

Chapter 4

Actions taken since exhibition



4. Actions taken since exhibition

4.1 Project amendments and refinements

An application for approval of a State significant infrastructure project (including a critical State significant infrastructure project) may, with the approval of the Planning Secretary, and in accordance with section 179(2) of the Environmental Planning and Assessment Regulation 2021, be amended before it is determined. During and subsequent to public exhibition of the EIS, Transport has undertaken further investigations and is proposing a number of design amendments and refinements. The aim of these amendments/refinements is to address issues raised during engagement and in submissions, take into account further design development, and minimise the potential impacts of the project where practicable; particularly in respect of land use and property, traffic and access, and biodiversity. The amendments/refinements have been developed taking into account consultation with the community and key stakeholders, and submissions made.

An Amendment Report has been prepared to consider the amendments to the exhibited project. The report considers whether the proposed amendments would result in any changes to the impacts described by the EIS, and whether any changes to the mitigation measures are required.

The proposed amendments are summarised in Table 3.1.

Further information about the proposed amendments is provided in the Amendment Report.

The project description chapters provided in the EIS (Chapters 6 (Project description – infrastructure and operation) and 7 (Project description – construction)) have been updated taking into account the proposed amendments. The amended project description is provided in Appendix A of the Amendment Report.

Table 4.1 Summary of proposed amendments

Feature	Overview
Camellia foreshore to Rydalmere alignment and bridge	<p>As described in section 5.4.2 and Appendix D (Camellia foreshore to Rydalmere option – preliminary environmental scoping) of the EIS, investigation of an alternative alignment between Camellia and Rydalmere (the ‘Camellia foreshore to Rydalmere option’) was ongoing in parallel with development of the EIS. It is now proposed to amend the project to incorporate this alternative alignment of the light rail track, active transport link and bridge over the Parramatta River.</p> <p>The new alignment extends along the Sandown Line corridor in Camellia; however, instead of crossing south over to Grand Avenue, it continues along the Parramatta River foreshore in Camellia before extending across a new bridge structure and along the boundary of Eric Primrose Reserve in Rydalmere.</p> <p>The bridge design has been amended and includes different pier arrangements in the river. It is also proposed to locate the light rail stop at John Street closer to Rydalmere Wharf.</p>
Bridge between Melrose Park and Wentworth Point	<p>The project as described in the EIS included a bridge located between the southern end of Wharf Road in Melrose Park and the northern end of Wentworth Point. It is proposed to amend the alignment and locate the bridge further to the west to avoid direct impacts to residential properties. The works would also include removing the existing high voltage transmission tower at Melrose Park and relocating the wires to three new poles located to the west of the original tower.</p>

Feature	Overview
Bridge at Hill Road	<p>The project as described in the EIS included retaining the Hill Road bridge in Sydney Olympic Park and providing a new bridge for light rail vehicles on the western side of the existing bridge.</p> <p>It is now proposed to remove the existing bridge at Hill Road and construct a new bridge, which would accommodate road traffic and light rail vehicles in an on-road (segregated) running corridor to reduce impacts on Narawang Wetland.</p>

In addition, refinements are proposed to the location of the traction power substation near Atkins Road, and the cut and fill volumes generated during earthworks.

4.2 Additional assessment

4.2.1 Updated assessment reports

Additional noise and vibration, heritage, and biodiversity assessments have been undertaken since EIS exhibition. The assessments have been undertaken to:

- assist with responding to issues raised in submissions and during consultation
- assess the impacts of the proposed amendments and refinements (see section 4.1 above) and associated amendments to the project site (described in section 3.3.1 of the Amendment Report) (referred to as ‘the amended project’)
- further progress commitments made in the EIS.

The technical papers for these issue areas that were prepared to support the EIS have been updated based on the additional assessments undertaken, and the following reports are provided separately:

- Updated Noise and Vibration Report
- Aboriginal Cultural Heritage Assessment Report
- Updated Statement of Heritage Impact
- Updated Historical Archaeological Assessment
- Updated Biodiversity Development Assessment Report.

A summary of the scope of the updated assessments is provided below.

The findings of the updated assessments have been incorporated (where relevant) into the responses provided in Chapters 5 to 8 of this report, and in the assessment of the proposed amendments described in the Amendment Report.

Updated Noise and Vibration Report

An assessment of the potential noise and vibration impacts of constructing and operating the project was undertaken to support the EIS (see Technical Paper 3 (Noise and Vibration)). Additional assessment has been undertaken, and the report has been updated, to assess the impacts of constructing and operating the amended project, including associated changes to construction activities. To assess these changes, the potential construction and operation noise impacts were remodelled, and the noise and vibration predictions updated.

The construction noise and vibration model was also adjusted to account for the most-affected façade for each building during each construction activity (for example the southern façade of a building could be the most-affected façade for track infrastructure works, the western façade could be the most-affected façade for road works, and the eastern façade could be the most affected façade for bridge works). This is considered a more robust modelling approach, which allows predicted impacts to be more directly compared to those that would be produced by the post-approval assessments.

The modelling also includes a minor increase in the study area to ensure all sensitive receivers near the amended Camellia foreshore to Rydalmere alignment were considered. This resulted in an increase in the size of noise catchment area D (NCA-D) and an increase in the number of sensitive receivers within this noise catchment area for the assessment.

The updated predictions have been taken into account in the responses provided in Chapters 5 to 8 of this report.

Further information about the updated assessment results and the potential noise and vibration impacts of the amended project is provided in section 6.3 of the Amendment Report.

Aboriginal Cultural Heritage Assessment Report

A preliminary Aboriginal cultural heritage assessment report was prepared as Technical Paper 4 (Preliminary Aboriginal Cultural Heritage Assessment Report) for the EIS. The preliminary assessment has been updated, and an Aboriginal Cultural Assessment Report (ACHAR) prepared, to:

- assess the impacts of the amended project site
- include information from additional geotechnical investigations, which provided insights into subsurface conditions and research on past land use in relation to potential archaeological deposits within Sydney Olympic Park
- assess potential impacts on two shell middens identified in the mangroves at Melrose Park in response to information provided by a community member during exhibition of the EIS
- include a detailed cultural values assessment, prepared by an anthropologist and informed by a site inspection and detailed cultural interviews with three Aboriginal cultural knowledge holders (see Appendix G of the ACHAR)
- provide an overview of the test excavation program and findings from the testing completed for one potential archaeological deposit (PAD) at Broadoaks Park
- address feedback received by registered Aboriginal parties during an Aboriginal focus group meeting and the statutory 28 day review period of the ACHAR
- revise assessments of significance and mitigation measures (including measures to prepare a project specific methodology for testing and for salvage, if required).

The ACHAR also addresses suggestions made by Heritage NSW (Aboriginal Cultural Heritage) in their submission (see section 5.6 of this report).

Additional investigations

Additional information provided by Sydney Olympic Park Authority confirmed that three PADs within Sydney Olympic Park identified in Technical Paper 4 (PAD4 Haslams Creek, PAD7 Hill Road West, and PAD8 Brickpit) had been previously disturbed and so no further investigations (i.e. archaeological testing) are required.

Two shell middens were recorded within the mangroves at Melrose Park following a site visit in February 2023 by Aboriginal cultural heritage officers from Transport and a representative of the Metropolitan Local Aboriginal Land Council. The two shell middens have been registered as sites on the Aboriginal Heritage Information Management System (AHIMS) (AHIMS 45-6-4078 and 45-6-4079) and assessed in the ACHAR. Further investigations (archaeological testing) are recommended and committed to by amended mitigation measure AH5 (see Appendix B (Updated mitigation measures)).

Transport engaged an anthropologist to prepare the cultural values assessment for the ACHAR. The assessment was informed by a site inspection and cultural interviews conducted with three Aboriginal cultural knowledge holders in February 2023 (see Appendix G of the ACHAR). The findings of the cultural values assessment have been incorporated into the ACHAR.

Test excavations commenced on 31 October 2022 overseen by archaeologists and Aboriginal Site Officers. The purpose of the test excavations was to assess and inform the archaeological potential of the project site, but excavations were not able to be completed in accordance with the test excavation methodology at the majority of locations due to the presence of asbestos and deep fill. Test excavations were completed at one PAD in Rydalmere (PLR2 PAD5 Broadoaks Park / AHIMS 45-6-4076) with eight artefacts found in fill layers. Based on the results of the test excavation it was concluded that this PAD location is highly disturbed and has no archaeological value.

Testing is still required to be completed at three potential archaeological deposits (PAD1 Ermington Boat Ramp, PAD3 Rydalmere Wharf, and PAD6 Ken Newman Park), two AHIMS midden sites in Melrose Park, and two AHIMS sites in the Parramatta CBD. Mitigation measure AH5 has been amended to capture the requirements for a project-specific methodology and testing to be completed prior to construction (see Appendix B (Updated mitigation measures) of this report).

The additional investigations have informed the responses to relevant issues raised in submissions (see Chapters 5 to 8 of this report).

Further information about the potential Aboriginal heritage impacts of the amended project is provided in section 6.4 of the Amendment Report.

Updated Statement of Heritage Impact

An assessment of potential direct and indirect impacts on built heritage was undertaken to support the EIS (see Technical Paper 5 (Statement of Heritage Impact – Built Heritage)). An updated Statement of Heritage Impact has been prepared to assess the potential impacts on built heritage items within or in the vicinity of the amended project site (described in section 3.3.1 of the Amendment Report) at Camellia and Rydalmere and to consider the proposed refinement of the Atkins Road substation. The assessment was informed by a site inspection.

Further information about the potential impacts of the amended project on built heritage is provided in section 6.5 of the Amendment Report.

Updated Historical Archaeological Assessment

An assessment of the potential impacts on non-Aboriginal archaeology (including maritime archaeology) was undertaken to support the EIS (see Technical Paper 6 (Historical Archaeological Assessment)). An updated Historical Archaeological Assessment has been prepared to map and assess the potential impacts on historical archaeological management units (HAMUs) and maritime archaeological management units (MAMUs) within the amended project site. The assessment has also been updated to:

- incorporate the results of additional geotechnical investigations
- include information on archaeological test excavations undertaken in late 2022

- include a Research Design and Excavation Methodology (see Appendix B of the Updated Historical Archaeological Assessment).

Additional investigations

As described above, archaeological test excavations commenced on 31 October 2022. The excavations started at one HAMU (HAMU 07) but could not be completed safely or in accordance with the Archaeological Research and Excavation Framework prepared for Technical Paper 6, due to the presence of asbestos and deep levels of fill, and the need for Aboriginal test excavations to be completed first.

At HAMU 07 limited evidence of landscape clearance was found in the test trenches that may relate to landscape clearance in the 18th century and so may be part of a State significant archaeological resource related to early farming. However, the test excavation only covered a relatively small area of the overall HAMU and the initial results do not provide a conclusive indicator of the intactness of an archaeological resource across the entire HAMU.

As such, testing is required for four HAMUs within the project site identified as having at least a medium potential for State significant archaeology:

- HAMU 29 Western Eric Primrose Reserve
- HAMU 07 Broadoaks Park
- HAMU 11 Ken Newman Park
- HAMU 15 Ermington Wharf and Archer Park.

Mitigation measures NAH2 and NAH3 have been updated to note the requirement to complete test excavations at the above locations prior to construction and in accordance with the Research Design and Excavation Methodology included in Appendix B of the Updated Historical Archaeological Assessment.

The additional investigations have informed the responses to relevant issues raised in submissions (see Chapters 5 to 8 of this report).

Further information about the potential impacts of the amended project on historical archaeology is provided in section 6.5 of the Amendment Report.

Updated Biodiversity Development Assessment Report

An assessment of the potential impacts on biodiversity was undertaken to support the EIS (see Technical Paper 9 (Biodiversity Development Assessment Report)).

The Biodiversity Development Assessment Report (BDAR) has been updated to consider the potential impacts of the amended project. The updated BDAR:

- includes updated calculations of impacts on native vegetation and estimates of vegetation and species offsets calculated in accordance with the Biodiversity Assessment Method
- considers changes to shadowing and flooding impacts on biodiversity as a result of the amended location of the bridges over the Parramatta River
- describes the further actions that have been undertaken since the EIS to avoid minimise biodiversity impacts (namely the proposed amendments and refinements described in section 4.1 of this report)
- addresses issues raised in submissions received from the Department of Planning and Environment (Environment and Heritage Group) and Sydney Olympic Park Authority (see sections 5.2 and 5.9 of this report).

Further information about the potential impacts of the amended project on biodiversity is provided in section 6.9 of the Amendment Report.

4.2.2 Other assessments undertaken

Supplementary Design, Place and Movement Report

Technical Paper 1 (Design, Place and Movement) was prepared to describe the design, place and movement requirements for the project (as defined by the SEARs) and how these would be met. Technical Paper 1 also described the design development process, and the project's urban design and placemaking vision, objectives and principles.

A Supplementary Design, Place and Movement Report has been prepared to update relevant sections of Technical Paper 1 to reflect the amended project.

Further information is provided in section 3.6 of the Amendment Report.

Supplementary Flooding Report

An assessment of the potential hydrology and flooding impacts of the project was undertaken to support the EIS (see Technical Paper 10 (Hydrology, Flooding and Water Quality)). A Supplementary Flooding Report has been prepared to assess the potential changes to flooding impacts as a result of the amended project.

Further information about the flooding impacts of the amended project is provided in section 6.10 of the Amendment Report.

Construction method for the bridges over the Parramatta River

As described in section 5.5.2 of the EIS, construction access into the Parramatta River is required to build the proposed new bridges between Camellia and Rydalmere and between Melrose Park and Wentworth Point. The proposed bridges span the Parramatta River at locations where there are existing constraints to access, environmental considerations, and a range of surrounding land uses. Several design and construction methods were considered in section 5.5.2 of the EIS for the in-water construction of the bridges to minimise impacts on sensitive areas, including bed sediments, vegetation and foreshore areas of the Parramatta River.

Since exhibition of the EIS, Transport has undertaken further review of the proposed in-river construction methods. Based on this review, Transport has confirmed that the construction method described and assessed in the EIS is feasible and adequately considers the key aspects that would have the potential to cause impacts. The following was confirmed as part of this review:

- No dredging would be required to construct the bridges.
- Piling for the temporary working platforms and bridge piers would result in minimal excess material (less than 3,000 m³), which would be managed consistent with the approach described in section 2.3.5 of the updated project description (see Appendix A of the Amendment Report).
- Barges would be used to lift and install precast bridge segments where required, and to deliver bridge segments and other construction materials from an existing purpose-built facility such as at White Bay.
- Once works are completed the temporary working platforms, including piles, would be removed.
- Closures of the navigational channel to undertake works would be as per those described in section 7.7.5 of the EIS.

Social impact – additional assessment

An assessment of the potential social impacts of the project was undertaken as part of the EIS (see Technical Paper 7 (Social Impact Assessment)). The social impact assessment was undertaken in accordance with the SEARs, which required consideration of (SEAR 8.1(c)) the social impacts that the project may have on people’s culture. However, potential impacts on Aboriginal culture were not able to be confirmed as part of the assessment as consultation with Aboriginal stakeholders was ongoing.

Since exhibition of the EIS, further consultation has been undertaken with Aboriginal stakeholders, as described in section 4.2.1 of this report. The outcomes of these consultation activities, and the cultural values assessment described in section 4.2.1, were reviewed to inform the identification, description and assessment of impacts on Aboriginal culture. The results are provided in Table 4.2 according to the format used to describe impacts in Technical Paper 7, which allocates the category of the potential impact in accordance with the categories specified in the *Social Impact Assessment Guideline* (DPIE, 2021b), and the significance of impacts ranked as shown on Figure 14.1 of the EIS.

Table 4.2 Social impacts on culture for Aboriginal communities and stakeholders

Social impact summary	Affected precincts in social locality	SIA impact category ¹	Significance of impact
Potential impacts on local Aboriginal cultural values during construction of the project have the potential to lead to spiritual and cultural impacts for local Aboriginal communities.	All precincts	Culture	High Negative
Potential opportunities to enhance local Aboriginal cultural values and outcomes for local Aboriginal communities and stakeholders through the project design and delivery.	All precincts	Culture	Medium Positive

Note: 1. Category of potential impact according to the *Social Impact Assessment Guideline for State Significant Projects* (DPIE, 2021b)

In accordance with new mitigation measure SE12 (see Appendix B (Updated mitigation measures) of this report) an Aboriginal community and stakeholder engagement strategy and action plan will be prepared to define the strategies that will be implemented to minimise impacts on cultural values and ensure that:

- information about the project is shared with Aboriginal stakeholders and communities in a timely manner
- local Aboriginal cultural and community values are identified and understood
- opportunities to reflect Aboriginal community and cultural values are identified and implemented.

Contamination – additional investigations

Additional contamination investigations were undertaken by WSP between May and September 2022. The investigations involved:

- obtaining soil samples from 149 geotechnical and contamination boreholes which were sited to target the amended project site, including 14 over water geotechnical boreholes
- conversion of eight boreholes to groundwater monitoring wells and groundwater gauging, purging and sampling from these eight wells
- analysis of soil, sediment and groundwater samples for contaminants of potential concern
- comparing the analytical results to health and environmental screening criteria.

An Interpretive Contamination Report was then prepared by Nation Partners, which involved:

- a detailed review of available contamination, groundwater and geotechnical data for the project
- consolidating and analysing the data to characterise contamination and acid sulphate conditions
- developing conceptual site models for construction and operation to identify potential contamination sources, receptors and exposure pathways and assigning qualitative risk rankings to areas in the project site to inform the appropriate level of mitigation
- identifying data gaps or areas where further assessment should be undertaken to inform remediation and management requirements
- providing recommendations for further assessment, management and remediation measures to facilitate construction and operation.

Further information regarding the findings of the WSP investigation and the additional works undertaken by Nation Partners is provided in the *Interpretive Contamination Report* (Nation Partners, 2023).

Key outcomes

The key outcomes of the contamination investigation undertaken by WSP are as follows:

- Concentrations of total recoverable hydrocarbons were recorded in soil samples collected from three borehole locations (one in Camellia, and two in Wentworth Point in the vicinity of the Woo-La-Ra Landfill) that exceeded the nominated criteria. The borehole location in Camellia was outside the project site.
- Total cyanide concentrations in excess of the nominated criteria were recorded in soil samples at two locations in the vicinity of the Woo-La-Ra Landfill in Wentworth Point.
- Asbestos was detected in 11 samples collected from eight borehole locations, with all samples collected at depths of less than 1.5 metres below ground surface.
- Samples with potential acid sulphate soil / acid sulphate soil that exceeded the action criteria for coarse textured soils (ASSMAC, 1998) were collected from depths less than three metres below ground surface at five locations (two in Parramatta River, one in Ken Newman Park, Ermington, and two in Wentworth Point).
- Coal tar was detected to be present in asphalt samples collected at two locations within public roads in Ermington.
- Dioxin concentrations in sediment samples collected from Parramatta River were generally comparable to the sediment results reported by Coffey (see Chapter 18 (Soils and contamination) of the EIS).
- Concentrations of per- and poly-fluorinated substances were recorded above the human health criteria for recreational exposure to water in one groundwater well located on the north side of Parramatta River.
- Concentrations of nutrients, dissolved metals and/or total recoverable hydrocarbons were detected above the adopted ecological assessment criteria, but below the human health criteria for recreational exposure to water, in all groundwater samples collected.

Based on the review of previous investigations, including the contamination investigation undertaken by WSP, Nation Partners identified the following potential sources of contamination as being present within the project site:

- Contamination of fill materials, soil and groundwater in Camellia resulting from historical and current industrial activities, waste disposal practices, and land reclamation using contaminated fill materials.
- The presence of heavy metals, total recoverable hydrocarbons and dioxins in sediments in the Parramatta River.
- Potential asbestos containing materials in fill materials used for land reclamation and/or ground levelling.
- Contamination of fill materials, soil and groundwater in Wentworth Point and Sydney Olympic Park resulting from historical industrial activities and the presence of multiple landfills and associated leachate management infrastructure, including the potential presence of landfill gas.
- Acid sulfate soils and/or potential acid sulfate soils in soils and sediments in areas within and adjacent to Parramatta River and in Ken Newman Park, Ermington.

The above findings are largely consistent with the areas of contamination concern described in Chapter 18 of the EIS.

Nation Partners then used the results of previous investigations and the outcomes of the conceptual site models to assign qualitative risk rankings to specific areas or construction scenarios for the project, which allowed commensurate responses or recommendations to minimise potential impacts from contamination to be identified. These are either consistent with the mitigation measures for the project (see Appendix B (Updated mitigation measures) of this report), or would be captured by implementing the mitigation measures. The following mitigation measures have been amended to capture the recommendations made by Nation Partners:

- Mitigation measure CS1 has been amended to include the need for targeted investigation in the north of Wentworth Point, as concentrations of total recoverable hydrocarbon and cyanide above the adopted land use criteria were identified in samples collected from boreholes drilled by WSP in this location.
- Mitigation measures CS2 and CS3 have been amended to require the exact location, layout and functioning of the asbestos containment cells in Camellia and the leachate management systems in Sydney Olympic Park to be confirmed so that the potential for the project to impact these systems can be better understood.

In accordance with the approach described in section 18.6.1 of the EIS, Transport has engaged a site auditor accredited under the site auditor scheme under the *Contaminated Land Management Act 1997 (NSW)* (the CLM Act) to review the scope and results of the further assessment undertaken by WSP, and confirm it is fit for purpose. Based on consultation with the EPA the site auditor also undertook a review of the appropriateness of the risk ratings/rankings provided in Chapter 18 of the EIS and in the *Interpretive Contamination Report* and the associated mitigation measures and recommendations.

The site auditor provided advice in the form of an interim site audit statement and concluded that:

...many, but not all, of the aspects of contamination assessment under the CLM Act framework required to be considered by a site auditor have been addressed in the investigation reports. However, the EIS and Nation Partners (2023) propose means to address the data gaps and uncertainties via further investigation and remediation or management during detailed design and construction phases of the project. In high-risk areas of the project site such as at Camellia, Wentworth Point and Sydney Olympic Park, these are proposed to be conducted under the CLM Act framework and site audit, which should consider site suitability. This is considered acceptable provided the recommendations are adopted and implemented appropriately.

4.2.3 Other information

Design change flexibility provisions

The design and construction method presented in the EIS and Amendment Report define a project that provides a sound basis for assessing the potential impacts of the project and inform the risks and issues potentially associated with the project. The level of information is sufficient to address the requirements of the SEARs and enable the Department of Planning and Environment to assess the project as part of the critical State significant infrastructure approval process in accordance with Division 5.2 of the EP&A Act.

As described in sections 6.1 and 23.3.2 of the EIS, the project would be subject to ongoing refinement during further design development. Section 23.3.2 of the EIS describes the process that Transport and its contractor(s) would follow where refinements are identified.

Flexibility has also been provided within the EIS and Amendment Report assessments. Having a reasonable degree of design and construction methodology flexibility for particular elements of the project in the assessment and approvals process can provide a range of benefits. These include the ability to integrate innovations, new technology, respond to identified constraints, and allow improvements to minimise impacts on the environment and community.

Since exhibition of the EIS, Transport has undertaken further work to confirm the project elements where it would be appropriate to allow a degree of design flexibility to ensure that design development can respond to:

- design principles and objectives described in Technical Paper 1 (Design, Place and Movement)
- urban design requirements being developed in accordance with these design principles and objectives
- updated mitigation measures (see Appendix B of this report)
- conditions of approval.

This expands on the approach described in section 23.3.2 of the EIS.

Transport's proposed flexibility provisions for the project, including the approach to applying these principles, are provided in Appendix E (Flexibility provisions) of this report.

Construction stages and construction environmental management framework

Chapter 7 (Project description – construction) of the EIS describes the project's proposed approach to construction and notes that the project may be staged, depending on future decisions regarding the delivery strategy. Since exhibition of the EIS, Transport has elected to stage construction of the project to align with the procurement and delivery strategy. The project construction stages are anticipated to be:

- Stage A – Bridge between Melrose Park and Wentworth Point
 - pre-construction preparation and site establishment, including heritage investigations
 - utilities relocation
 - main construction works
- Stage B – Main alignment construction works and supply, operate and maintain system operation construction works.

Further information regarding the stages is provided within Appendix F (Staging Report) and Appendix G (Construction Environmental Management Framework) of this report. Appendix F details the construction activities which would occur within each stage and the mitigation measures which would be implemented as appropriate to the scope, risks and timing of each stage. This is supported by the risk assessment within Appendix G, which also provides a framework for the management of environmental impacts within each stage, considerate of the risk level.

4.3 Clarifications

In response to issues raised in the submissions and during ongoing stakeholder and community engagement, this section clarifies information included in the EIS related to the following:

- primary project working hours (see section 4.3.1)
- provision of power supply to light rail vehicles and inclusion of wire-free sections (see section 4.3.2)
- managing impacts on trees (see section 4.3.3)
- impacts on Ermington Boat Ramp (see section 4.3.4)
- flood management objectives (see section 4.3.5)
- design excellence and bridge design (see section 4.3.6).

The clarifications provided below include additional information on how these matters would be managed based on further design development and construction planning undertaken since the EIS was exhibited.

It is noted that none of these clarifications are changes to the design or construction method of the project as described in the EIS. Further information regarding these clarifications is provided below.

4.3.1 Primary project working hours

What working hours are Transport proposing for the project?

Recommended standard hours

The *Interim Construction Noise Guideline* (DECC, 2009) provides the following recommended standard hours for normal construction work:

- Monday to Friday: 7am to 6pm
- Saturday: 8am to 1pm
- no work on Sundays or public holidays.

The *Interim Construction Noise Guideline* notes that these recommended standard hours are non-mandatory and that work should be scheduled during these hours unless work at other times can be justified.

Section 2.3 of the *Interim Construction Noise Guideline* states that there are some situations where construction work may need to be undertaken outside of these hours. The guideline notes that, in general, only works undertaken on public infrastructure need to be undertaken outside the recommended standard hours, and that the need is typically based on the requirement to maintain the operational integrity of public infrastructure, as these works provide a benefit to the greater community (that is, more than just local residents). The guideline also notes that the consent authority may impose more or less stringent construction hours.

Primary project working hours

As described in section 7.5 of the EIS, working hours are proposed for the project that would extend the recommended standard hours outlined in the *Interim Construction Noise Guideline* (noted above) to:

- Monday to Friday: 7am to 7pm
- Saturday: 7am to 7pm
- Sundays and public holidays: 7am to 7pm.

Transport also proposes that, where there is the potential for construction noise impacts, no work would be undertaken in that area one weekend per month, except in the following circumstances:

- where the substantial majority of potentially affected receivers agree that the work can be undertaken
- where construction works do not exceed the noise management levels specified in the *Interim Construction Noise Guideline* (Table 3) at residential sensitive receivers
- where emergency work is required to avoid the loss of life or damage to property, or to prevent environmental harm.

High noise and vibration intensive works would be limited to the recommended standard working hours as far as practicable.

Why are changes to the recommended standard working hours proposed?

Balancing the need to undertake construction efficiently and safely with the potential for community impacts

Transport acknowledges that construction has the potential to affect the communities in which it is undertaken and that amenity impacts can affect people's quality of life, health and wellbeing.

Transport also understands that there is the potential for some residents to experience construction fatigue due to other projects being constructed nearby, and that this too can impact some people's wellbeing.

Potential amenity impacts, including noise and vibration; traffic, transport and access; air quality; and visual impact, were a key focus for the EIS and a comprehensive range of specialist technical assessments was carried out to consider these impacts on the community,

Balancing the potential impacts of construction with the delivery of projects that ultimately benefit local communities is complex. While amenity impacts are an unavoidable part of major projects such as Parramatta Light Rail Stage 2, Transport works hard to minimise impacts on the community, while also ensuring the works are undertaken as safely and efficiently as possible.

The proposal to construct the project during periods other than the recommended standard hours outlined in the *Interim Construction Noise Guideline* requires a strong justification to be provided. In the context of the above issues, the primary project working hours are proposed to:

- reduce the duration and associated impacts of construction in any one location
- facilitate working in road corridors safely and efficiently
- facilitate special event planning.

Further information about these aspects is provided below.

Reducing the duration of construction in any one location

Data from the project's community and stakeholder engagement (described in Chapter 8 (Community and stakeholder engagement) of the EIS) indicated support for reducing the overall construction period. This provides an opportunity for Transport to propose options to meet this request from the community. In response to requests for a shorter overall construction period, Transport proposed a small increase in working hours above the *Interim Construction Noise Guideline* recommended standard hours to shorten the length of construction as far as practicable.

The extended construction hours could reduce the duration of amenity impacts (including noise, access, etc) in some circumstances, such as for receivers close to trackwork with no major structures, as the work front would move quicker along the alignment. It is estimated, at this stage of the design process, that constructing the project during the primary project working hours would allow up to about 25 per cent

more time for construction activities in a working week, potentially reducing the overall construction period.

Working in road corridors

The project would be constructed along road corridors for most of its length. Road corridors are used by a range of vehicles, pedestrians and cyclists. Changing/disrupting access along these corridors has the potential to affect access to other locations, and access to properties located on the corridor where the work is being undertaken. It also has the potential for safety impacts – for road users and construction workers.

The primary project working hours provide flexibility to program works within the road corridor at times when traffic volumes are lower (for example, prior to and following peak traffic periods), reducing the potential for disruption to the general public and providing a safe working environment for workers.

Numerous utilities are also located within the road corridor, and constructing the project would include protecting and/or adjustments to utilities in work locations. The primary project working hours provide flexibility to minimise potential disruptions to critical utilities during times of greatest needs, such as late evening and night time periods.

Special event planning

Construction during the primary project hours would enable works within or with the potential to affect locations such as the Parramatta CBD, Sydney Olympic Park (including Sydney Showground) and Rosehill Gardens Racecourse to be planned around special events by permitting additional flexibility within the permissible construction hours. Where special events are scheduled, works could be programmed to be undertaken in the additional hours in each day, allowing a reduction or pause in works during the special event period. An example of this is a sporting event that may require works not be conducted on a particular weekday afternoon. The works planned for this period could be moved to Saturday afternoon or completed during the shoulder period of the other weekdays (i.e. after 5pm).

How do the primary project hours differ from the standard approach to out-of-hours work, and how and when would these hours be used?

The primary project hours differ from the standard approach to out-of-hours work in that they incentivise the contractor to work during the 7am to 7pm periods rather than seeking approval through the out-of-hours work process to undertake works that may extend into the night time period. The incentives arise from the need to obtain fewer approvals, staff allocation benefits and construction efficiencies. The primary project hours also allow flexibility for the contractor to complete works that may need additional time on a given day, such as long-duration concrete pours, without needing to seek additional approvals that can delay the works.

A similar approach was implemented during construction of Parramatta Light Rail Stage 1, which significantly reduced the number of nights worked and the associated noise and access impacts on the community.

Transport would seek to minimise impacts by scheduling work during the recommended standard hours. However, the extended construction hours would be used in circumstances such as the following:

- to complete road works in the early evening rather than overnight
- to undertake utility works outside of peak usage periods
- to undertake works outside of planned special events (as noted above)
- to undertake works that need to be completed within the same day.

How has the community been consulted on the proposed primary project working hours?

Consultation for the project

The community was engaged to determine if the primary project working hours was an acceptable option to reduce the overall construction period. Requests for feedback were sought from an extensive number of residents and local community members along the alignment. This included an online survey for feedback that was:

- distributed via letterbox drop to about 7,000 households along the alignment, which had been identified as part of the noise and vibration assessment as having the potential to experience increased noise levels (greater than 5 dBA above background levels) during construction
- emailed to over 1,500 community members
- placed on social media with a reach of 12,000 people.

The following types of questions were asked in the survey to ascertain the above:

- Would you support extended construction hours (7am -7pm) on weekdays, weekends or Sundays and/or public holidays?
- Do you think extended construction hours would impact your day-to-day lifestyle?
- If extended construction hours were to be implemented, what mitigations would you recommend?

A total of 257 responses were received from community members. The survey results found:

- about half of respondents believed the extended construction hours would not impact their day-to-day lifestyle
- 75 per cent of respondents supported the primary project working hours during weekdays
- 67 per cent of the respondents supported the primary project working hours on Saturdays
- 53 per cent of respondents supported the primary project working hours on Sundays and/or public holidays.

Key activities to seek feedback on noise and vibration aspects have also included the following:

- A social impact and outcomes online survey – this survey was undertaken between November 2021 and January 2022, and asked respondents to rate potential impacts (including noise and vibration) as very significant, significant, neutral, insignificant, very insignificant or do not know. The survey also asked about what time of day respondents were most concerned about (day time, night-time, both or none of the above).
- A ‘Have Your Say’ survey – this survey was undertaken between May 2022 and July 2022, and asked respondents to indicate their level of concern about different construction impacts (including noise and vibration) and if they were concerned about potential impacts associated with day works, evening works, night works, all of the above, or none of the above, along with feedback on suggested measures.

Further information on the outcomes of the above surveys is provided in sections 3.3.3.2 and 3.7.7.2 of Technical Paper 3 (Noise and Vibration).

Public exhibition of the EIS also provided the opportunity for the broader community and other stakeholders to provide comments in relation to the primary project construction hours. In total, 91 submissions were received from members of the public. Of these, six submitters raised issues that were specific to the proposed extended construction hours:

- two community members supported the primary project working hours so that the project could be completed as soon as possible

- four community members supported the primary project working hours during the weekdays, but not on the weekends/Sundays.

Consultation during construction of Parramatta Light Rail Stage 1

The selection of the primary project working hours has also been informed by feedback received during construction of Parramatta Light Rail Stage 1.

A variation was sought to the environment protection license (EPL number 21347) to construct Stage 1 to enable extended out-of-hours work at the intersection of Church Street and George Street, Parramatta in June and July of 2021. Stakeholder consultation was undertaken with potentially affected receivers, including businesses and residents, via a comprehensive door knock campaign, to request feedback on the proposed extension of hours. A total of 126 stakeholders contacted (98 per cent) (of which the majority were commercial operators) had no objection to the proposed hours. One stakeholder objected.

For the works at the intersection of Church Street and Phillip Street, Parramatta, similar consultation was undertaken. A total of 62 stakeholders contacted (94 per cent) had no objection to the proposal. Four stakeholders objected. Again, the majority of respondents were commercial operators.

Stakeholders were provided with additional information regarding the works program, where relevant:

- due to the nature of utility relocation works, safety risks and impacts on traffic, high noise activities are unavoidable at night
- duration of night work schedules, scheduling of noisy works and link to weekly works
- explanation of works being undertaken
- explanation of the plant and equipment being used
- explanation of Parramatta Connect (Parramatta Light Rail Stage 1 construction contractor) Construction Noise and Vibration Management Sub-plan, noise modelling and noise monitoring.

Feedback was requested on the mitigation measures that had been implemented for their suitability and effectiveness. The respondents were satisfied with the information provided and were supportive of the duration reduction to the construction program as a result of the extended hours.

How will construction during extended hours be managed and will the community continue to have a say?

The proposal to construct the project during periods other than the recommended standard hours outlined in the *Interim Construction Noise Guideline* requires negotiation with the affected community.

Transport is committed to ongoing consultation with the community, including in relation to the potential for impacts during construction, for work during the primary project working hours and for out-of-hours work.

In accordance with the approach to managing amenity impacts described in section 14.6 of the EIS, comprehensive and appropriate communication and consultation with the community and other key stakeholders would play a key role in managing the potential for impacts during construction, including during extended hours. Effective communication and engagement are fundamental to reducing risk and minimising potential impacts. Identifying, engaging and effectively communicating with stakeholders is critical to the successful delivery of the project. Consistent with, and in accordance with mitigation measure SE1, the Community Communication Strategy provided in Appendix D will be implemented to guide the management and delivery of community and stakeholder engagement in the lead up to, and during, construction and ensure that opportunities for input are provided and feedback from the community is encouraged.

Transport is committed to avoiding or minimising amenity impacts from all construction projects under its control, including Parramatta Light Rail. Where possible, specific works will be prioritised to minimise the duration of construction, and community feedback will be taken into account when designing construction programs.

In relation to the potential for noise and vibration impacts, Transport recognises the importance of engaging with the community during the development of noise mitigation strategies, and the provision of information regarding the noise and vibration impacts of Transport's projects.

The *Construction Noise and Vibration Strategy* (Transport for NSW, 2019a) describes Transport's approach to mitigate and manage construction noise and vibration for infrastructure projects and applies to light rail infrastructure works. Of relevance to undertaking construction during extended hours, key objectives of the *Construction Noise and Vibration Strategy* include:

- encouraging the undertaking of works during the recommended standard hours, where reasonable and feasible
- ensuring proactive consultation with the community and other stakeholders, to facilitate effective project delivery with balanced stakeholder impacts
- implementing reasonable and feasible noise and vibration mitigation measures on all projects that take into consideration the time of works and the likely extent and duration of impact.

A range of mitigation measures would be used to reduce noise and vibration during the extended construction hours, including:

- selecting machinery and planning activities that would minimise construction impacts
- installing noise mitigation measures where possible, such as noise blankets and non-tonal reversing alarms (these make a low noise similar to a 'quacking' sound)
- providing respite periods
- limiting high vibration-causing activities to standard construction hours, where possible
- notifying nearby residents in advance of noisy or vibration-generating works
- noise and vibration monitoring to ensure works are kept within allowable limits, undertaken at locations identified by the project's acoustic and vibration consultants.

The project-specific mitigation measures proposed to minimise noise and vibration and traffic and access impacts during construction provide commitments to consult with the community in relation to the potential impacts and management approaches. In particular, mitigation measure NV6 provides that 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)).

In accordance with mitigation measure NV6, the results of the assessments will be documented in construction noise and vibration impact statements. The statements will confirm predicted impacts at relevant receivers to assist with the selection of feasible and reasonable management measures. 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*.

Mitigation measure NV6 has been amended to commit to:

- undertaking the location and activity-specific construction noise and vibration assessments based on a more detailed understanding of construction methods, including the size and type of construction equipment, duration and timing; and detailed reviews of local receivers, as required
- informing potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, and providing them with details of the complaints management system (developed in accordance with mitigation measure SE3).

Other key mitigation measures include:

- Mitigation measure NV5 provides that the construction noise and vibration management plan, which will detail processes, responsibilities and measures to manage noise and vibration and minimise the potential for impacts during construction, will be aligned with the results of community consultation. The plan will be prepared in accordance with the *Construction Noise and Vibration Strategy*, which defines the requirements in relation to community consultation and notification.
- Mitigation measure NV8 provides that appropriate respite periods will be identified, in consultation with the community and in accordance with the *Construction Noise and Vibration Strategy*, for work with the potential to result in noise levels above 75 dBA and/or that needs to occur outside the primary project working hours.
- Mitigation measure NV12 provides that 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 in section 7.5 of the EIS as far as practicable, and in consultation with the community and key stakeholders (including the NSW EPA) (as noted below).
- Mitigation measure TT12 provides that 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. Additional measures identified as an outcome of consultation will be implemented during construction, where reasonable and feasible.

Out-of-hours work subject to an environmental protection licence would be managed in accordance with the provisions of the licence and the requirements of the NSW EPA.

Works subject to exemptions under the EPL (including low noise impact and emergency works) will be managed in accordance with an out-of-hours work protocol (required by mitigation measure NV11). The out-of-hours work protocol will include feasible and reasonable measures and communication requirements in accordance with the *Construction Noise and Vibration Strategy*. Measures will focus on proactive communication and engagement with potentially affected receivers, provision of respite periods, and/or alternative accommodation for defined exceedance levels.

Scheduling works

The proposed primary project working hours would be consistent with the aims of the *Interim Construction Noise Guideline* and the *Construction Noise and Vibration Strategy*, which establish a hierarchy for works to occur during less noise sensitive periods. Section 6.1.1 of the *Construction Noise and Vibration Strategy* notes that where work cannot be scheduled during the recommended standard hours, a hierarchy of working hours outside the standard hours should apply.

As far as practicable, and as described in section 7.5 of the EIS, Transport would seek to minimise impacts by scheduling work during the recommended standard hours and then according to the following hierarchy of preferred working hours for work outside recommended standard hours:

- Saturday afternoon periods between 1pm and 6pm
- Sunday and public holiday day periods between 8am and 6pm

- weekday evening periods between 6pm and 7pm
- weekend evening periods between 6pm and 7pm
- weekday evening periods between 7pm and 10pm
- weekend evening periods between 7pm and 10pm
- weekend night periods between 10pm and 8am
- work during the weekday evening and night, scheduling the noisiest work first (between 6pm and 10pm) to minimise sleep disturbance in the night (between 10pm and 7am)
- all other times outside the recommended standard hours.

4.3.2 Provision of power supply to light rail vehicles and inclusion of wire-free sections

What are the main options for powering light rail vehicles?

Electricity in the form of 750 volt direct current (DC) is required to power the light rail vehicles. Five traction power substations would be constructed along the alignment to convert the 11 kilovolt alternating current provided by Endeavour Energy or Ausgrid to the required DC voltage.

There are three feasible options to power light rail vehicles:

- Overhead wiring – where overhead (also known as catenary) wires connect to the light rail vehicles via a pantograph on the roof of the light rail vehicle and distribute the electricity from the substations to the light rail vehicles.
- Onboard energy storage system – comprising of batteries, supercapacitors or a combination of both installed within the light rail vehicles.
- A third rail – (also known as a live rail, electric rail or conductor rail), where electric power is provided through a semi-continuous rigid conductor placed alongside or between the rails of the track.

What are the preferred options for the project

Transport has developed light rail vehicles and light rail network standards that strive to improve interoperability across the fleet. Where possible, systems are being rationalised and made consistent across new light rail vehicle fleets in NSW.

The Parramatta Light Rail network (i.e. Parramatta Light Rail Stage 1 and the project) is intended to be operated by one operator with a homogenous fleet (which does not constrain vehicles to isolated sections) to maximise operational, maintenance and services efficiencies on the network. As such, the project will be designed and built to suit operations by the same light rail vehicles as Parramatta Stage 1.

An in-ground third rail system was not considered viable for the following reasons:

- The system is not compatible with the current Parramatta Light Rail Stage 1 light rail vehicles.
- Use of a proprietary product could limit future decisions on network expansions, asset replacements, and competitive markets.
- The system is less resilient to minor surface water events and heavier traffic loads.

Therefore, the use of overhead wiring with an onboard energy storage system comprising batteries (which may be supplemented by capacitors) was determined to be the preferred solution to the provision of power supply for the project and is also being used for Parramatta Light Rail Stage 1. Note that super capacitors are best for high power, short duration traction efforts. These may be offered in concert with batteries, which can typically sustain a longer discharge period at lower power.

Light rail vehicles on the Parramatta Light Rail network would be powered using overhead wiring, with onboard batteries used in the wire-free sections that are charged via the overhead wiring. Static in-ground chargers could also be used at terminus locations to supplement the overhead wiring, or if the terminus is in a wire-free section.

What are the benefits and constraints associated with wire-free?

Overhead wiring provides the most reliable power source for light rail vehicles, particularly on steeper grades or within complex operating environments.

However, wire-free sections can provide a number of benefits including:

- less above ground infrastructure (wires) resulting in better visual and urban design outcomes
- reduction in potential impacts on aerial fauna, such as bats, migratory birds, raptors, etc
- minimises visual impacts on heritage items and heritage settings
- reduced need for street tree removal and pruning, and increased potential for tree planting and larger tree canopies.

While there are benefits associated with having wire-free sections, the selection of wire-free sections must carefully balance these benefits with the potential impacts on safety and operation. Battery capacity is finite, limited by the size, weight and technology. Factors that impact power requirements include gradient, the number of stops and traffic lights, speed, vehicle loading, air conditioning load and number of turns, distance, and travel time. Increased extents of wire-free sections increase potential compromises to critical operational factors including:

- Journey time increases and reduced punctuality – additional in-service time may be required to charge batteries sufficiently to safely pass to the next wire-free section. Acceleration and speed may also be limited.
- Service resilience – without continuous power vehicles can be at risk of being stranded when incurring long delays, such as during major events, traffic incidents and passenger emergencies.
- Service reliability – more stress on key assets potentially increases failures in service.
- A reduction in patronage – patronage may reduce due to reduced punctuality and reliability, which may cause an increase in congestion on other modes of transport.
- Safety – managing the above factors may affect network safety, which could result in events such as removing passengers or recovery of stranded vehicles, and reduced reliability and resilience in operations.

The factors noted above are important considerations that need to be taken into account when considering the length and location of wire-free sections, and where overhead wiring sections should be located to charge the batteries.

Noting the need to maintain interoperability with the Parramatta Light Rail Stage 1 systems and vehicles, longer sections of wire-free running also become increasingly difficult to achieve without compromising operations and costs.

What was proposed in the EIS?

As described in section 6.7.4 of the EIS, power would be distributed from the substations to the light rail vehicles via overhead wiring strung on poles. Poles would be located so as not to obstruct existing infrastructure, footpaths or cycle routes.

The overhead wiring structures would be located and designed based on site characteristics and operational requirements. The poles would typically require foundations and associated electrical infrastructure.

The final configuration and design of the overhead wiring would be determined during design development in consultation with key stakeholders. This would include consideration of elements such as integration of street lighting and traffic signals to minimise visual clutter.

Wire-free sections of alignment would be provided along Dawn Fraser Avenue between the Jacaranda Square and Carter Street stops. Further investigations would be conducted during design development in consultation with key stakeholders to assess the potential to incorporate wire-free design in other locations. This could include visually sensitive environments or areas where existing above-ground infrastructure and significant street trees need to be retained. This commitment is confirmed by new mitigation measure LV3.

Overhead wiring, tracks and other infrastructure would be designed to mitigate risks associated with high voltage cabling and potential earth leakage.

What issues and concerns have been raised / potential impacts identified?

A number of agencies and submitters raised queries, recommendations or issues relating to the proposed power supply for the light rail vehicles and the use of wire-free sections.

The issues raised can be generally categorised as those that relate to:

- visual context and/or impacts
- potential biodiversity impacts
- operational issues.

The issues raised are discussed further below. It is noted that when the agency advice and submissions are reviewed collectively, the submissions suggest that, in total, up to 80 per cent of the project alignment should be made wire-free, which would not be feasible for the reasons outlined above. City of Parramatta Council also made a recommendation to provide wire-free running in the future Camellia town centre. This section is not part of the project and overhead wiring has already been installed in this location for Parramatta Light Rail Stage 1.

Visual context and/or impacts

City of Parramatta Council noted that wire-free (catenary free) sections can considerably improve the visual impact of the project by limiting most infrastructure to track level. Council recommended that wire-free running should be provided in high density residential areas, and specifically within the Ken Newman Park reserve and adjoining linear green space.

Sydney Olympic Park Authority noted that wire-free track should be installed adjacent to the State Abattoir heritage precinct and parklands to minimise the potential for visual impacts. Sydney Olympic Park currently has no overhead wiring, with the exception of a short distance of high voltage cables at the northern end of Wentworth Point.

Royal Agricultural Society noted that the operation of light rail with overhead wiring will create visual impacts at the intersection of Australia Avenue and Dawn Fraser Avenue where a significant number of poles and overhead wiring would be required adjacent to an open space (Jacaranda Square).

A number of community submitters requested that the project include wire-free power in Wentworth Point, to ensure it is in keeping with the existing appearance and aesthetic of the precinct as a whole.

A community submitter requested that the track through Ken Newman Park and along Boronia Road (between the River Road and Melrose Park stops) be a wire-free green track to fit in with the surrounding area.

Submitters also requested that wire-free sections be provided in Sydney Olympic Park, including along Australia Avenue and Dawn Fraser Avenue, to support stronger placemaking outcomes through the Sydney Olympic Park town centre.

Biodiversity impacts

The Department of Planning and Environment (Environment and Heritage Group) disagreed with the statement in the EIS about the relatively minor increase in risk of injury and mortality from overheard wiring for raptors (birds of prey), migratory species, Grey-headed Flying-foxes, and the White-bellied Sea-eagle. Additionally, Environment and Heritage Group noted that the mitigation measures should be amended to include the requirement to remove/minimise the use of overhead wiring from the new bridges.

Sydney Olympic Park Authority noted that installing wiring adjacent to the Millennium Parklands and over the bridge between Melrose Park and Wentworth Point poses a risk to flying fauna, and that no firm commitment is made in the EIS to avoid wiring in ecologically-sensitive or parklands areas to reduce ecological risk. Sydney Olympic Park Authority recommended that overhead wiring should be avoided adjacent to the parklands, commensurate with the parklands setting, and that any decision to install overhead wiring in these locations should be appropriately justified.

Operational issues

Submitters stated that wire-free power supply would not be required or should not be used. Issues raised include:

- There is no need to waste money on 'wire-free' sections.
- The project should fully operate with overhead wiring to reduce costs, reduce incidents and safety issues, and improve efficiency and reliability for the overall network.

How is Transport responding?

Transport acknowledges the interest by stakeholders and the community in providing additional wire-free sections and the benefits and constraints of wire-free sections.

In addition to the commitment to a wire-free section along Dawn Fraser Avenue between the Jacaranda Square and Carter Street stops Transport has conducted further consultation with key stakeholders to elicit their preferences on additional wire-free sections.

While it is not possible to deliver all of the wire-free sections suggested in submissions, a greater extent of wire-free can be achieved. Further investigation is required to assess the technical and operational feasibility of prioritised sections so that Transport can determine the appropriate balance of benefit and compromise while seeking innovations during further design development.

The design development of wire-free sections would be informed by several technical assessments and would consider the factors described above in the benefits and constraints section of this clarification.

What commitment/s is Transport making?

Opportunities to provide additional wire-free sections will be actively pursued through design development and following contractor engagement, in accordance with new mitigation measure LV3.

Consultation will continue with key stakeholders including City of Parramatta Council and Sydney Olympic Park Authority and their input will be considered in determining the prioritisation of additional wire-free sections. During this process, the potential for biodiversity impacts, visual impacts and landscape outcomes would be considered, along with technical constraints and opportunities.

4.3.3 Managing impacts on trees

How were impacts on trees assessed in the EIS?

The EIS included an arboricultural assessment to assess the impacts on street trees and 'planted vegetation'. The planted vegetation was mapped as part of initial biodiversity surveys. However, the vegetation does not meet the statutory thresholds for participation in the NSW Biodiversity Offsets Scheme and so were not assessed as part of Technical Paper 9 (Biodiversity Development Assessment Report).

The arboricultural assessment, which was undertaken by a qualified arborist, was informed by a survey of street trees and planted vegetation within and immediately adjacent to the project site. For the purposes of the assessment, and in accordance with the SEARs, a 'tree' was defined as per Australian Standard AS 4980-2009 *Protection of trees on development sites* (AS 4980-2009) as a 'Long lived woody perennial plant greater than (or usually greater than) three metres in height with one or relatively few main stems or trunks'.

The results of the assessment were described in the Arboricultural Report, which forms Appendix B to Technical Paper 1 (Design, Place and Movement). The results were summarised in Chapter 15 (Landscape and visual impacts) of the EIS.

How would the project impact on trees?

The arboricultural assessment assumed a 'worst-case' scenario as a starting point to develop the proposed approach to managing potential impacts, which was that all trees within the project site would need to be removed to construct the project.

The assessment report identified that about 4,000 trees are located within the project site and so are likely to require removal, and 900 trees are located close to the project site (that is, the tree protection zone extends into the project site).

The trees within / close to the project site consist of a mix of locally indigenous species, Australian native species, and exotic ornamental or invasive specimens. The trees, most of which have been planted, are generally street trees, park and reserve plantings (including tree planting in the Millennium Parklands in Sydney Olympic Park) or landscaping on adjacent properties.

The results of the assessment are summarised in section 15.3.3 of the EIS, which includes an outline of the key locations that would be affected by tree removal (see Table 15.5). It was acknowledged that a number of trees that would need to be removed contribute to the amenity and character of the local area and/or screen views from sensitive receivers, including trees identified by the arboricultural assessment as having high amenity value.

In addition to the removal of trees, as described in section 15.3.3, retained trees located close to work areas, and trees adjacent to the project site, could be impacted during construction, including as a result of inadvertent damage and root disturbance, if they are not adequately protected.

What was proposed to manage these impacts in the EIS?

The proposed approach to managing impacts on trees (defined as vegetation that does not meet the statutory thresholds for participation in the NSW Biodiversity Offsets Scheme but meets the definition noted above under AS 4980-2009) was described in section 15.6.1 of the EIS. The approach was developed based on Transport's experience with Parramatta Light Rail Stage 1.

The first priority would be to avoid or minimise impacts on trees as far as practicable. This would include continuing to refine the location of infrastructure during design development and construction planning to minimise the areas impacted, and investigating opportunities to retain existing trees where possible.

Design development and construction planning would be informed by the preparation of a tree register to identify all trees with the potential to be impacted by the project, and considering options to reduce impacts on trees.

Trees to be retained within the project site, and those located close to the project site that could be impacted, would be protected in accordance with AS 4970–2009.

The above commitments were defined by mitigation measures LV3, LV4 and LV7 in the EIS.

The EIS also committed to:

- preparing a tree offset strategy to define how the loss of trees would be offset to achieve a net increase in tree canopy (mitigation measure LV5)
- planting a significant number of new street trees along the project site and in surrounding streets to support a high quality, comfortable, and amenable public domain and customer environment.

Further information about the proposed approach to mitigation and management, which has been refined since the EIS was placed on exhibition, is provided below.

What further work has been undertaken since EIS exhibition in relation to trees and tree management?

The assessment of tree impacts has been updated to reflect the revised project site resulting from the proposed amendments described in section 4.1 of this report. This was informed by an additional survey of trees located in the amended project site at Camellia and Rydalmere, which was undertaken by an arborist in December 2022. Tree details such as hollows and diameter at breast height were recorded to inform future offsetting calculations.

The results of the previous tree survey were also reviewed. Where some whole tree groups were previously identified for removal, this has been revised to better reflect the split of the tree group within or adjacent to the project site. In summary, the project is now expected to require the removal of up to about 3,400 trees. This includes a reduction in trees that would need to be removed in Camellia and Wentworth Point as a result of the proposed amendments, and retention of about 15 mature fig trees identified as having high amenity value adjacent to Rydalmere Wharf. The updated assessment of tree impacts is provided in section 6.8 of the Amendment Report.

In response to issues raised during ongoing engagement, together with issues raised in submissions, Transport has further reviewed and refined the commitments made in the EIS. This has included aligning the proposed approach with the latest Transport policies with respect to biodiversity management and tree offsets to strengthen the mitigation measures and make clearer Transport's intent to avoid tree removal during design development and construction planning as far as practicable. Further information about the proposed approach to managing trees, which has been updated to take into account these additional considerations, is provided below.

How would impacts on trees be managed?

Transport's *Biodiversity Policy* was published in August 2022. The *Biodiversity Policy* acknowledges that the development of transport infrastructure can lead to unavoidable direct and indirect impacts on biodiversity. These impacts include habitat fragmentation effects that can persist long after the infrastructure is built. In response to this issue, the *Biodiversity Policy* has been adopted with the following purpose 'Transport strives to protect and enhance biodiversity, with the goal of achieving a no net loss of biodiversity as a consequence of its infrastructure development activities'. The policy is underpinned by five principles to achieving no net loss, including principle 2 'Provide biodiversity offsets or conservation measures for all Transport development activities where it is feasible and reasonable to do so, including where the impacts do not trigger the legal offset requirements'.

With respect to principle 2, the policy commits that where there are impacts arising from projects that do not meet statutory thresholds for participation in the Biodiversity Offset Scheme replacement trees and hollows would be provided, where reasonable and feasible, in accordance with prescribed ratios. The *Biodiversity Policy* commits Transport to replace individual trees and hollows removed by Transport activities subject to certain exemptions for low-risk activities.

The *Tree and hollow replacement guidelines* (Transport for NSW, 2022b) set out how Transport will implement this requirement. The guidelines state that trees and hollows that have not been offset in accordance with NSW Biodiversity Offset Scheme thresholds or the Transport biodiversity offset thresholds processes (such as trees that are not part of a recognisable plant community type or are below the offset area thresholds) are required to be replaced. The guidelines define tree replacement ratios, where the number of replacement trees depends on the tree size, but is greater than a 1:1 ratio (see Table 4.3).

Table 4.3 Tree and hollow replacement requirements

Tree size ¹	Tree replacement requirement
Very large tree (DBH ² greater than 100 centimetres)	Plant minimum 16 trees
Large tree (DBH between 50 centimetres and 100 centimetres)	Plant minimum 8 trees
Very large tree (DBH greater than 20 centimetres, but less than 50 centimetres)	Plant minimum 4 trees
Small tree (DBH greater than 5 centimetres, but less than 20 centimetres)	Plant minimum 2 trees
Hollow replacement requirement ³	Provide three artificial hollows for every occupied hollow removed

Notes: 1. For trees with multiple stems/trunks, calculate the payment required for the largest stem DBH. Only one stem requires replacement/payment.

2. DBH – Diameter at breast height.

3. Assume 20% occupancy rate. For every five hollows identified (or where less than five hollows will be impacted), assume one hollow will be occupied and requires replacement. Where hollows are inspected during the clearing process, actual occupation can be used as the basis for the replacement requirement.

For this project, street trees and ‘planted vegetation’ were identified but not assessed as part of the Biodiversity Development Assessment Report. This vegetation would not be eligible to be offset through the NSW Biodiversity Offset Scheme. Impacts on street trees and ‘planted vegetation’ would be offset by implementing the tree offset strategy prepared in accordance with mitigation measure LV6.

In response to Transport’s policy commitments, mitigation measure LV6 has been amended (see Appendix B (Updated mitigation measures)) to clarify the requirement that the tree offset strategy will be prepared in accordance with the *Biodiversity Policy* (Transport for NSW, 2022a) and the *Tree and hollow replacement guidelines* (Transport for NSW, 2022b). This will include tree replacement ratios that would apply to offset the removal of trees. The wording of this measure has also been amended to confirm the commitment to provide a net increase in tree number and canopy. In accordance with updated mitigation measure LV6, the tree offset strategy will define and identify:

- how impacts on trees will be offset
- the tree replacement ratios that would apply to offset the removal of trees (see Table 4.3)
- 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.

Replacement trees would comprise a mix of endemic, native and exotic trees to give appropriate streetscape, heritage and biodiversity outcomes (including in areas of environmental sensitivity). The considerations for species selection would include:

- site constraints such as underground utilities, overhead powerlines and verge widths
- scale of streets and built form
- creating diversity and seasonal variety
- existing tree species and streetscape character
- soils, hydrology and natural landscape character.

Tree sizes would be determined as suitable for the planting landscape, and advanced plantings would be considered in certain locations.

Selection of tree species, size and planting locations would be carried out in consultation and/or partnership with City of Parramatta Council, City of Ryde Council and Sydney Olympic Park Authority and in accordance with the project's urban design requirements. Mitigation measure LV6 has also been updated to reflect the opportunity for future partnerships, if mutually agreed by all parties, along with the need to demonstrate how lessons learned from the Parramatta Light Rail Stage 1 tree offset strategy have been incorporated.

In response to issues raised about tree removal, Transport has also added an additional requirement to mitigation measure LV5 to confirm that trees within the project site boundary, which will not be directly impacted by infrastructure or utility works, will be assessed for retention through careful consideration of design and construction methods. This will include consideration of the following options:

- 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.

Further information is provided in Appendix B (Updated mitigation measures).

4.3.4 Impacts on Ermington Boat Ramp

What was described in the EIS?

Access to Ermington Boat Ramp during construction

As shown in Figure 2.5 of the EIS, Ermington Boat Ramp and its associated car and boat trailer parking are located at the southern end of Wharf Road adjacent to the location of the northern end of the proposed bridge between Melrose Park and Wentworth Point.

Chapter 7 (Project description – construction) of the EIS describes the proposed approach to construction, including the indicative construction methodology and transport and access arrangements based on preliminary construction planning. The proposed approach to constructing the bridges over the Parramatta River, including the use of temporary working platforms located in the river, is described in section 7.3.2 of the EIS.

Changes to maritime infrastructure and navigation that are expected to be required based on the proposed approach to bridge construction are described in section 7.7.5 of the EIS. Section 7.7.5 notes that as Ermington Boat Ramp and its road access are located within and close to the work area for the bridge between Melrose Park and Wentworth Point it is anticipated that the boat ramp would need to close for a period of up to three years.

Further information about the traffic and access impacts of the proposed construction methodology to maritime facilities, navigation and river access is provided in section 9.3.8 of the EIS. This section notes that as a result of the closure of Ermington Boat Ramp, recreational boat users would need to access the Parramatta River via other nearby alternative boat ramps, including:

- Kissing Point Park Boat Ramp on the northern side of Parramatta River in Putney
- Silverwater and Rhodes boat ramps on the southern side of the river.

These ramps are all located within about five kilometres of Ermington Boat Ramp.

The social and community impacts of closing the boat ramp during construction have been considered by Technical Paper 7 (Social Impact Assessment) and are summarised in Chapter 14 (Socio-economic impacts) of the EIS.

Changes to boat trailer parking during operation

As described in section 9.4.8 of the EIS, the design of the light rail alignment at Waratah Street, and the presence of the bridge between Melrose Park and Wentworth Point, would impact the existing Ermington Boat Ramp trailer parking area. It is estimated that about 10 of the existing 52 trailer parking spaces would be affected, and the total number of boat trailer parking spaces would reduce from 52 to 42 spaces.

Why does Ermington Boat Ramp need to close during construction?

Archer Park, the southern section of Wharf Road, and the Ermington Boat Ramp car park at Melrose Park, would be the site of a proposed construction compound (construction compound 8 shown in Figure 7.9 of the EIS, now referred to as construction compound 7 in the updated project description in Appendix A of the Amendment Report). This construction compound would mainly be used for construction activities associated with the bridge between Melrose Park and Wentworth Point, including pre-assembly and storage of bridge components. It would also be used to provide direct access to the bridge and the temporary working platforms in shallow waters. The compound would also include workforce amenities, material storage and laydown, and maintenance workshops for plant and equipment. The compound would be large enough to accommodate a potential casting yard for in-situ construction. Where sufficient space is available, staff and workforce parking would also be provided.

The space needed for the construction compound and to accommodate frequent movement of construction vehicles, heavy machinery, deliveries and bridge components to and from the temporary working platforms would require ongoing use of the boat ramp car park and southern section of Wharf Road. Even if the boat ramp area was not needed to accommodate the construction compound, the use of heavy machinery (including large cranes, piling rigs, excavators etc) introduces a potential safety risk that would be exacerbated if public vehicles were allowed to access the ramp. Additionally, construction associated with the northern section of the bridge would block part of Wharf Road. As a result, public access via the land to the boat ramp and car park cannot be maintained.

The presence of the temporary working platforms, which are required to facilitate construction of the bridge in Parramatta River, would also introduce a potential safety risk if public vessels were allowed access to the boat ramp from the river. Further information regarding the options considered for bridge construction is provided in sections 5.5.2 of the EIS and 4.2.2 of this report.

What alternatives were considered?

Transport investigated a number of alternative locations for construction compound 8. Transport concluded that there are no similarly sized, relatively flat areas of land within one kilometre of the proposed bridge site that are unconstrained by existing or proposed future development and available for lease over the construction period.

Consideration was also given to potentially using the proposed construction compound in Hope Street (construction compound 7) as an alternate and/or support site for bridge construction. However, the availability of this site would depend on the timing of its acquisition and is unlikely to coincide with the construction of Stage A (Bridge between Melrose Park and Wentworth Point). The acquisition of compound 7 is currently aligned with construction of Stage B (Main alignment construction works and supply, operate and maintain system operation construction works).

Even if construction compound 7 could be acquired earlier the location of the compound would mean that increased heavy vehicle movements to access the bridge site would be required along Hope Street, past Melrose Park Public School and the residences along Wharf Road. The increase in heavy vehicle movements would result in additional safety and traffic impacts and would also be less efficient, resulting in a longer construction period.

There is a similar but significantly smaller construction compound on the southern side of Parramatta River (construction compound 9) and consideration was also given to the feasibility of constructing the entire bridge from the southern side of the river. However, access to this site would be via a narrow corridor of land from Hill Road parallel to the 132 kilovolt electricity transmission lines, which would severely restrict the setup of large cranes and the movement of heavy vehicles and over height machinery. There is also no space on the southern side of the river to locate a casting yard for the bridge segments.

The potential use of an over-water construction compound was also investigated. However, this was not considered feasible given the large area that would be required and the need for construction access within sensitive foreshore areas, which would potentially result in impacts on Aboriginal heritage, mangroves and the marine environment, as well as introducing additional navigational constraints.

As such, construction compound 8, located on the northern side of the river, was identified as the preferred solution to facilitate construction of the bridge. This compound would allow for more efficient and cost-effective construction with greater flexibility for compound layout and alternative construction techniques.

As described in section 4.2.2 of this report, further investigation has also been undertaken since exhibition of the EIS regarding the bridge construction methodology. The results of this investigation confirmed that the use of temporary working platforms for in-river construction is still the preferred solution to minimise the disturbance of potentially contaminated river bed sediments and potential impacts on mangroves. As noted above, the use of temporary working platforms and in-river construction would also restrict access to and from the boat ramp from the river.

What issues and concerns have been raised?

A number of submitters raised queries, recommendations or issues relating to the closure of Ermington Boat Ramp. Submitters also suggested how potential impacts could be mitigated and offset. Submissions were received from members of the public and organisations, including boat owner and fishing groups. Similar issues were also raised during ongoing engagement with the community and key stakeholders.

The issues raised can be generally categorised as follows:

- need and justification for closure, including the duration of closure
- traffic and access impacts of closing the ramp, particularly in terms of access to and the capacity of other boat ramps

- social and community impacts of closing the boat ramp
- suggested mitigation and offset measures.

Further information on these issues is provided below.

Need for closure and duration

Submitters expressed concern and/or objected to the proposed closure as part of construction, including the perception that closure is only proposed to provide the construction contractor with land for construction facilities and car parking.

Submitters also expressed concern regarding the duration of the closure, querying why it needed to be so long, and noting that the closure is not justified.

Further information is provided in the issues summary in section 8.3.3 of this report.

Traffic and access impacts of closing Ermington Boat Ramp

Submitters expressed concern about the traffic, transport and access impacts of closing Ermington Boat Ramp during construction, particularly in relation to access to, and the capacity of, suggested alternative boat ramps, including Rhodes and Kissing Point. Comments made included:

- Silverwater, Rhodes and Kissing Point Park boat ramps are already overcrowded and insufficient parking capacity is available to accommodate the additional usage from Ermington.
- Increased use of other boat ramps could result in increased traffic congestion and reduced availability of parking spaces, which may inconvenience other users and decrease pedestrian safety.
- Rhodes and Kissing Point boat ramps are unsafe for large vessels.

Further information is provided in the issues summary in section 8.6.1 of this report.

Social impacts of closing Ermington Boat Ramp

Submitters identified a range of potential social and community impacts associated with the proposed closure of Ermington Boat Ramp during construction and the loss of this valued community facility. Issues raised included:

- Boaters from western Sydney and the local area who use the ramp will be forced to keep their families at home because of a distinct lack of facilities and major overcrowding in the area.
- There will be reduced participation in boating and recreational activities which could impact quality of life and wellbeing for the people of western Sydney.
- Forcing people to tow further afield will add to congestion and stress.

Further information is provided in the issues summary in section 8.10.1 of this report.

Mitigating the impacts of closing Ermington Boat Ramp

Submitters provided comment on the preferred approach to mitigating and offsetting the impacts of construction on access to Ermington Boat Ramp, Parramatta River and Sydney Harbour, including:

- provide managed access to the boat ramp
- provide alternative launching facilities that can accommodate a range of vessel types, with appropriate access and parking space
- upgrade nearby boat ramps with better launch ramps, supporting infrastructure and car parking to accommodate boat owners who cannot access Ermington Boat Ramp

- implement traffic management plans at Ermington Boat Ramp and any alternate boat ramps
- provide owners of registered boats within a 60 minute drive of Ermington Boat Ramp with a discount on registration fees and tolls to access other ramps.

Further information is provided in the issues summary in section 8.6.4 of this report.

What further work has been undertaken since EIS exhibition in response to these issues?

Transport has undertaken a review of the attributes of Ermington Boat Ramp as well as proposed alternative boat ramps (Silverwater, Blaxland Road (Rhodes) and Kissing Point boat ramps). Cabarita and Bayview Park boat ramps were also investigated, although these are further east and up to about 24 minutes travel time from Ermington Boat Ramp.

The review included the number of ramp lanes, trailer parking spaces, the presence of boat holding structures, and information about water access/useability.

The review of Ermington Boat Ramp and other alternative boat ramps indicated the following:

- Ermington Boat Ramp has ready access to deep water and is accessible at all tides. A number of the alternative ramps investigated are affected by shallow water at low tides and by currents and ferry wash.
- Boat ramps in urban settings are space constrained such that available trailer parking capacity is generally less than the capacity of the boat ramp for launching and retrieval.

As such, improvements to launching capacity (such as extra boat ramp lanes) and ramp efficiency measures (such as boat holding structures and pontoons) would provide limited benefit unless matched with additional trailer parking capacity.

The key outcomes of the review of Silverwater Boat Ramp and Kissing Point Park Boat Ramp are provided below. However, in summary, while new offset parking could be provided at these locations, the loss of open space on waterfront land would result in social and amenity impacts on the community as these locations are popular areas for recreational use. As such, the review concluded that the impacts associated with providing new additional parking at these locations to offset the loss of parking at Ermington Boat Ramp would currently outweigh the benefits. Opportunities to increase trailer parking capacity would be considered during construction planning.

Blaxland Road (Rhodes) was determined to not be a viable alternative as it did not have sufficient available space around the ramp.

Silverwater Boat Ramp

The review determined that there was sufficient space around Silverwater Boat Ramp to offset the loss of up to 36 trailer parking spaces at Ermington Boat Ramp during construction if areas within Silverwater Park were used to provide additional parking spaces. The provision of new trailer parking spaces at Silverwater Park to offset impacts at Ermington Boat Ramp would impact existing areas of open space, with the supply of such areas limited in this locality. Opportunities to increase trailer parking capacity that would result in lesser impacts on this open space would be considered during construction planning.

Additionally, upgrades to the ramp itself would be constrained as the Parramatta River is shallow at this location. Dredging or extension of the boat ramp into the navigation channel would be required to accommodate a deeper launch site.

Kissing Point Park Boat Ramp

Kissing Point Park Boat Ramp is highly used and access to the ramp is currently constrained, with narrow roads and limited parking. The review determined that there would be sufficient space around the boat ramp to provide up to 30 additional trailer parking spaces both temporarily and following construction if parking was provided in the surrounding reserve (Kissing Point Park), which is under the care, control and management of City of Ryde Council. However, this would result in the loss of open space on waterfront land. Areas within the reserve are currently used as trailer parking by the Concord-Ryde Sailing Club on event days.

How was the community consulted in relation to the proposed closure?

Consultation with the community and key stakeholders was undertaken in association with public exhibition of the EIS in November and December 2022 as described in Chapter 2 (Stakeholder and community engagement) of this report.

The following stakeholders and groups were notified of the exhibition of the EIS and were asked to review the EIS and provide a submission:

- Boating Industry Association
- sailing clubs
- rowing clubs
- Sydney Ferries / Transdev
- local marinas
- boatsheds.

A meeting regarding the impacts on Ermington Boat Ramp was also held with Wentworth Point residents and eight members of the Melrose Park Residents Action Group and the Waterfront Action Group on 15 February 2023.

How long does it need to close for?

The closure of Ermington Boat Ramp for up to three years is a reasonable worst-case assumption used in the EIS for assessment purposes.

As part of the procurement process for construction of the bridge, Transport would require tenderers to innovate their design and construction processes to minimise the duration of bridge construction and any impacts on the boat ramp and navigational channel closures, particularly during the peak boating season.

How would the potential impacts of closing the ramp be managed (including impacts on other ramps) – what does Transport for NSW commit to?

Boat ramps are managed by the relevant local councils, but NSW Maritime facilitates upgrades to ramps and works closely with councils to improve ramp safety and access conditions. Through their Maritime Infrastructure Boating Now Grants Program, NSW Maritime can also issue grant funding for boat ramp projects that meet an agreed criterion.

Where appropriate, Transport will work with key stakeholders and those local councils who manage boat ramps in the surrounding area to contribute to future funding plans aimed at providing safe and reliable access to the Parramatta River.

In addition, opportunities to mitigate the impacts on parking at Ermington Boat Ramp will be reviewed during design development. Mitigation measure TT6 has been amended to capture this commitment.

The following mitigation measures (see Appendix B (Updated mitigation measures) of this report) also confirm Transport's commitment to mitigating the impacts of the project on Ermington Boat Ramp:

- Mitigation measure TT11 provides that 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.
- Mitigation measure TT12 provides that 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. 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.
- Mitigation measure SE5 provides that access to community facilities and infrastructure will be maintained during construction as far as practicable. Where alternate access arrangements need to be made, 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).
- Mitigation measure SE6 provides that Transport 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 assist with identifying measures to minimise the potential impacts of the project on community infrastructure as far as possible.

Transport would continue to work with key stakeholders, including its Maritime branch, industry stakeholders, residents and interest groups to provide an update on the closure of Ermington Boat Ramp and any remaining offset measures. All consultation will be undertaken with mitigation measure SE1 and the Community Communication Strategy developed for the project (provided in Appendix D of this report).

4.3.5 Flood management objectives

Flood management objectives for the project

In accordance with the SEARs, flood management objectives were identified for the project to provide criteria against which potential impacts are assessed and managed in relation to changes in flooding conditions. As described in section 17.1.3 of the EIS, the following flood management objectives have been defined.

- for operational flood levels in events up to the one per cent annual exceedance probability (AEP) there should be no increase in flood levels relative to the existing condition (afflux) greater than:
 - 10 millimetres in residential zoned land
 - 20 millimetres in commercial/industrial zoned land
 - 50 millimetres in public land (defined as any land (including a public reserve) vested in or under the control of the council)
- the potential for soil erosion and scouring is minimised for events up to and including a one per cent AEP flood event
- no change in flood hazard category in residential and commercial/industrial zoned land
- no change to the flood hazard category for events up to and including the one per cent AEP flood event for dedicated evacuation routes.

How where the objectives developed?

The flood management objectives were developed in consultation with, and with input from, key project stakeholders, including City of Parramatta Council. The objectives were developed to be consistent with accepted industry practice and relevant guidelines, as well as similar objectives for other major infrastructure projects in NSW (including Sydney Metro West, Parramatta Light Rail Stage 1, and Inland Rail (Parkes to Narromine)).

When developing the flood management objectives consideration was also given to the following:

- Guidance and requirements outlined in the *Floodplain Development Manual* (DIPNR, 2005), namely Appendix F and Appendix G of the manual.
- The following objectives from Section 2.4.2.1 of the Parramatta Development Control Plan 2011 (City of Parramatta Council, 2011):
 - the proponents of development are aware of the potential flood hazard and consequent risk and liability associated with the use and development of flood liable land
 - manage flood liable land in an economically, environmentally and socially sustainable manner
 - ensure that the proposed development does not expose existing development to increased risks associated with flooding
 - ensure that developments with high sensitivity to flood risk are sited and designed to provide reliable access and minimise risk from flooding
 - minimise the risk to life by ensuring the provision of appropriate access from areas affected by flooding up to extreme events
 - minimise the damage to property, including motor vehicles, arising from flooding
 - new development should not result in any increased risk to human life.
- The *State Significant Infrastructure Template Conditions of Approval (Linear Infrastructure)* (DPE, 2022a), which stipulate that infrastructure must be designed and constructed to limit impacts on flooding characteristics in areas outside the project boundary during any flood event up to and including the one per cent AEP flood event to the following:
 - (a) a maximum increase in inundation time of one hour
 - (b) a maximum increase of 10 millimetres in above-floor inundation to habitable rooms where floor levels are currently exceeded
 - (c) no above-floor inundation of habitable rooms which are currently not inundated
 - (d) a maximum increase of 50 millimetres in inundation of land zoned as residential, industrial or commercial
 - (e) a maximum increase of 100 millimetres in inundation of land zoned as rural, primary production, environment zone or public recreation
 - (f) no significant increase in the flood hazard or risk to life
 - (g) maximum relative increase in velocity of 10 per cent, where the resulting velocity is greater than one metres per second, unless adequate scour protection measures are implemented and/or the velocity increases do not exacerbate erosion as demonstrated through site-specific risk of scour or geomorphological assessments
- *Guide to Road Design Part 5: Drainage-General and Hydrology Considerations* (Austroads, 2023) (Guide to Road Design Part 5).

The recommended acceptable impact for industrial and commercial buildings in the Guide to Road Design Part 5 is 50 millimetres in the one per cent AEP event and the acceptable impact for other buildings is 25 millimetres, with 10 millimetres considered acceptable for houses at significant flood risk or for sensitive receivers (e.g. schools) and critical infrastructure. The Guide to Road Design Part 5 notes that changes of less than 10 millimetres should not be considered relevant as 10 millimetres is typically the limit of accuracy of two-dimensional flood models.

The flood management objectives developed for the project are consistent with the above guidelines and other projects and are stricter than the values recommended by the Guide to Road Design Part 5.

4.3.6 Design excellence and bridge design

Transport is committed to achieving design excellence for the project, which is ‘the highest standard of architectural, urban and landscape design’ (Government Architect NSW, 2017).

Section 5.6 of the EIS provides information about the focus areas of ongoing design consideration and the further design refinements that would be undertaken to minimise environmental impacts and improve outcomes and project value. As described in section 5.6.2 of the EIS, design development will continue through the preparation of the project’s urban design requirements, which will provide detailed urban design guidelines and key requirements for the project that will guide future design, procurement and delivery phases of the project. Technical Paper 1 (Design, Place and Movement) forms the basis for the future development of the urban design requirements for the project and defines approaches to achieving good design outcomes.

Further information around the process to achieving design excellence for the proposed bridges is provided in the sections below.

Independent design review

The Transport Design Review Panel has provided independent, high level expert design review and advice to the project from the early planning stages. As described in section 5.6.1 of the EIS, the Transport Design Review Panel recommended certain investigations and processes focused on striving for design excellence for the bridges. One recommendation, employed by the project team, was the engagement of an architect as part of the multidisciplinary team undertaking bridge design (see below).

During design development a Design Review Panel, specific to the Parramatta Light Rail Stage 2 project, will be engaged to provide ongoing design excellence advice during design development and delivery. There would be some continuity of membership from the Transport Design Review Panel and from the Parramatta Light Rail Stage 1 Design Review Panel to avoid loss of knowledge and lessons from earlier stages. The project-specific Design Review Panel will be chaired by the NSW Government Architect (or its nominee) and comprise members who are highly qualified, experienced and independent professionals, with a variety of skills across design in the built environment.

Multidisciplinary design team

A team of urban designers, landscape architects, architects, and an Aboriginal design consultancy are involved in bridge design alongside environment, engineering, engagement and transport planning specialists. This multidisciplinary team is responsible for developing a design solution that is well integrated. The team draws on their variety of skills to realise the urban design vision and objectives for the project (shown in Figure 5.26 of the EIS).

Urban design requirements

Design development would be conducted with the aim of achieving project outcomes that meet the needs of customers and communities and deliver high-quality place outcomes. The project will deliver detailed urban design guidelines and key requirements for the project (including the bridges) to guide design development, procurement and delivery. These will be developed in accordance with the site-specific bridge design requirements provided in Chapter 13 of Technical Paper 1, or as updated by the Supplementary Design, Place and Movement Report.

Mitigation measure LV1 provides that the urban design requirements will be finalised in accordance with the vision, principles and outcomes in Technical Paper 1 and the Supplementary Design, Place and Movement Report, and in consultation with key stakeholders, which is inclusive of local councils, the operator, the rail regulator, and the Design Review Panel.

In accordance with mitigation measure LV2, design development will be undertaken in accordance with the urban design requirements and in consultation with the Design Review Panel.

Stakeholder engagement in the design process

As described in Chapters 5 (Design development, alternatives and options), 8 (Community and stakeholder engagement) and Technical Paper 1 (Design, Place and Movement) of the EIS, stakeholders (including councils) have been consulted as part of design development. Stakeholders would continue to be consulted in accordance with the project's overarching Community Communication Strategy (provided in Appendix D of this report), which will be implemented in accordance with mitigation measure SE1. Mitigation measure SE1 has been amended to confirm Transport's commitment to ongoing consultation with key stakeholders during design development.

As noted above, in accordance with mitigation measure LV1, key stakeholders will be consulted as part of the process of finalising the urban design requirements.

4.4 Corrections

4.4.1 Land ownership details

The project would require the use of land temporarily and permanently. Section 13.3 and Appendix E (Preliminary land requirements) of the EIS described the project's estimated land requirements based on the reference design at the time the EIS was exhibited. Appendix E included a list of property details. One property at Wentworth Point (Lot 1 DP 270778) was incorrectly identified as being owned by the City of Parramatta Council. It is confirmed that this lot is privately owned.

The estimated land requirements have been updated as a result of ongoing design development and in response to the proposed amendments to the project described in section 4.1 of this report. The above correction to ownership information is reflected in the updated estimated land requirements. Further information is provided in section 6.6 and Appendix E (Updated preliminary land requirements) of the Amendment Report.

4.4.2 Residual land

Residual land is defined by the EIS as land acquired to construct the project that is surplus to the operational requirements of the project. Section 6.9.2 of the EIS provided a summary of the estimated areas and potential locations of residual land, and an outline of how the potential future uses of this land would be determined.

Reference to potential areas of residual land located north of Hope Street (west of the Melrose Park stop) and at the south-east corner of Hope and Waratah streets in section 6.9.2 of the EIS was made in error. It is confirmed that there is unlikely to be residual land available at these locations.

The potential areas of residual land have been refined as a result of ongoing design development and in response to the proposed amendments to the project described in section 4.1 of this report.

It is now estimated that the residual land would comprise a total of about 4,000 square metres (0.4 hectares) with most of the residual land located in the vicinity of the Atkins Road stop, Melrose Park. The final area of residual land would be subject to ongoing design development. Further information is provided in section 1.9.2 of the updated project description (see Appendix A of the Amendment Report).

4.4.3 Signalised traffic intersection at Murray Rose Avenue

Section 9.4.7 of the EIS and section 6.2 of Technical Paper 2 (Transport and Traffic) describes the way in which the project would change access to some properties located along the project alignment. These sections noted that access to Sydney Showground would be provided via traffic signals at Gate 13 (Murray Rose Avenue) from Australia Avenue.

To clarify the statement made, it is confirmed that traffic signals are proposed at the intersection of Murray Rose Avenue and Australia Avenue, not at the entry to Gate 13 (on Australia Avenue). Access to Gate 13 adjacent to Murray Rose Avenue would be via the traffic signals proposed at the Murray Rose Avenue / Australia Avenue intersection.

The location of the proposed signals is as shown in Figure 6.11 of Technical Paper 2. These signals were considered in the traffic network modelling that informed the operational traffic impact assessment in the EIS. This correction does not affect the results of transport and transport assessment.