertaken in accordance with the urban design requirements and with advice from the Design Review Panel.	Design
Managing impacts on trees	LV3	A tree register will be prepared by a qualified arborist to identify all trees with the potential to be impacted by the project, and the proposed impacts to trees, including: • definitions of tree and canopy • definition of what constitutes an impact (generally more than minor crown or root pruning of more than 10 per cent) • location of each tree • tree values and condition • where a tree requires removal, whether, in the opinion of the arborist, it can be successfully transplanted • the extent of the proposed impact (complete removal or extent of pruning).	Design, construction
	LV4	The design will continue to be refined to avoid or minimise impacts on trees, and will include consideration of options to reduce impacts on trees, including: • operational requirements in relation to tree locations • adjustments to the design to avoid impacting trees (such as opportunities for localised narrowing of footpaths, use of porous pavement) • reduction in the standard offset distances required for underground services • consideration of the health of each tree, including its vigour and likely ability to survive in situ pruning or transplanting.	Design
	LV5	A tree offset strategy will be developed to offset the loss of trees and achieve a net increase in tree canopy. The strategy will define and identify: • how impacts on trees will be offset • locations for replacement trees • species and trees sizes to ensure a mix of species and a range of mature heights to provide visual diversity as appropriate to proposed planting locations • requirements for monitoring and maintenance. The strategy will be developed, and locations of replacement trees confirmed, in consultation with City of Parramatta Council, City of Ryde Council and Sydney Olympic Park Authority.	Design
Lighting	LV6	Lighting will be designed and sited to minimise glare and light spill into adjoining areas in accordance with Australian/New Zealand Standard *AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting* and relevant standards in the series *AS/NZS 1158:2005 Lighting for roads and public spaces*.	Design

Impact/issue	ID	Mitigation measure	Timing
Construction			
Managing impacts on trees	LV7	Construction planning will demonstrate consideration of all practicable options to avoid or minimise impacts on trees, including: • review of the construction methodology and layout of work sites, compounds, access, ancillary infrastructure and fencing • consideration of alternative construction methods and equipment. Trees to be retained will be protected prior to the commencement of construction in accordance with Australian Standard *AS4970–2009 Protection of trees on development sites*.	Pre-construction, construction
	LV8	Any tree pruning that is more than minor will be undertaken by a qualified arborist in accordance with *AS 4373–2007 Pruning of amenity trees*.	Construction
Construction site management	LV9	Construction site hoarding and fencing will be designed, erected and maintained to minimise visual impacts. This will include: • erecting hoarding/fencing as early as possible in the site establishment phase to provide visual screening • using high quality materials suitable for parks and public spaces where sites are located close to sensitive receivers and public open space • featuring graphics, artwork or project information at appropriate locations in consultation with Transport for NSW • maintaining hoarding/fencing regularly, including the prompt removal of graffiti.	Construction
	LV10	Lighting of work areas, compounds, and work sites will be oriented to minimise glare and light spill impact on adjacent receivers.	Construction
Site restoration and rehabilitation	LV11	Following completion of construction, site restoration will be undertaken in accordance with the rehabilitation strategy (mitigation measure LP9). Temporary impacts on public open space will be rehabilitated in consultation with the relevant local council or Sydney Olympic Park Authority.	Construction
	LV12	Early planting and revegetation works will be undertaken where practicable to provide a screening buffer that has time to mature before the project is operational.	Construction
	LV13	Construction programming will provide for the progressive rehabilitation of disturbed areas as far as practicable, to minimise the duration and extent of temporary visual and landscape character impacts.	Construction
Biodiversity			
Design			
Avoiding impacts on biodiversity	BD1	Vegetation clearing will be limited to the minimum necessary to construct the project. The design and location of infrastructure will be further refined during each design phase to minimise or avoid impacts on native vegetation and fauna habitat as far as practicable.	Design
Offsetting impacts on native vegetation and threatened species	BD2	Biodiversity offsets will be finalised in accordance with the NSW Biodiversity Offsets Scheme and the NSW Assessment Bilateral Agreement under the EPBC Act, in consultation with the NSW Department of Planning and Environment (Environment, Energy and Science Directorate). Offsets required under the *Fisheries Management Act 1994* will be finalised consultation with DPI Fisheries.	Design

Impact/issue	ID	Mitigation measure	Timing
Habitat connectivity impacts – Sydney Olympic Park	BD3	Design development in Sydney Olympic Park and the Millennium Parklands will ensure that habitat connectivity and quality for the Green and Golden Bell Frog is maintained in consultation with Sydney Olympic Park Authority.	Design
	BD4	The use of overhead wiring will be minimised as far as practicable in areas adjoining Grey-headed Flying-fox foraging habitat and the flight paths of the White-bellied Sea-eagle and migratory waders, particularly on the bridges over the Parramatta River, adjacent to Newington Nature Reserve, and around Hill Road and the Holker Busway.	Design
Impacts to habitat values	BD5	The planting of feed trees for the Grey-headed Flying-fox will be considered to improve habitat values at Wentworth Point and Sydney Olympic Park, with a particular focus on locally indigenous winter-flowering species, such as Forest Red Gum (*Eucalyptus tereticornis*), Spotted Gum (*Corymbia maculata*) and Broad-leaved Paperbark (*Melaleuca quinquenervia*).	Design
	BD6	Landscaping will use locally indigenous species to buffer the light rail alignment adjacent to vegetated areas, including Newington Nature Reserve, and along Hill Road and the Holker Busway.	Design
	BD7	Opportunities to minimise light pollution to ecologically sensitive areas, particularly the Parramatta River, Newington Nature Reserve and the Millennium Parklands will be investigated and implemented where reasonable and feasible, with regard to the *National Light Pollution Guidelines for Wildlife* (Department of the Environment and Energy, 2020).	Design
	BD8	The design of the proposed bridges over the Parramatta River, and works to bridges in Sydney Olympic Park, will include provision for bat-friendly roost features. Bat-friendly roost features, and the use of nest boxes appropriate for use by microbats, will also be investigated and installed at other locations, where appropriate.	Design
Construction			
Habitat impacts – Sydney Olympic Park	BD9	Habitat connectivity and quality for the Green and Golden Bell Frog will be maintained during construction. This will include replacing any Green and Golden Bell Frog underpasses with the potential to be affected during construction with an equivalent structure, in consultation with Sydney Olympic Park Authority.	Construction
	BD10	Construction measures to avoid impacts on breeding of threatened fauna, such as the White-bellied Sea-eagle and Southern Myotis, will be implemented where feasible and reasonable. Such measures, including timing of construction, quieter construction methods, and/or the use of temporary noise barriers, will be implemented where feasible and reasonable, for works at: • Holker Busway (to minimise impacts on the breeding of the Southern Myotis during October to April) • Hill Road near the White-bellied Sea-eagle nest (breeding season from July to January).	Construction
	BD11	Where existing frog-proof fencing within Sydney Olympic Park is impacted by the project, temporary frog-proof fencing will be installed around work areas. Permanent frog-proof fencing will be reinstated following construction.	Construction

Impact/issue	ID	Mitigation measure	Timing
Impacts on mangrove vegetation	BD12	Impacts on estuarine mangrove vegetation at Haslams Creek will to be avoided or minimised as far as practicable. Works on the Holker Busway bridge will be undertaken via scaffolding attached to the bridge where practicable, rather than from the ground, to minimise impacts on estuarine mangrove vegetation.	Construction
General biodiversity impacts and management	BD13	A biodiversity management plan will be prepared prior to construction and implemented as part of the CEMP. The plan will include measures to protect biodiversity and minimise the potential for impacts during construction. The plan will include but not be limited to: • measures to manage biosecurity risks (including pathogens and weeds) in accordance with the *Biosecurity Act 2015* (NSW) • locations and requirements for pre-clearing surveys, including where clearing is required within Sydney Olympic Park and areas of mangrove, saltmarsh or other riparian vegetation (see mitigation measure BD14) • an unexpected finds procedure • hygiene controls in relation to chytrid fungus, cinnamon fungus (Phytophthora cinnamomi) and myrtle rust (Pucciniales fungi) • locations and procedures for monitoring (see mitigation measures BD16 to BD18). The plan will be developed in accordance with the *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (Roads and Traffic Authority (RTA), 2011). Management measures for works within Sydney Olympic Park and the Millennium Parklands will be developed in consultation with Sydney Olympic Park Authority.	Construction
	BD14	Pre-clearing surveys will be completed prior to any works (including minor works) within sensitive areas, including at the following locations: • vegetated land within Sydney Olympic Park • areas of mangrove, saltmarsh or other riparian vegetation. • areas identified by the project ecologist as supporting known or potential habitat, for ground-dwelling and arboreal species. Pre-clearing surveys will be undertaken in accordance with Guide 1 (Pre-clearing process) of the *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA, 2011).	Pre-construction
Rehabilitation and revegetation	BD15	The rehabilitation strategy (mitigation measure LP9) will include a revegetation plan, prepared and implemented in consultation with relevant stakeholders, including Sydney Olympic Park Authority and landowners. The revegetation plan will include: • clear objectives for rehabilitation and re-establishment of native vegetation in temporary disturbance areas, in accordance with Guide 3 (Re-establishment of native vegetation) of the *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA, 2011) • active revegetation of mangroves at the proposed bridges over the Parramatta River • requirements for ongoing monitoring.	Construction

Impact/issue	ID	Mitigation measure	Timing
Monitoring	BD16	A fauna monitoring program, including monitoring locations, methods and timing, will be developed and implemented in consultation with Sydney Olympic Park Authority ecologists and Birdlife Australia, using available baseline data. The program will include monitoring during construction of: • frog fencing • microbat roosts (for any works along the Holker Busway during the microbat breeding season) • the response of the White-bellied Sea-eagle to construction noise.	Construction
	BD17	Monitoring of indirect impacts on mangroves, saltmarsh and the Narrow-leafed Wilsonia (*Wilsonia backhousei*) population will be undertaken during and following construction. If an incident occurs in these areas, monitoring by a suitably qualified expert is required to determine the severity and potential need for additional offsets under the *Biodiversity Assessment Method* (DPIE, 2020).	Construction
Operation			
Monitoring	BD18	The behavioural response of the White-bellied Sea-eagle to operation will be monitored in consultation with Sydney Olympic Park Authority ecologists and Birdlife Australia during the first two years of operation.	Operation
Water			
Design			
Flooding impacts	W1	A flood management strategy will be prepared, building on the results of the assessment presented in Technical Paper 10 (Hydrology, Flooding and Water Quality) to inform further design development and demonstrate how: • the project will achieve the Flood Management Objectives and Flood Immunity Standards • the risk of flooding to the project will be minimised • the potential impacts of the project on flood behaviour (under pre-project conditions) will be managed such that flooding characteristics will not be adversely impacted The flood management strategy will: • confirm the project's level of flood immunity • confirm the impacts of the project on flood behaviour in accordance with the NSW Floodplain Development Manual (DIPNR, 2005) • identify design responses and management measures to minimise: • flooding impacts above the one per cent AEP by adopting climate change adaptation measures • flooding impacts to flood sensitive areas and infrastructure within Sydney Olympic Park, including the Narawang Wetland, the Brick Pit and the existing leachate system • potential impacts to the flood capacity and potential for scour as a result of the bridge piers. The strategy will be prepared by a suitably qualified and experienced specialist in consultation with City of Parramatta Council, City of Ryde Council, Sydney Olympic Park Authority, NSW State Emergency Service and the Department of Planning and Environment	Design

Impact/issue	ID	Mitigation measure	Timing
	W2	Drainage and flood management infrastructure will be designed with regard to relevant drainage design requirements and guidelines, including the *Development Engineering Design Guidelines* (City of Parramatta Council, 2018) and *Sydney Olympic Park Authority Policy – Stormwater Management and Water Sensitive Urban Design* (Sydney Olympic Park Authority, 2016).	Design
Water quality impacts	W3	The location and specification of water quality treatment measures will be determined with reference to the NSW and project-specific water quality objectives and existing water quality.	Design
Impacts on bores	W4	Further investigations and consultation with the owner of groundwater bore GW107659 will be undertaken to identify the potential for the project to affect existing water extraction and to identify appropriate management measures in accordance with the *NSW Aquifer Interference Policy* (Department of Primary Industries, 2012).	Design
	W5	Further investigations and consultation with the owner of groundwater bore GW063660 will be undertaken to identify if the bore can be retained. Any decommissioning required will be undertaken in accordance with the *Minimum Construction Requirements for Water Bores in Australia* (National Uniform Drillers Licensing Committee, 2012). Decommissioning will be developed in consultation and agreement with the bore owner.	Design
Construction			
Flooding impacts	W6	Construction planning and the layout of construction work sites and compounds will be undertaken with consideration of overland flow paths and flood risk, avoiding flood liable land as far as practicable.	Pre-construction
	W7	A flood and emergency response plan will be prepared and implemented. The plan will include measures, process and responsibilities to minimise the potential impacts of construction activities on flood behaviour as far as practicable. It will also include measures to manage flood risks and address flood recovery during construction.	Pre-construction, construction
	W8	Ongoing consultation will occur with the NSW State Emergency Service and relevant councils in relation to potential impacts to existing community emergency management arrangements for flooding.	Design, pre-construction, construction operation
Water quality impacts	W9	A soil and water management plan will be prepared as part of the CEMP and implemented during construction. The plan will detail processes, responsibilities and measures to manage potential soil and water quality impacts during construction, including measures to minimise the potential for pollutants to enter surface water and groundwater. The plan will be prepared in accordance with relevant guidelines and standards, including *Managing Urban Stormwater – Soils and Construction* - Volume 1 (Landcom, 2004) and Volume 2D *Main Road Construction* (DECC, 2008b) (the Blue Book), *Best Practice Erosion and Sediment Control* (International Erosion Control Association (Australasia), 2008), and *Sydney Olympic Park Authority Policy - Stormwater Management and Water Sensitive Urban Design* (Sydney Olympic Park Authority, 2016) (for works in Sydney Olympic Park).	Pre-construction, construction
	W10	Discharge to surface water will be undertaken in accordance with *Transport for NSW Water Discharge and Reuse Guideline DMS-SD-024 version 4.0* (2019b), and project specific objectives.	Construction

Impact/issue	ID	Mitigation measure	Timing
Water quality monitoring	W11	A water quality monitoring program will be developed and implemented as part of the soil and water management plan to monitor potential surface water quality impacts. The program will define: • monitoring parameters • monitoring locations • frequency and duration of monitoring. The monitoring program will include monitoring prior to the commencement of construction to validate the baseline water quality of potential receiving waters and confirm project-specific water quality criteria. Water quality monitoring will continue for a minimum of 12 months following the completion of construction, or until affected watercourses are rehabilitated to an acceptable condition (or as otherwise required by any project conditions of approval). The monitoring program will assess compliance with the project-specific water quality objectives and the efficacy of the mitigation measures. It will be developed in consultation with the NSW EPA, City of Parramatta Council and Sydney Olympic Park Authority.	Pre-construction, construction
Work within the Parramatta River	W12	Hydrodynamic modelling will be undertaken to inform the final bridge construction methodology and features of the temporary jetties to minimise the risk of river bank destabilisation or additional flooding to nearby areas. The modelling will also identify if additional measures, such as scour protection are required.	Pre-construction
	W13	The soil and water management plan will detail measures to manage potential changes to hydrodynamic processes within the Parramatta River and ensure appropriate mitigation measures are implemented to minimise erosion, scour and destabilisation of the river banks.	Pre-construction, construction
Works within watercourses	W14	Works within or near watercourses will be undertaken with consideration of the *Guidelines for watercourse crossings on waterfront land* (DPI, 2012) and *Guidelines for controlled activities on waterfront land – Riparian corridors* (NRAR, 2018).	Construction
Groundwater impacts	W15	Impacts on groundwater during construction will be minimised as far as practicable by: • avoiding the need to extract groundwater • minimising groundwater inflows and volumes into excavations.	Construction
	W16	A dewatering management strategy will be prepared as part of the soil and water management plan and implemented during construction. The plan will detail measures for the appropriate management of extracted groundwater, including leachate.	Pre-construction, construction
Operation			
Emergency management	W17	Emergency management arrangements will be developed to manage flood risks to people and vehicles accessing stops and facilities.	Operation

Impact/issue	ID	Mitigation measure	Timing
Soils and contamination			
Design			
Investigation of data gaps	CS1	Additional investigations will be undertaken to inform the design, construction planning, and preparation of remediation action plan(s) (RAP(s)) (if required). The investigations will include further characterising the existing contamination status of the project site. The results of site investigations will be assessed against the criteria contained with the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPC, 2013) to determine the need for any remediation. An independent site auditor accredited under the site auditor scheme under the CLM Act will review the scope and results of the further investigation, including any recommendations for further assessment, and provide a written opinion on the contamination risk and the appropriateness of the reports and any proposed recommendations.	Design
Management of contaminated sites	CS2	Where the project has the potential to affect the remediation systems in the stabling and maintenance facility, and the asbestos containment cells at 13A Grand Avenue and the former Sandown Line, the controls and protocols outlined in the existing long-term environmental management plan will be implemented such that the systems continue to operate effectively.	Design
	CS3	Where the project has the potential to affect the leachate management systems in Sydney Olympic Park, negotiation will be undertaken with Sydney Olympic Park to understand the extent of the potential interaction and controls and protocols outlined in the existing management plan will be implemented such that the systems continue to operate effectively.	Design
	CS4	Where the potential for disturbance of existing remediation systems in Camellia and Sydney Olympic Park is not consistent with the existing management plans, a remediation action plan(s) will be prepared in consultation with the landowners and NSW EPA. The plan(s) will describe how these systems will be managed during construction, and/or how these systems will be reinstated such that they continue to operate effectively after construction is complete.	Design
	CS5	Where a remediation action plan(s) is/are determined to be required following further investigation at 37A Grand Avenue, Camelia (and any other areas within the project site) it will be prepared and implemented in accordance with the *National Environment Protection (Assessment of Site Contamination) Measure 1999*. The remediation action plan(s) will be reviewed by an independent site auditor (accredited under the site auditor scheme under the CLM Act), to certify the appropriateness of the plan(s) and that the site can be made suitable for the proposed use.	Design
Construction			
Demolition of structures containing hazardous materials	CS6	Hazardous materials surveys will be undertaken to inform construction planning.	Pre-construction
Potential impacts of soil disturbance	CS7	The soil and water management plan (mitigation measure W9) will detail processes, responsibilities and measures to manage potential soil impacts during construction, including potential impacts associated with the presence of existing contamination, stockpile management, saline soils and acid sulfate soils.	Pre-construction, construction

Impact/issue	ID	Mitigation measure	Timing
Potential impacts of contaminated sediment disturbance	CS8	Physical controls (such as sediment curtains) will be implemented during works within the Parramatta River to minimise the disturbance and migration of contaminated sediments.	Pre-construction, construction
Disposal of contaminated soil and groundwater	CS9	The preferred methods to manage and dispose of contaminated materials and groundwater will be confirmed following further geotechnical and contamination investigations and incorporated into the waste and resource management plan (mitigation measure WR3).	Pre-construction
Landfill gas intrusion	CS10	Protocols to address and manage the potential for landfill gases along Hill Road and in Sydney Olympic Park will be developed as part of the air quality management plan (mitigation measure AQ1) and implemented during construction. The protocols will consider confined and/or enclosed spaces and appropriate controls as required (e.g., forced ventilation) and will include appropriate occupational monitoring.	Pre-construction, construction
Acid sulfate soils	CS11	An acid sulfate soils management plan will be prepared as part of the soil and water management plan in accordance with the *Acid Sulfate Soils Assessment Guidelines* (ASSMAC, 1998). The plan will define the process and measures to manage actual and potential acid sulfate soil and sediment disturbed during construction. The plan will include a summary of available acid sulfate soil information relevant to the project site and identify any further soil/water analysis required as a precursor to implementing the management plan. Acid sulfate soils will be disposed off-site (where required) in accordance with the *Waste Classification Guidelines - Part 1: Classifying waste* (NSW EPA, 2014a) and *Part 4: Acid sulfate soil*s (NSW EPA, 2014b).	Pre-construction, construction
Stockpile management and handling	CS12	Temporary storage and containment systems for the stockpiling of contaminated material during construction will be designed to be impervious to the materials stored, resistant to fire (where required), prevent cross contamination of clean fill, covered to prevent contact with rainfall (when required), and managed and maintained to prevent any release of liquids and contaminated run-off to stormwater drains, waters and land.	Pre-construction, construction
Management of previously unidentified contaminated material	CS13	The discovery of previously unidentified contaminated material will be managed in accordance with an unexpected contaminated finds procedure, which will be included in the soil and water management plan.	Pre-construction, construction
Operation			
Contamination during operation	CS14	Spills and leaks of vehicles or maintenance plant and equipment will be managed in accordance with Transport for NSW's standard operating procedures.	Operation
	CS15	Ongoing management and monitoring measures will be implemented for any areas where minor, residual contamination remains following construction.	Operation

Impact/issue	ID	Mitigation measure	Timing
Hazards and risks			
Design			
Electro-magnetic fields	HR1	The project will be designed in accordance with *Non-Ionising Radiation Protection Guidelines for Limiting Exposure to Time Varying Electric and Magnetic Fields* (ICNIRP, 2010) and Australian Standard *AS 2067:2016 Substations and high voltage installations exceeding 1 kV* to minimise the risk associated with electro-magnetic field exposure. Wiring, tracks and other infrastructure will be designed to mitigate risks associated with high voltage cabling and potential earth leakage.	Design
Public safety	HR2	Ongoing design development will be subject to detailed safety reviews through the Safety in Design process, to identify measures to mitigate, manage and reduce the risk of incidents arising from collisions during operation.	Design
Construction			
Managing the potential for hazards during construction	HR3	The CEMP will detail incident management and emergency response processes, responsibilities and measures to manage hazards, and incident and emergency situations during construction.	Pre-construction, construction
	HR4	The soil and water management plan will include a spill response procedure. The procedure will detail measures to manage hazardous substances and dangerous goods, including storage, handling and spill response, in accordance with legislative requirements.	Pre-construction, construction
Impacts on services and utilities	HR5	Valve shut downs on the Sydney Water drinking water trunk mains will be undertaken to confirm the condition and functionality of the nearest valves to the project site and whether any repairs or rectification works are required to the existing assets.	Pre-construction
	HR6	An incident and emergency response plan will be prepared to include the process to be followed in the event of an incident involving critical utilities such as the Sydney Water drinking water trunk mains, Jemena high pressure gas pipelines and VIVA fuel lines. The plan will be developed in consultation with the service providers and incorporate the findings from the utility investigations and Sydney Water condition assessment.	Pre-construction, construction
	HR7	A safety management study will be undertaken for proposed alterations to the gas and fuel pipelines in accordance with Australian and New Zealand Standard *AS/NZS 2885.6:2018 Pipelines – Gas and liquid petroleum, Part 6: Pipeline safety management*. The outcomes of the safety management study will be incorporated in construction planning. Management measures identified will be included in the incident and emergency response plan and implemented during construction.	Pre-construction, construction
Transport of dangerous goods and hazardous materials	HR8	The transport of dangerous goods will be undertaken in accordance with the Dangerous Goods (Road and Rail Transport) Regulation 2009 and the Australian Code for the *Transport of Dangerous Goods by Road and Rail* (National Transport Commission, 2017).	Construction
Operation			
Public safety during operation	HR9	Targeted safety campaigns to raise awareness about the operation of light rail vehicles will be undertaken in the lead up to the opening of the project and during operation to promote safe operation. This will focus on raising awareness and promoting safe behaviours around light rail vehicles.	Operation

Impact/issue	ID	Mitigation measure	Timing
Air quality			
Design			
Energy use and greenhouse gases	GHG1	An energy and greenhouse gas strategy will be prepared to document the greenhouse reduction targets for the construction and operational stages of the project. The strategy will: • be prepared in accordance with Infrastructure Sustainability Council and NSW Government Resource Efficiency Policy (OEH, 2014) requirements • identify the key initiatives that will be explored further to meet these targets in accordance with the carbon emissions management hierarchy • be reviewed throughout the project lifecycle.	Design, construction, operation
	GHG2	Opportunities to reduce construction and operational greenhouse gas emissions will be investigated including, but not limited to: • purchasing electricity derived from a renewable energy source • the use of biodiesel in plant and equipment • connecting compound sites to grid electricity, where available • the use of low embodied energy and recycled materials • promoting the selection of energy efficient rolling stock, electrical equipment and maintenance vehicles. Preferred measures will be defined in the energy and greenhouse gas strategy.	Design
Construction			
General air quality impacts	AQ1	An air quality management plan will be prepared as part of the CEMP and implemented during construction. The plan will detail processes, responsibilities and measures to manage air quality, odour and landfill gas and minimise the potential for impacts during construction. The plan will include an air quality, odour and landfill gas monitoring program, which will be undertaken for the duration of construction.	Pre-construction, construction
Odour emissions	AQ2	An odour management strategy will be developed prior to construction and implemented for the duration of works involving ground disturbance in Camellia, near the Parramatta River and in Sydney Olympic Park. The strategy will include: • proposed work methods and mitigation measures that aim to limit odour at sensitive receivers • routine observation of weather conditions • regular odour surveys at receptor locations by appropriately qualified professionals (mitigation measure AQ4) • measures to minimise the generation of odour at the end of each work day/shift • mechanisms for investigating odour complaints, including conduct of additional odour surveys (mitigation measure AQ4) • contingency and rectification measures should significant odour issues occur at sensitive receivers in the vicinity of the project site.	Pre-construction, construction

Impact/issue	ID	Mitigation measure	Timing
	AQ3	Odour surveys will be undertaken at downwind receivers during works involving ground disturbance in Camellia, near Parramatta River and in Sydney Olympic Park in accordance with *Determination of odorants in ambient air by field inspection* (VDI 3940, 1993). The odour surveys will be undertaken: • daily, for one hour when works commence, and prior to works completing • if wind conditions drop below three metres per second • if an odour complaint is received. If significant odour issues are observed in the vicinity of sensitive receivers, the contingency and rectification measures defined by the odour management strategy will be implemented (see AQ2).	Construction
Climate change			
Design			
Climate change risk assessment	CC1	The climate change risk assessment will continue to be refined in accordance with Australian Standard *AS 5334-2013 Climate change adaptation for settlements and infrastructure – A risk based approach* and the *Transport for NSW Climate Risk Assessment Guidelines* (Transport for NSW, 2021a). Adaptation measures will be confirmed, and actions implemented, to address very high, high and medium risks where reasonable and feasible.	Design
Operation			
Emergency management planning	CC2	Operational procedures for emergency planning and management will be prepared and implemented to consider the increased risk of flooding, storm surges and heatwaves.	Operation
Climate change risk management	CC3	Operational procedures will be developed and implemented to appropriately respond to extreme climate events (temperature, winds or rainfall), as identified in the updated climate change risk assessment.	Operation
Waste and resources			
Design			
Waste generation and recycling	WR1	Measures to minimise spoil generation will be confirmed during design development. This will include a focus on optimising the design to minimise spoil volumes, and the reuse of material on site.	Design
Sustainable procurement and resource use	WR2	Material procurement and resource use planning will be undertaken in accordance with the *Sustainable Design Guidelines* (Transport for NSW, 2020c).	Design
Construction			
Construction waste and spoil management	WR3	A waste and resource management plan will be prepared as part of the CEMP and implemented during construction. The plan will adopt the circular economy principles and the waste hierarchy contained in the *Waste Avoidance and Resource Recovery Act 2001* and the *Infrastructure Sustainability Rating Scheme Technical Manual* (Infrastructure Sustainability Council, 2021). It will detail processes, responsibilities and measures to manage waste and resource use, and minimise the potential for impacts during construction. The plan will include strategies to manage spoil, including preferred reuse options.	Pre-construction, construction
	WR4	All waste will be classified in accordance with the *Waste Classification Guidelines* (NSW EPA, 2014a) and managed in accordance with the POEO Act and associated regulations.	Construction

Impact/issue	ID	Mitigation measure	Timing
	WR5	The disturbance, movement and disposal of special waste, including hazardous building materials such as asbestos containing materials, will be carried out in accordance with the Work Health and Safety Regulation 2011 and relevant guidelines.	Construction
Management of unexpected waste materials	WR6	Suitable areas will be identified to allow for contingency management of unexpected waste materials, including contaminated materials. Such areas will be hardstand or lined, appropriately stabilised and bunded, with sufficient space for stockpile storage.	Construction
Operation			
Operational waste management	WR7	Operational waste, including general litter clean up, will be managed consistent with the Parramatta Light Rail Stage 1 Operations Environmental Management Plan and the waste hierarchy principles contained in the *Waste Avoidance and Resource Recovery Act 2001*.	Operation