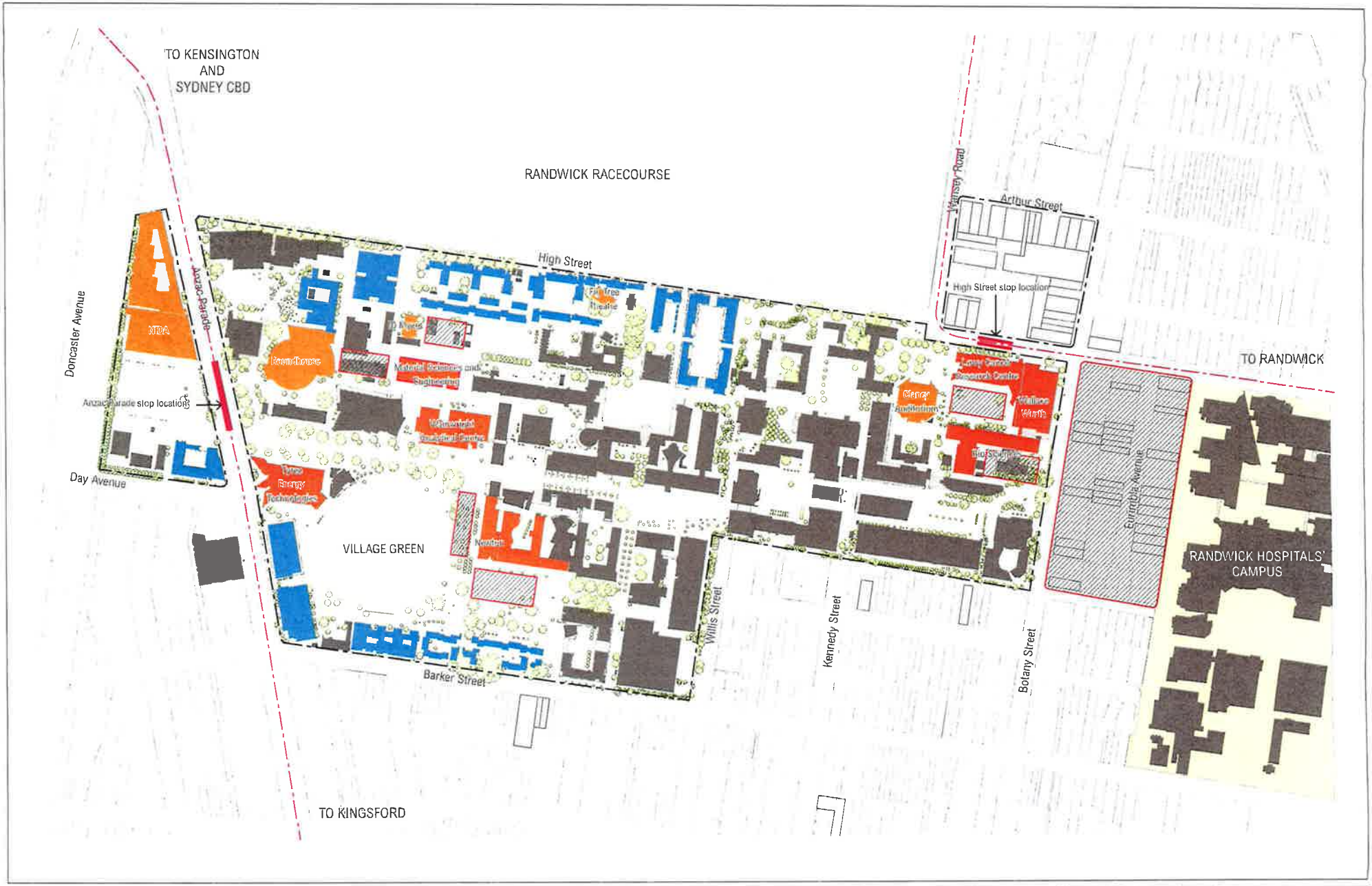

LEGEND

Current and future locations of environments sensitive to noise, vibration, EMI and RFI

- Existing research intensive
- Under construction
- Performance venues
- Residential
- Sites for future research intensive construction
- Randwick Hospitals' campus

0 25 50 100m

UNSW SYDNEY

ASPECT Studios™

Tzannes Associates ARCHITECTURE URBAN DESIGN

CBD & South East Light Rail Project
EIS Response for UNSW

Campus Sensitive Environments and Research Areas

SCALE	DRAWN	CHECKED	DATE	PROJECT	DRAWING	REVISION
1:4000 @A3	KG		07/04/14	13040	11	A

CBD & South-East Light Rail Project

Project SSI 6042

UNSW Submission to the CBD & South-East Light Rail Project incorporating the Preferred Infrastructure Report

Submitted to Planning & Infrastructure
On Behalf of University of NSW

Volume 1 of 1

9 April 2014 ■ 13533

JBA Urban Planning Consultants Pty Ltd ABN 84 060 735 104 w jbaurban.com.au
North Sydney t +61 2 9956 6962 ■ Newcastle t +61 2 4927 0980

JBA operates under a Quality Management System that has been certified as complying with ISO 9001:2008. This report has been prepared and reviewed in accordance with that system. If the report is not signed below, it is a preliminary draft.

This report has been prepared by:

Oliver Klein 9/04/2014

This report has been reviewed by:

Tim Ward 9/04/2014

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Executive Summary

This submission has been prepared by JBA on behalf of the University of NSW (UNSW).

The proposed CBD and South East Light Rail (CSELR) project provides a once-in-a-generation opportunity to provide central and south-eastern Sydney with a world class light rail system.

As a key partner in the Randwick Education & Health Specialised Precinct (Precinct) and the CSELR delivery process, UNSW strongly supports the project and the public benefits it will bring to the community, the Precinct and to the University.

UNSW shares the same objectives and stated likely public benefits as Transport for NSW (TfNSW). UNSW has also identified its own key project objectives since its involvement as a lead partner and key stakeholder in the process. These key objectives are:

- Staff and student safety;
- Improved urban amenity;
- A fully integrated transport solution;
- Environmental sustainability;
- Business continuity; and
- Capacity and capability for the future.

Whilst these objectives were broadly met by the exhibited scheme presented in the exhibited Environmental Impact Statement (EIS), and in its submission (dated 16 December 2013) UNSW focussed its attention on its fundamental concern, staff and student safety for its community and the wider community, concerns remain and have been further identified following the review of the Submissions Report (which incorporates the Preferred Infrastructure Report), dated March 2014.

This submission addresses remaining concerns arising from both the EIS and the Submissions Report in relation to both stops at UNSW (at Anzac Parade and at High Street), as well as a range of remaining construction and operational issues. Where relevant, UNSW and its consultant team has prepared a set of suggested conditions of approval to further mitigate against environmental impacts of the project and to ensure appropriate outcomes in relation to both short and long-term impacts.

Key remaining issues are:

- The capacity of the UNSW stops, including platform sizes, and assumptions around Level of Service (LoS) benchmarking;
- Concept designs for each of the UNSW stops having regard to the above, including stop architecture;
- Creation of a pedestrian plaza in High Street between Wansey Road and Botany Street;
- Impacts of noise, vibration, electromagnetic interference (EMI) and radio frequency interference (RFI) upon sensitive teaching, research and other University environments during construction and operation of the light rail;
- Impacts upon general UNSW operations and maintaining 'business-as-usual' in terms of traffic and access, and bus services; and

- Ongoing consultation with UNSW.

In general, suggested conditions of approval seek to ensure that UNSW's typical daily operations can continue as unaffected as possible in recognition of the importance the University plays in the Precinct and to the economy in general. As discussed in the original submission by UNSW, significant detrimental effects have the potential to introduce wider-ranging and longer-term impacts upon the Precinct's and University's viability, amenity, character and reputation.

1.0 UNSW Supports the Project

As set out in its original submission of 16 December 2013, as a key partner in this once-in-a-generation project, UNSW strongly supports the CBD and South East Light Rail (CSELR) project and its broader objectives and wide-ranging benefits it will bring to the CBD and the south-eastern suburbs, for the following reasons:

- The opportunity to improve pedestrian and passenger safety, in particular for UNSW students and staff within the network;
- Improved reliability, efficiency, amenity, capacity and quality of the public transport network;
- The provision of a fully integrated transport solution with access to major destinations in the south east including Moore Park, UNSW, Royal Randwick Racecourse and the Randwick Education & Health Specialised Precinct (Precinct);
- Opportunities to improve the overall amenity of public spaces and the public domain;
- The increased use of sustainable transport modes and improved environmental sustainability;
- Meeting long-term travel demand between the CBD and suburbs to the south east and leaving a lasting legacy; and
- Facilitating orderly and efficient growth of urban development and economic activity along the corridors and particularly within the Precinct.

Reflecting this support and partnership approach UNSW is committed to providing resources to the project.

2.0 Review of the TfNSW Response

UNSW and its consultant team comprising Tzannes Associates, ASPECT Studios, Traffix Group, Transafe, ARUP, Resonate and JBA have reviewed the submitted Submissions Report (incorporating the Preferred Infrastructure Report) Volumes 1 and 2, both dated March 2014.

A number of key issues remain for UNSW with respect to the design, safety and efficiency of the UNSW stops and the likely and potential impacts of the project at both construction and operational stages. Commentary on these key issues is set out below and in further detail as part of this submission.

UNSW and its team have considered the responses made by TfNSW in the Submissions Report. The table of responses from the Submissions Report has been replicated and a further column of responses added for review and consideration by Planning & Infrastructure. This table is included in this submission at **Appendix A**. Commentary in this additional column sets out:

- Whether the proposed Mitigation Measures are considered sufficient to address UNSW's concerns;
- Any remaining or residual concerns of UNSW ; and
- If residual concerns are not considered to be sufficiently addressed, reference to a specific suggested condition which addresses remaining issues.

3.0 Key Issues Remaining for UNSW

A number of key issues remain unresolved in relation to the project. These are:

- The capacity of the UNSW stops, including platform sizes, and assumptions around pedestrian Level of Service (LoS) calculation and benchmarking;
- Concept designs for each of the UNSW stops having regard to the above, including stop architecture;
- Creation of a pedestrian plaza in High Street between Wansey Road and Botany Street;
- Impacts of noise, vibration, electromagnetic interference (EMI) and radio frequency interference (RFI) upon sensitive teaching, research and other University environments during construction and operation of the light rail;
- Impacts upon general UNSW operations and maintaining 'business-as-usual' in terms of traffic and access, and bus services; and
- Ongoing consultation with UNSW.

Detailed consideration of these matters is included below.

To ensure these matters can be suitably resolved, UNSW has prepared a set of suggested conditions of approval. These are found at **Appendix B** to this submission.

To assist Planning & Infrastructure in its assessment of the project in relation to some of UNSW's key stop design and performance issues, appended are also patronage assessments for both UNSW stops as well as refined concept designs to address safety, capacity and level of service of these stops. These are included at **Appendix C** and **Appendix D**, respectively.

Further technical review of platform sizes and comparison of levels of services assumptions has also been carried out. This work by Traffix Group can be found at **Appendices E and F. Appendix G** sets out Road Safety Audits for the Concept Designs for both UNSW stops.

3.1 Stop Capacity

3.1.1 Passenger Numbers

It is the view of UNSW that TfNSW has not applied the most accurate survey information or data in relation to anticipated or potential patronage of the light rail and its stops in relation to UNSW. The data applied by TfNSW appears to understate the likely levels of patronage and therefore results in a better than anticipated level of service of the platforms and stops compared to UNSW data. This in turn has the potential to result in under-performing stops and platforms and a compromise in light rail user safety.

UNSW has estimated its passenger demand based on detailed counts of existing use as the basis for its determination of the required capacity of the platforms. To assist, the 2013 *UNSW Patronage Assessment for the Upper Campus and Lower Campus* is provided at **Appendix C**. UNSW believes its pedestrian counts are more accurate than the TfNSW's estimated figures and should be used in the detailed design of the platforms, including the calculation of platform width.

UNSW predicted passenger numbers are based on actual counts (in 15 minute intervals) and location of every pedestrian entering and exiting the campus over a typical day. This data was then supplemented by an online survey to record mode of travel (including bus route), origin of trip and whether they would shift to the new light rail service. The passenger volumes predicted by this method are higher

than those predicted by TfNSW, and reflect the peak 15 minute volumes that occur in the afternoon following the end of lectures every hour.

It is understood that TfNSW is using passenger numbers predicted by strategic transport modelling and are only presented as a per hour volume and thus fail to register peak volumes in a manner that reflects accurately the passenger demand at its stops.

UNSW's surveys are for 2013, however, UNSW is presently undertaking surveys for 2014 and the results should be available in the coming weeks. These will be forwarded to Planning & Infrastructure and TfNSW as they become available and/or are updated. The 2013 data nonetheless provides suitable and sufficient data to allow for a more detailed review and consideration of actual patronage via public transport to the UNSW Kensington campus.

It should be further noted that UNSW has not included the additional non-UNSW passengers and inclusion of these numbers will increase the size requirement of the stops.

The objective of application of more accurate passenger data is to not only to provide more detailed information but to ensure the capacity and design of the stops meets projected demand and provides for the safest environment possible on and around the stops, having regard to other matters of relevance in the operation of the light rail.

3.1.2 Platform Size

Different methods have been adopted by TfNSW and UNSW to determine the required size of the light rail platforms at the Anzac Parade and High Street stops as described below.

The Service Method has been applied by TfNSW. For alighting, this method restricts the number of passengers alighting on to a platform to the maximum capacity of each Light Rail Vehicle (LRV) (approx. 300 pax). For boarding, this method restricts the number of passengers that can fit on to a platform to board the LRV. Passengers that cannot fit on to the platform are required to wait off the platform.

The Demand Method has been applied by UNSW. For alighting, this method allows passenger demand to exceed the capacity of the LRV. For boarding, this method allows all passengers wanting to be on the platform to be accommodated.

Each method has its advantages and disadvantages – see **Appendix E** for detail.

Importantly, the disadvantages of the Service Method firstly in determining platform sizes in alighting from a LRV are:

- It does not provide an indication of the unconstrained passenger demands for the service; and
- Limiting the number of passengers will 'spread' the peak period i.e. passengers will have to wait until next LRV.

Secondly, the disadvantages of the Service Method in determining platform sizes in terms of boarding are:

- It restricts the number of passengers that can fit on to a platform to board the next LRV;
- Passengers that cannot fit on to the platform are required to wait off the platform. In some situations, this can be accommodated on ramps and approaches. However, for very high boarding volumes, passengers may need

to wait on the side of the road, with multiple waiting areas due to different origins;

- It requires 'options' to manage passenger access to the stop e.g. marshalling and staff resources will increase the operating cost of the project; and
- It is very difficult to manage passenger access for stops with multiple access points and/or adjacent crossing points, particularly when others will be seeking to simply cross Anzac Parade side to side at the same time in order to access the bus services, classes or accommodation.

This may negatively impact passenger safety.

The advantages of the Demand Method firstly, in determining platform sizes in relation to alighting are:

- It provides an indication of the unconstrained passenger demands for the service;
- If the light rail operator changes operating patterns to more frequent services, this may result in second LRV arriving whilst passengers from previous LRV are still departing the platform and such variations can be accommodated; and
- If the light rail operator changes the LRV type, it may result in larger capacities and therefore more alighting passengers and such variations can be accommodated to enable future growth to be addressed.

Secondly, the advantages of the Demand Method in determining platform sizes in relation to boarding are:

- It caters for a stop design to cater for peak demands that reduces risk of overflow on to road;
- It reduces need for 'options' to manage passenger access to the stop e.g. marshalling and so improves passenger safety; and
- It provides for real passenger demands for the service.

Overall, Traffix Group has concluded that for alighting, it is considered that the Service Method, adopted by TfNSW, is an appropriate method to determine the required size of the platform stops, taking into account the concurrent boarding and alighting demands at each stop.

However, for boarding, it is considered that the Demand Method, as adopted by UNSW, is preferred as it will estimate the unconstrained passenger demands for the service enabling the stop design to cater for peak demands. This will reduce the risk of overflow on to the road and reduces need for 'options' to manage passenger access to the stop e.g. marshalling, and correspondingly will improve passenger safety.

Further, UNSW understands that TfNSW has sized the platforms to suit the alighting and boarding of a full light rail vehicle. This is inadequate as during several 15 minute peaks the numbers arriving at the platform to board the light rail will exceed the vehicle capacity and therefore a wider platform is required for safer use. These peak 15 minute volumes are sourced from the pedestrian counts that record entry and exit points for all pedestrians accessing the campus and a sample of mode choice undertaken by UNSW in association with its annual Travel Survey.

3.1.3 Level of Service (LoS)

Traffix Group reviewed a number of relevant guidance documents which may have informed TfNSW in its consideration of the likely LoS of the light rail stop platforms and accessways. These included:

- London Underground Station Planning Standards and Guidelines, Transport for London(TfL), 2012 Edition
- Pedestrian Comfort Guidance for London – Guidance Documents, Transport for London, 2010
- Victorian Rail Industry Operators Group Standards (VRIOGS) 002.1, Railway Station Design Standard and Guidelines. Revision A, 29/03/2011
- Network Rail Station Capacity Assessment Guidance, May 2011 (United Kingdom)

Importantly, as stated in its original submission, UNSW believes the first main assumption of UNSW's likely patronage has been significantly underestimated meaning demand will outweigh capacity during peak periods on both platforms /stops servicing the Kensington campus.

In reviewing the various guidance documents, Traffix Group has found that for platforms, the TfL and Network Rail guides will give better LoS for smaller areas per passenger. The Victorian guide – the VRIOGS, reflecting the Australian space requirements, is more conservative than the UK guides, giving larger areas per passenger for each LoS.

For accessways all guidelines give the same LoS for various numbers of passengers per minute per metre width.

Figure 1 below provides a graphical comparison of levels of services under each guideline for platforms and accessways. This Figure is also found in the document at **Appendix F**. Generally, a LoS 'C' is considered acceptable under these various guidelines.

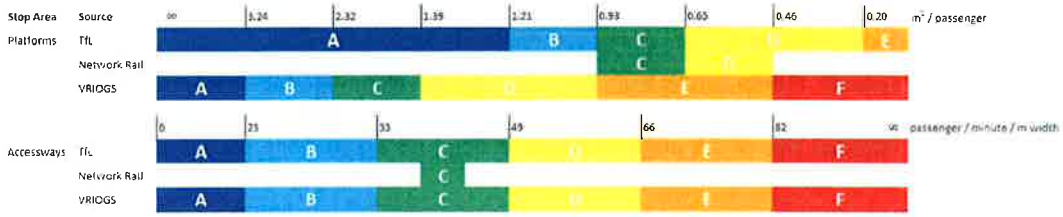

Figure 1 – Comparison of Level of Service from relevant guidelines
Source: Traffix Group

Additionally, the VRIOGS is deemed appropriate as it relates specifically to surface-based rail infrastructure in an Australian context, and importantly an environment that is freely accessed by users / pedestrians without barrier controls. That is, passengers are able to access platforms from a variety of directions within a largely uncontrolled or unmanaged environment, unlike say an underground railway station without open distractions, other vehicles, and other externalities at play that influence the light rail stop environment.

To that end, having considered both platform size assumptions and level of service comparisons via relevant guidelines, to ensure a safe and efficient light rail environment can be provided relative to the likely pedestrian / passenger demand in an Australian context, UNSW considers the VRIOGS the appropriate standard. See *VRIOGS 002.1 – Railway Station Design standard and guideline – Revision A* at **Appendix H**.

This standard generally allows for a platform size commensurate with likely demand of 1.39m^2 to 2.32m^2/passenger which is some 0.74m^2 to 1.39m^2 bigger per passenger than the UK guidelines indicate. Similarly, the VRIOGS recommends

as an acceptable standard between 33 and 49 passengers per minute per metres width. This is generally consistent with the UK guideline standards.

UNSW understands that TfNSW may have considered and applied standards other than the VRIOGS. It is noted that the standard chosen by TfNSW has a smaller area requirement than the equivalent Victorian Standard to achieve the same LoS in an Australian context.

Relevantly, it is noted that the predicted volumes, especially for Anzac Parade, would be amongst the top 5 busiest tram stops in Melbourne. UNSW reaffirms that it considers the VRIOGS as the appropriate standard.

Accordingly, the VRIOGS has informed the UNSW Concept Designs for both stops, which are recommended as the refined designs to accommodate the likely demand at UNSW and provide the standard of safety, security, and efficiency sought by UNSW and TfNSW. Accordingly, the UNSW alternative concept design platforms, access ramps and pedestrians crossings have all been designed to meet a LoS 'C' under this Standard.

The application of a LoS 'C' under the VRIOGS is to ensure that the size of the platform will be safe and that the operation of the stops will be efficient.

It is noted that the EIS has not referenced the Standard used for calculation of pedestrian LoS, nevertheless, on the basis of the above, UNSW recommends the Victorian standard as it is used for tram stops in Melbourne and as there is no equivalent Australian or New South Wales Standard.

Suggested conditions of approval at **Appendix B** set out the preferred approach sought by UNSW in relation to the adoption of both the UNSW-preferred standard and the Victorian standard.

3.2 Concept Design – UNSW Anzac Parade Stop

A Concept Design for the UNSW Anzac Parade stop is included at **Appendix D** to address matters arising from the patronage study and to satisfy the objective of a LoS of 'C' (1.39m^2/passenger) under the VRIOGS.

The UNSW alternative concept design differs from the TfNSW Preferred Infrastructure Project Design in the following ways (noting the TfNSW design is nominated as indicative only):

- Additional UNSW land is available to ensure maximisation of the platform area and size to allow a LoS of 'C' to be achieved, while maintaining adequate footpath widths on either side of Anzac Parade;
- Increased platform area / size (min 90m length) - the difference between TfNSW and UNSW platform width is simple to alter (some 0.6m to 1.3m) and will have substantial impact on the LoS, safety and long term capacity of the stop with no additional kerb replacement;
- Definition of a second pedestrian crossing from the platform to NIDA and College Walk (see further below); and
- Removal of vehicular right turn into Day Avenue off Anzac Parade southbound following TfNSW advice.

The benefits of these design changes are improved and increased capacity of the platform, and corresponding improved safety, accessibility and visibility for light rail users.

Importantly, further consideration of the design is also required to review and address the impacts to the University research and teaching environment from EMI, RFI, noise and vibration (see **Section 3.4** below).

Suggested conditions of approval at **Appendix B** set out the preferred approach sought by UNSW in relation to the adoption of the UNSW-preferred Concept Design.

3.2.1 Road Safety Audit

A Road Safety Audit has been carried out by Transafe to review the adequacy of the Concept Design for this Stop (See **Appendix G**). Transafe concludes that:

- A wider platform is preferred to cater for peak demands;
- A centre island platform is preferred;
- The TfNSW proposed 45m platform creates risk for pedestrian conflict in the at grade areas beyond the platform;
- Banning of right turns into Day Avenue is supported as it reduces possible conflict points;
- The provision of a staggered, signalised, midblock crossing to the northern end of the platform is considered important for passenger safety and is strongly supported;
- Signals need to be coordinated to prevent the "see-through" effect;
- Marshalling and other active controls are not considered to be effective for control of large numbers of pedestrians to the platform; and
- Passive control measures for passenger management such as larger platforms and storage areas are recommended.

3.2.2 Stop Architecture

The proposed stop architecture (comprising soft and hard landscaping, street furniture, shelters, barriers, signage and shared-use poles and the like) does not meet UNSW design quality expectations. Accordingly, UNSW proposes reviewing the stop architecture for suitability with TfNSW and will seek to design the UNSW stops consistent with TfNSW requirements. UNSW proposes to contribute any extra costs associated with this in relation to its construction.

Shelters at the UNSW stops will be designed to maximise transparency and visibility (while providing shade and rain protection where appropriate), and to the extent practicable to minimise barriers for pedestrians and reduce clutter and signage.

The reason for this particular attention to design detail (especially for the Anzac Parade stop) is due to the need for larger platforms resulting from the larger than typical number of users on a daily basis.

The proposed design changes (above that proposed by TfNSW) involve:

- A canopy over 100% of the platform length and the associated access ramps, rather than just 90% of the platform's length;
- Two signalised pedestrian crossings at Anzac Parade to provide access to both University Mall and College Walk directly from the ends of proposed island platform;
- Paving, kerbs, and footpaths equal in quality to the – University Mall paving types to ensure their integration;

- Bus shelter on the west side of Anzac Parade to match the stop shelter architecture;
- Public Art – UNSW seeks TfNSW access and guidelines for safe clearances to place public art in the median reservation south and north of the pedestrian crossings on Anzac Parade;
- Use of shared use poles (or Smartpoles as in the City of Sydney) as nearly all existing utility poles are intended to be removed between High Street and Day Avenue – shared use poles will limit clutter and reduce the number of roadside hazards; and
- Lighting appropriate to provide a safe environment and operation of CCTV at the stop consistent with Australian Standards.

3.2.3 Second Signalised Crossing

UNSW understands that TfNSW is yet to gain RMS support or approval for the proposed second pedestrian crossing at the UNSW Anzac Parade stop. UNSW seeks confirmation that the RMS would support the second pedestrian crossing which seeks to provide direct access to/from the island platform within Anzac Parade to both University Mall and College Walk. This is essential for the safe operation of the platform.

As noted in the UNSW original submission, the second crossing provides for important dispersal of pedestrian movements onto and off the platform and reduces congestion at a single crossing and allows for more effective and efficient movement onto and off the platform, particularly at peak periods. Dual crossings provide for easier circulation and allow pedestrian paths to more closely follow the natural desire lines into and out of the lower campus.

Overall, a safer pedestrian environment is created with a second pedestrian crossing commensurate with the likely level of light rail usage at this stop and level of saturation of the platform.

Lastly, it is requested, as recommended in Transafe's Road Safety Audit for this stop that the signals in this area of Anzac Parade be coordinated to prevent the "see-through" effect.

3.3 Concept Design – UNSW High Street Stop

A Concept Design for the UNSW High Street stop is included at **Appendix D** to address matters arising from the patronage study and to satisfy the objective of a LoS of 'C' (1.39m^2/passenger) under the VRIOGS.

The TfNSW proposal to move the stop from Wansey Road to High Street is supported. However, moving the stop into High Street has moved the light rail track and vehicles significantly closer to UNSW research facilities – now some 7.8m (as shown in the TfNSW drawings, between the Lowy Cancer Research Centre and the southern edge of the light rail track).

The UNSW alternative concept design differs from the TfNSW proposal in the following ways (noting the TfNSW design is nominated as indicative only):

- Location of the shared pedestrian and cycle path;
- Removal of general through-traffic from High Street and property access from Arthur Street rather than from High Street for the Wansey Road to Botany Street block (see further below);

- Location of the light rail track as far north within the High Street road corridor as possible;
- Side platforms contiguous with surrounding plaza and footpath levels in High Street rather than an island platform;
- Pedestrian plaza from Wansey Road to Botany Street with pedestrian crossings at each end of High Street within this block and with the track zone defined by rough paving, kerbs and bollards with provision for chains (if required); and
- Retained mature trees and landscaping within the frontage to the UNSW Kensington campus at the Lowy Cancer Research Centre and Wallace Wurth Building.

The benefits of these design changes are:

- Improved access to the stop;
- Improved and increased capacity of the stop;
- Ability to retain the green edge and landscaping at Gate 9 to the campus and buildings fronting High Street;
- Improved cyclist access and safety; and
- Ability for TfNSW to better mitigate against noise, vibration, electro-magnetic and radio frequency interference of core UNSW functions, including sensitive uses and research facilities near High Street, due to spacing / location of tracks and other potential design features.

Important issues in relation to the location of the stop and impacts of noise, vibration, EMI and RFI are addressed further below in **Section 3.4**.

Suggested conditions of approval at **Appendix B** set out the preferred approach sought by UNSW in relation to the adoption of the UNSW-preferred Concept Design.

3.3.1 Road Safety Audit

A Road Safety Audit has been carried out by Transafe to review the adequacy of the Concept Design for this Stop (See **Appendix G**). Transafe concludes that risks exist with both the TfNSW and UNSW options:

- Banning right turns to Botany Street from High Street or closing the street to traffic increases the risk of possible conflict for all road users;
- Reduced speed limits should be considered in High Street between Wansey Road and Botany Street to improve pedestrian safety for both TfNSW and UNSW's stop designs;
- The longitudinal step up/down from platforms to light rail tracks as proposed by TfNSW is a potential pedestrian hazard;
- The UNSW shared pedestrian and cycle path to the west of the light rail tracks within the Wansey Road road reservation decreases the potential for conflict between cyclists and adjacent traffic;
- Reduced numbers of poles and the careful location of them is recommended to limit roadside hazards;
- High Street crossings should be designed to allow a continuous crossing phase from the north to south sides of the street;
- UNSW's proposed at grade plaza and platforms allow for greater storage of rail patrons and is supported;

- The UNSW proposed provision of strategic planting, seating, and urban design features, including some fencing, within the proposed plaza are expected to minimise risk of conflict between light rail vehicles and pedestrians;
- Bus movements along the rail tracks as is possible is UNSW's proposal is possible but not preferred; and
- Uncontrolled at-grade crossings (2 off) of the light rail tracks as are proposed in the UNSW stop design, It is recommended careful consideration be given to design of these crossings to minimise risk to pedestrians.

3.3.2 Stop Architecture

The proposed stop architecture (comprising soft and hard landscaping, street furniture, shelters, barriers, signage and shared-use poles and the like) does not meet UNSW design quality expectations. Accordingly, UNSW proposes reviewing the stop architecture for suitability with TfNSW and will seek to design the UNSW stops consistent with TfNSW requirements. UNSW proposes to contribute any extra costs associated with this in relation to its construction.

Shelters at the UNSW stops will be designed to maximise transparency and visibility (while providing shade and rain protection where appropriate), and to the extent practicable to minimise barriers for pedestrians and reduce clutter and signage.

The reason for this particular attention to design detail (especially for the Anzac Parade stop) is due to the need for larger platforms resulting from the larger than typical number of users on a daily basis.

The proposed design changes (above that proposed by TfNSW) involve:

- Canopies over 100% of the platform lengths and the associated access ramps;
- Paving to match the paving in University Mall;
- Bus shelters to match the stop architecture for consistency;
- Use of shared use poles (or Smartpoles as in the City of Sydney) as nearly all existing utility poles are intended to be removed between Wansey Road and Botany Street – shared use poles will limit clutter and reduce the number of roadside hazards; and
- Lighting appropriate to provide a safe environment and operation of CCTV at the stop consistent with Australian Standards.

3.3.3 Location of Footpath and Cycle Path

The originally proposed shared footpath and cyclepath in Wansey Road at its western edge and near the High Street intersection appears to be have been moved to a central alignment within Wansey Road as a result of the changed stop location and design for this stop.

Whilst we note that the revised design for this stop is indicative only and subject to a detailed design process, it is UNSW's preference to see this cyclist infrastructure relocated to the western edge of the road reservation in the detailed design. This will avoid the need for additional crossings in Wansey Road for cyclists and pedestrians, de-clutter and simplify this intersection and remove the need for cyclists in particular to cross within the light rail alignment at the intersection. This will improve the safe use of the cycle path by removing two crossings of the cycle path across the light rail tracks (the other being on Wansey Road further north close to Alison Road) and reducing the risk of cyclists crossing

High Street through the middle of the signalised intersection at Wansey Road to enter the Kensington campus.

Overall, this will ensure appropriate and safe access along Wansey Road for cyclists (and pedestrians), the majority of which are University-related trips and improves / increases the operational efficiency of this intersection.

The Concept Design for the UNSW High Street stop (at **Appendix D**) re-iterates UNSW's preference for a shared pedestrian and cycle path along the western edge of the Wansey Road reservation, with a shared pedestrian / bicycle crossing of High Street to access into the Kensington campus at Gate 9.

3.3.4 High Street Pedestrian Plaza

The TfNSW proposal for Wansey Road (e.g. one way southbound) and High Street between Wansey Road and Avoca Street (one lane each way, some right turns prohibited) and the reduction of road pavement space in High Street, particularly at intersections where turning movements will be restricted, will significantly change traffic patterns throughout the local road network and reduce the importance of High Street as a traffic route.

The UNSW proposal to create a pedestrian plaza within High Street between Wansey Road and Botany Street will further change traffic patterns throughout the local road network and additionally reduce the importance of High Street as a traffic route.

The UNSW pedestrian plaza option offers significant benefits over the TfNSW option including reduced potential EMI, RFI and vibration impacts on UNSW research facilities, improved pedestrian safety, and increased stop capacity (as overflow can be accommodated on footpaths). Further detailed traffic modelling (meseoscopic to assess route choice changes and micro-simulation to assess detailed operations) is required to provide RMS and Council with sufficient information to allow an informed decision. UNSW seeks TfNSW support for, and input into, the development of the appropriate traffic modelling and negotiations with RMS and Randwick City Council.

UNSW understands that TfNSW acknowledges the proposal to change the section of High Street between Wansey Road and Botany Road into a pedestrian plaza, subject to the approval of all relevant authorities.

This conversion will enable the light rail tracks to be located as far north within the road reservation as a first step to ameliorate the impacts of EMI, RFI, noise and vibration to the University research environment.

Further, UNSW understands that TfNSW will consider the pedestrian plaza, to the extent that appropriate documentation can be provided during the design of the project and TfNSW will in the future coordinate with UNSW on the construction of the pedestrian plaza, subject to ensuring operations of light rail are maintained.

To ensure that the pedestrian plaza can proceed UNSW seeks the following condition:

> *TfNSW and UNSW shall work jointly in obtaining the necessary approvals by providing support to close High Street and create the High Street Pedestrian Plaza between Wansey Road and Botany Street. The road shall be closed to all vehicles except for the following: Light Rail Vehicles, emergency vehicles and buses. TfNSW shall provide access to information, technical assistance and assistance in negotiation with approving authorities.*

A possible alternative to this condition may be further requirements in this regard via the role a Network Coordination Liaison Group (or its equivalent) may play in resolving detailed designs and temporary, construction-related, and permanent operational traffic and transport changes resulting from the project. The Network Coordination Liaison Group is expected to consist of relevant road authorities such as RMS and Councils, as well as key partner stakeholders, such as UNSW. We have included both suggestions as part of **Appendix B.**

Note that this concept design is precautionary in regard to potentially minimising EMI and RFI to the environment and will increase the safety of the stop by removing other traffic from this section of High Street.

UNSW can commit to conducting the studies required to close the street to vehicles and to any additional costs for the construction of the pedestrian plaza. However, UNSW requires the support of TfNSW to assist in this process and to ensure that it is integrated into the detail design in a timely manner. If this done it may limit the cost of future mitigation.

3.4 Construction and Operational Impacts from Noise, Vibration, Electromagnetic Interference (EMI) and Radio Frequency Interference (RFI)

3.4.1 Sensitive Environments at UNSW

Sensitive environments at UNSW include but are not limited to:

- Current and future research spaces, such as the Lowy Cancer Research Centre and Wallace Wurth Building (which front High Street), the Tyree Energy Technologies Building which fronts Anzac Parade, the Mark Wainwright Analytical Centre, the Newton Building and Old Main Building and research development sites such as the Materials Science and Engineering Building Stages 1 and 2 and the Biosciences Renewal Project Stages 1 and 2;
- Teaching and performance spaces in vicinity of the proposed stops and construction compound;
- Student accommodation along both Anzac Parade and High Street;
- Teaching and performance spaces at NIDA at Anzac Parade (and adjacent to the proposed construction compound location); and
- Other UNSW environments in the vicinity of the proposed stops.

Additionally, some environments at the Kensington campus also have sensitive periods, such as exam, enrolment and census periods. Exams are typically held during the whole of June and whole of November and from 9am to 5pm throughout the day, enrolment periods are typically from mid-February to mid - March and mid-July to mid-August and census periods are generally from the beginning of April to mid-April and the beginning of September to mid-September.

Summer exams also occur in early to mid-February, typically from 9am to 4pm.

Further, student vacation periods' acting as study time precedes each of the exam periods and are also considered sensitive periods.

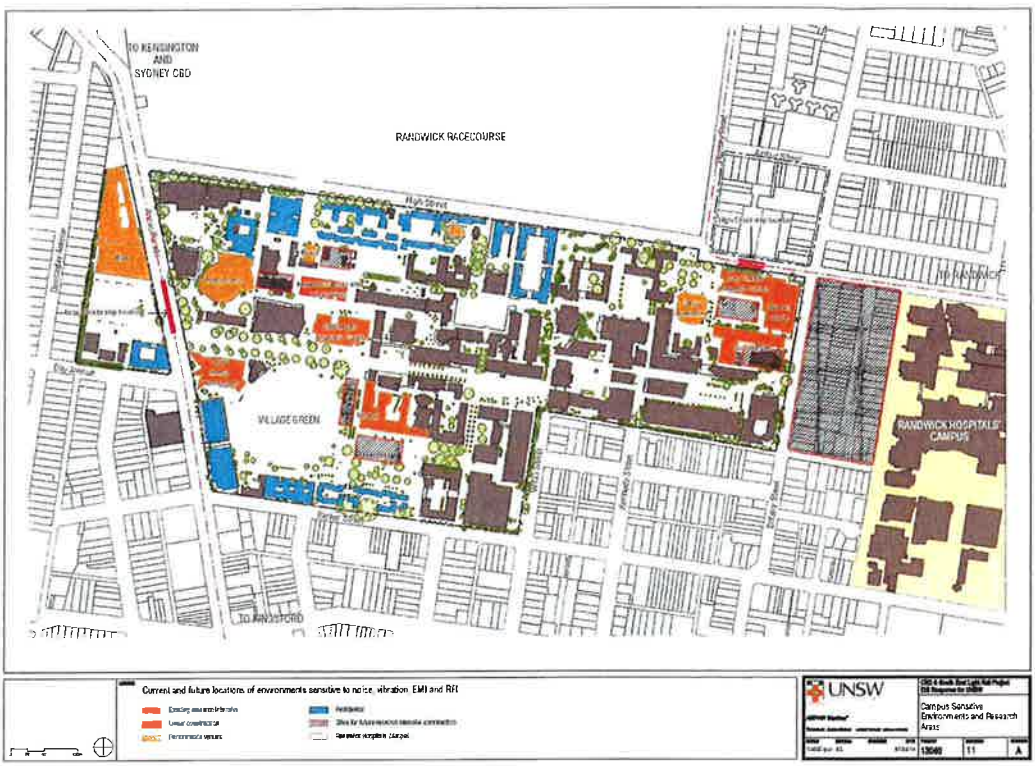

Figure 2 – Current and future locations of environments sensitive to noise, vibration, EMI and RFI
Source: UNSW

The calendar for 2014 and beyond has not yet been established, but the above is based on 2012 and 2013 timetabling. Key dates will need to be confirmed by UNSW at the beginning of each year.

Notably, UNSW exams are not held solely on the Kensington campus. Randwick Racecourse provides significant space for students and exams in its Oaks Marquee; Kensington Room (Ground Floor); Grandview Room (Level 1); Royal Randwick Ballroom (Level 2), Centennial Room (Level 3 South); and Skyline Room (Level 3 North). Typically Randwick Racecourse will accommodate up to 2,500 students at any given exam session in addition to exams concurrently held at the campus.

The above locations are not fixed and are also subject to change. Accordingly, information can be provided as it becomes available as well as throughout the proposed UNSW sign-off processes under various suggested conditions of approval.

To ensure normal business is able to continue for UNSW and it is able to provide teaching and research consistent with its obligations to its students and its charter, particularly in relation to exam conditions, careful consideration needs to be made to prevent construction impacts during these periods and to preserve consistent amenity.

We note any disruption to published and timetabled bus services during construction will also affect students' ability to arrive at the campus for classes and at exam locations.

To assist current timetables for classes are included at **Appendix I**. We have further sought to assist through relevant suggested conditions at **Appendix B**.

3.4.2 Noise and Vibration Impacts

A review of the EIS and the Preferred Infrastructure Report reveals that no technical assessment specifically related to the impact of construction and operation ground borne vibration on the operation of vibration-sensitive equipment has been undertaken in relation to the various UNSW sensitive environments identified.

It is still the view of UNSW that assurance should be provided that the necessary mitigation measures required to avoid significant adverse impact on their sensitive environments be demonstrated, as this currently cannot be ascertained from the EIS or the Preferred Infrastructure Report documentation.

Particular areas of concern with respect to the impact of the proposed light rail system on the UNSW sensitive environments remain as follows:

- Vibration from light rail rolling stock operating on track systems in the vicinity of sensitive sites affecting the performance of sensitive laboratory equipment and impacting research animals. This is dependent upon the specifically proposed rail/track fixings and the vibration reduction they provide and other possible vehicle design mitigation options;
- Vibration during the construction of the light rail system affecting the performance of sensitive laboratory equipment or impacting research animals that is or will be located in the identified sensitive environments, dependent upon the proposed construction methodology and equipment; and
- Highly intrusive construction or operating noise (Based on the EIS report, a 20dB exceedance over the proposed Noise Management Level is predicted).

To assist with consideration of this key issue, suggested conditions of approval have been included at **Appendix B**.

3.4.3 Electromagnetic Interference (EMI) and Radio Frequency Interference (RFI)

Background to the University's Concerns

Research is a core activity of UNSW. This research is of a co-ordinated national research network importance. The facilities are purpose designed to support this work. If the EMI/RFI environment deteriorates in any research sensitive location, an entirely new facility (or range of facilities) would be required to be constructed on a new site. Moreover, researchers and the research program maybe interrupted and lost. UNSW cannot tolerate this circumstance.

EMI and RFI are disturbances that affect an electrical circuit due to either electromagnetic induction or electromagnetic radiation emitted from an external source. In this case, there is a known risk of EMI and RFI associated with LRV operations manifesting as a time-varying DC magnetic field adjacent to the light rail alignment either caused by DC magnetic field emissions from the LRV propulsion power system and/or by temporary shifts in the earth's static DC magnetic field caused by movement of light rail vehicles.

There are specific examples where such EMI and RFI have caused negative impacts to the operation of advanced scientific and medical research equipment, affecting the ability to fulfil research missions at specialist university research facilities. In particular, UNSW would draw attention to the recent experience in Minneapolis, Minnesota, USA, where the Metropolitan Council of the City of Minneapolis has recently constructed a light rail transit project immediately

adjacent to research facilities located within the University of Minnesota's Minneapolis Campus.

The similarity between the circumstances at the University of Minnesota and the current situation facing UNSW are significant and compelling.

In the case of the University of Minnesota the Metropolitan Council of Minneapolis has proceeded with the construction of the light rail transit project, in some circumstances with the light rail lines within 25 m of sensitive research facilities in the absence of determining (prior to approvals) the existing levels of EMI and RFI or the actual predicted impact of EMI and RFI. The University of Minnesota ultimately was forced to seek redress through the courts, and an Agreement between the two parties was eventually agreed.

This Agreement stipulated specific vibration and EMI and RFI criteria that the light rail transit project needed to comply with, and established a framework for implementation of mitigation measures and ongoing real-time monitoring of vibration and EMI and RFI to confirm compliance with the criteria. Potential mitigation measures were identified as follows:

- Light rail vehicles that could operate on batteries while on campus;
- Installation of effective active cancellation devices (note: these strategies are still experimental and to our knowledge have not been validated in comparable situations);
- Moving the alignment; and.
- Relocation of affected laboratory facilities (recognizing that these facilities would not be able to be used for EMI and RFI sensitive research in the future), at a cost allocated to the CSELR project.

At their most extreme the mitigation measures provide that the Metropolitan Council will compensate the University of Minnesota for the relocation of impacted research facilities. Under the terms of this agreement two research facilities were ultimately relocated at a cost of over $25 million (USD) and over a year of work.

For UNSW the relevant research facilities are recently constructed or fitted out, are under construction or are planned for construction. They include but are not limited to the purpose built Lowy Cancer Research Centre, the Wallace Wurth Building, the Tyree Energy Technologies Building, the BioSciences Renewal Project stages 1 and 2, the Newton Building, the Old main Building, the Material Sciences and Engineering Building Stages 1 and 2, TETB and the Mark Wainwright Analytical Centre. Some are located opposite, and within 25m of, the proposed light rail stop on High Street or the proposed light rail stop on Anzac Parade..

UNSW Preferred Approach to Managing the EMI Issue

As is in evidence from the University of Minnesota case there is a clear potential for vibration and EMI/RFI impacts that significantly impede the ability for particular research to be progressed at the University, putting at jeopardy the entire research mission of various research centres. This has not been adequately assessed by TfNSW.

In particular, it is unknown what level of noise, vibration, EMI and RFI the CSELR project will have on the identified sensitive environments, what source and other mitigation measures may ameliorate the impacts to these sensitive envrionments to prevent jeopardising the University's various research missions, or the levels of noise, vibration, EMI and RFI that currently exist.

Without certainty around these issues UNSW is subject to a significant level of risk in terms of its ability to ensure its sensitive facilities are provided in the short, medium and long term ability to support its various areas of research. If these research missions are jeopardised, then it would have no alternative than to find an alternative locations, potentially resulting in UNSW having to relocate the research centres or losing these research centres entirely to another university. This risk is clearly unacceptable to UNSW.

Notwithstanding this, UNSW is an active supporter of the CSELR project and is supportive of light rail. However, given the significance of the impacts it is suggested by UNSW that a precautionary approach to managing the issue would be prudent.

With regard to the possible mitigation measures (identified above) it is noted that there is limited potential for retro-fitting vibration reduction and EMI/RFI cancellation devices, which are essentially experimental at this time. In the absence of specific impact assessment to determine whether the impacts are acceptable, a prudent and precautionary approach would be to minimise the impacts as much as possible in the first instance. This could be achieved through relocation of the light rail tracks as far to the north as possible for the High Street stop – meaning an alignment along the northern edge of High Street, rather than the currently proposed alignment in the centre of High Street. Whilst this is only a small distance it is virtual doubling of the distance from the Lowy Cancer Research Centre, which is a key research environment, it is highlighted that the levels of EMI/RFI at a receptor have been advised to be directly proportional to the inverse square of the distance from the source. Given this, a small increase in the distance between the source and the receptor can result in significant reduction in EMI/RFI at the receptor.

Whilst there is no guarantee (in the absence of a detailed impact assessment) that relocating the light rail tracks to the northern edge of High Street would reduce noise, vibration, EMI and RFI below unacceptable levels, it would result in impacts as low as reasonably possible.

EMI and RFI is caused by the operation of the light rail system, including the acceleration and deceleration of and the source of power to the LRV . The alternative concept design of the High Street stop and pedestrian plaza will lower the speed and lower the acceleration and deceleration of the vehicle and therefore lower the amount of EMI produced. This lowers the potential amount of EMI and RFI requiring mitigation. Considertaion needs to be given to alternate sources of power supply to the LRV as power supply through catenary wires is a known source of EMI and RFI.

Further, irrespective of the location of the CSELR tracks on High Street, it will be imperative to have a suitably robust and comprehensive condition of approval which protects UNSW and in particular protects the research mission of the University. Existing EMI/RFI levels have not been established by TfNSW and the time frame for this work may be extensive. There is a possibility that source mitigation measures will not be sufficient. Suggested conditions in this respect form part of **Appendix B.**

UNSW considers this issue to have a very high risk. If mitigation can only be achieved by rebuilding the facility the costs for the proponent and/or TfNSW will be very high.

The Unviersity's sensitive research facilities are reliant on providing the environment for experimental equipment that can be sensitive to EMI and RFI. This equipment is continually changing as research progresses.Therefore, maintaining the existing level of EMI and RFI in these facilities and for future proposed facilities is critical to maintaining research for the Unviersity.

Note that it is the facility environment that needs to be maintained, for the use of the building to be maintained, not individual pieces of equipment that are ephemeral.

3.5 Construction and Operational Impacts on UNSW Operations

Whilst this response is driven predominantly by UNSW's desire to see a safe and accessible environment at the campus for its students and staff and one which achieves and maintains a high level of amenity within, and at the edges of, the campus. To that end, these key concerns remain those tied to broadly meeting the project's objectives from a public benefit standpoint, but also the ability for UNSW to continue to be able to provide a learning, teaching, and research environment commensurate with its place as one of Australia's and the Asia-Pacific Region's premier universities, during both construction and operation.

It is essential that UNSW be able to operate as normally as possible during the CSELR construction works. Maintaining traffic and transport access to the campus is fundamental to ongoing operations not being detrimentally affected, and in turn affecting the University's reputation and standing, particularly with student intake and its ability to maintain a competitive business edge and attract not only students but the best staff and key supporters of education, research, technology, and innovation.

Key to the above is addressing the concerns as highlighted below.

3.5.1 Student and Staff Access

In addition to public transport, UNSW has approximately 8,000 staff and students arriving by private vehicle, 7,000 walking and more than 1,000 cycling to campus each day.

In order to continue operations, sufficient access points and capacity for each of these modes needs to be managed and maintained throughout construction and beyond in a safe and efficient manner.

Any changes to arrangements need to be coordinated and communicated in advance to avoid confusion and disruption to operations. This includes any space for being considered for a construction compound on the University campus where it may impact car parking or other University operation.

In order to ensure that the bicycle network extent and operations are supported by the CSELR project, UNSW engaged ARUP to review and recommend how this would best be achieved. ARUP's *External Bicycle Network* report was included at Appendix G to the original submission of 16 December 2013. The University maintains support ARUP's recommendations.

3.5.2 Delivery Access

Daily campus delivery requirements and campus specific construction traffic must be considered and managed during construction and delivery phases of the CSELR project.

Ongoing access for deliveries is essential for normal operations to continue. Access to the Kensington campus is limited to a number of entry/exit points. These were indicated at Figure 34 (Drawing 43 in Appendix A) of the original submission. All access points are likely to be affected by the construction works in

one way or another, and especially so, dependent upon the size of the delivery vehicle.

Certain access points presently cannot cater for oversized vehicles, whereas other access points can. Should any one Gate be affected for an extended duration (including the route to that Gate) severe impacts to supplies of materials and other important deliveries is likely to result. As can also be seen from Figure 34, not all loading docks or parts of the campus are readily accessible from other parts of the campus.

Some research activities rely on specialised gas and other services to operate. Due to the infrastructure involved use of alternative gates and access points may not be possible. Regular access for these activities will need to be maintained throughout the construction process and any proposed closures need careful planning and agreement. Lead times to enable closures may be significant so as not to adversely impact University operations.

3.5.3 UNSW Construction Program

The UNSW Kensington Campus has a building replacement cost value of approximately $2.5bn. With ageing built infrastructure the university currently spends in the order of $200m a year on facilities.

At present there are 4 major projects recently completed or underway on the Kensington Campus:

- Wallace Wurth School of Medicine (completion May 2014) - $146m;
- Kensington Colleges Redevelopment (completed January 2014) - $110m;
- Materials Science Building (completion June 2015) - $145m; and
- Mechanical Engineering Refurbishment (completion March 2015) - $68m

In December 2013 the University Council approved a capital program that will see the University continue to undertake a similar level of activity throughout the period of the construction of the CSELR. The projects in this capital development program are as noted in Table 1 below.

Table 1 – UNSW Capital Development Program – Short term

Project	Budget	Construction Period	Construction Access
Biosciences Phase 1	$150m	2014 - 2017	Gate 11 Botany Street
Biosciences Phase 2	$120m	2017 - 2020	Gate 11 Botany Street
Materials Science Lab Fit Out	$38m	2015	Gate 2 High Street
Chemical Sciences Refit	$63m	2016 - 2017	Gate 2 High Street
Electrical Engineering Refit	$100m	2015 - 2016	Gate 2 High Street
Civil Engineering Refit	$40m	2016 - 2017	Gate 11 Botany Street
Squarehouse / Blockhouse	$48m	2017 - 2018	Gate 2 High Street

The University will also be reviewing its student accommodation demand following the opening of 950 new beds in 2014. If sufficient demand exists additional student accommodation could be developed.

The University also has other projects in planning that are subject to external funding from Government and / or fundraising.

The construction program is broadly identified in the Figure 35 (Drawing 9 in Appendix A) to the original submission. As with routine deliveries, only certain access points and Gates will be able to directly serve individual construction sites.

Some of these Gates are directly affected by the timing, duration and location of the CSELR project and its works.

To assist in resolving routine and construction access issues and likely impacts, UNSW seeks to work proactively with TfNSW to formulate a construction program that is mutually acceptable to both parties and considers the economic and business impacts of each project or entity.

3.5.4 Journey Time

Chapter 5 of the EIS Proposal infrastructure and operations (Tables 5.6 and 5.7) indicates the following journey times for the light rail:

- UNSW Upper Campus to Central 13 minutes;
- Central to UNSW Upper Campus 16 minutes;
- UNSW Lower Campus to Central 14 minutes; and
- Central to UNSW Lower Campus 15 minutes.

These times are broadly the same as the timetable for the existing UNSW express bus service of 15 minutes. UNSW notes signal priority will enable the light rail system to achieve 97% reliability and also notes the importance of coordinated signals in zones such as in Anzac Parade between High Street and Barker Street.

Additionally, it is noted that elements of delay have been factored into these journey times and that the final performance will be part of the detailed design phase of the proposal (5.4.3. LRV road network integration Pg. 5-82 of the EIS).

As the largest customer destination of the proposed light rail UNSW proposes a number of measures to reduce journey times between UNSW and Central Station:

- As the mass transport mode, provide the light rail with higher priority under the Sydney Coordinated Adaptive Transport System at key intersections and during key periods;
- Include technology used by other modern light rail systems including signal pre-emption at key intersections;
- Increase the amount of separate running for the light rail to improve speed in key parts of the corridor;
- Include coordination of signals in the Anzac Parade zone between High Street and Barker Street; and
- Include journey time improvement as one of the criteria for procurement of the operator.

It is noted that the proposed UNSW Anzac Parade stop will simplify the signal operations of the corner of Anzac Parade and High Street improve the journey time relative to the forecasts above.

UNSW does not support any changes that would increase travel times between Central Station and the UNSW Kensington Campus e.g. additional stop(s).

3.5.5 Bus Services

UNSW notes that the CTTMS by Booz & Company and Aecom executive summary (pg. xvi) identifies no mitigation strategies in relation to construction impacts for the Randwick Precinct where it addresses UNSW. It is also noted the express services remain in place with no mitigation measures identified (University Express Services 890, 891 and 892 4.6.6.5 Pg. 152 of the EIS).

This contrasts with the mitigations measures for class 1 and 2 special events, which the University express bus services qualify as, in terms of impact, but are not defined as,

UNSW accepts that there will be disruption during the construction of the CSELR project. However the University does not accept that there are no mitigation measures to offset the disruption and maintain or improve the experience for its staff and students particularly those travelling on the express bus services from Central Station.

Arrangements at Central Station / Express Services

UNSW is in a highly competitive environment to attract and retain top students. Many of the students who endure the construction activities will not benefit from the CSELR project as they will have graduated.

The failure of the UNSW express bus services to be able to cope with UNSW staff and students, including a bus every 75 seconds, is a key driver of the need for mitigation strategies for these services as part of the project.

Accordingly, UNSW requests the following changes and inclusions:

- Run express buses in the morning peak along Alison Road and Botany Street onto High Street;
- Provide shelter at Eddie Avenue;
- Investigate loading express buses on Chalmers street south of Devonshire Street per the major events;
- Guarantee Sydney buses staff are on site to load buses from rear doors and ensure ticket machines are operational;
- Allow the larger articulated buses to continue to provide express bus services;
- Dispense with tickets for the duration of construction;
- Provide supplementary services from Green Square, Redfern and/or Bondi Junction; and
- Provide alternate depot locations for peak service buses to the southern side of the harbour (eg Green Square) to improve service reliability.

NSW Long Term Transport Master Plan

The NSW Long Term Transport Master Plan includes an action for a pedestrian friendly CBD:

> 4.9.3
>
> Action Create new dedicated pedestrian links in the CBD
>
> A Central Station east-west link (parallel and to the north of Devonshire Street tunnel and providing a link across Pitt and George Streets to the west).
>
> *We will prioritise pedestrian access and mobility in and around busy CBD public transport interchanges, contributing to the creation of attractive, safe pedestrian friendly urban precincts.*
>
> 4.9.1 – A transit Friendly CBD

Under the action of Upgrading Busy CBD Interchanges, we note:

> *Central Station – A comprehensive and multi-modal upgrade would encompass and integrate trains, coaches, taxis, buses and light rail. The rail network efficiency program provides opportunity to streamline rail services to Central. The implementation of Sydney's Rail Future and construction of light rail will enhance the role of the Station and possibly require an upgrade to better integrate with surrounding transport infrastructure. The upgrade will alleviate overcrowding on some platforms and pedestrian congestion in the passenger terminal at peak times. Wayfinding will be improved within and outside the station.*

The Central Station East-West link is required to provide an integrated solution and seamless transfer between heavy rail and light rail for University staff and students as well as people attending special events.

UNSW notes that this is an agreed action of the NSW Long Term Transport Master Plan and recommends that it is delivered in time for 2019 when light rail services start.

Arrangements at Randwick Racecourse (Exam Periods / Locations)

As a consequence of University operational requirements, including particularly key periods such as exam times and session commencement times it is requested that the works be timetabled to avoid key periods advised for the University.

This includes consideration of works in Alison Road and the certainty of bus timetabling during these periodsas they will impact UNSW exams held at the Randwick Racecourse.

Other Bus and Operations comments

It is noted that UNSW supports:

- The Anzac Parade Services (routes 391, 392, 394 and 399) continuing to Gate 9 High Street providing direct connections to UNSW;
- The continuation of cross regional bus services via High Street including routes 348, 370, 375, 400 and 410; and
- The Kingsford mitigations strategies of Tidal flow operation on Anzac Parade and staged construction activities in the Anzac Parade and Alison Road corridors.

It is also noted that the University Express bus services and Metrobus routes M10 and M50 will not operate as they will be replaced by CSELR.

Future Routes / Services

UNSW strongly recommends that decisions regarding all future bus routes and the operation of the Light Rail Services are made on merit i.e. that neither place contractual limitations or restrictions on the other.

3.6 Ongoing Consultation with UNSW

UNSW has had a key role throughout the CSELR project in providing resources and playing a critical role in design and development of the project on the Client Working Group and other forums.

It is noted that the UNSW community will be the largest single customer for the CSELR project. Its staff and students will also travel counter to the commuter flow to the CBD using what would otherwise be surplus capacity.

The University, as a key partner in the CSELR project, seeks to maintain positive and meaningful engagement on the project in ensuring its objectives can be achieved.

As stated in this and in its original submission to the EIS, UNSW will continue to partner with TfNSW and the contractor to find solutions to the recommendations raised in this submission package that enhance detailed design process and the facilitation and delivery of the light rail network.

UNSW has sought to work collaboratively in achieving optimal outcomes for the University and the wider community. Its strong desire is to assist in detailed design outcomes as put forward in this submission, particularly for light rail stops at its perimeter and those along the route that affect the daily operations of the campus.

To achieve suitable and meaningful input into the detailed design phase, UNSW seeks the preparation and implementation of a stakeholder liaison protocol and sign-off mechanism to address early works and main construction works to assist in input, feedback (and critically) notification of when certain works may be carried out. As noted, UNSW has numerous sensitive uses and functions for which significant disruptions (programmed or otherwise) may pose significant issues to those uses and the University in general. Additionally, as noted below, the University is its own service provider and therefore needs appropriate consultation regarding the ongoing operation of its services. Accordingly, the potential staging and planning of works will be an important consideration for and impact upon UNSW.

UNSW acknowledges that the detailed design process for the CSELR will continue after the EIS process has completed. UNSW proposes the following principles for the UNSW stop designs and for the corridors on Anzac Parade (between High Street and Barker Street) and High Street (between Wansey Road and Botany Street) as well as any services, utilities, bus stop and other impacts on the Kensington campus:

- Notice period of 15 business days following issue of documentation for comment on any design changes;
- A clear rationale for any design changes with reference to UNSW's priorities, the social impact objectives of the project and previous design drawings and concepts;
- Engagement of an independent certifier should there be a dispute between TfNSW and UNSW on a design solution; and
- Services and utilities:
  - A notice period of 90 days for any proposed electrical, telecommunications and IT infrastructure works; and
  - A notice period of 30 business days for any other services infrastructure works.

Note: the University owns and operates its own utilities infrastructure and therefore is a utilities authority for services infrastructure within the campus. Any proposed changes, alterations or shutdowns of these utilities must be appropriately notified to and agreed with UNSW.

A Business and Landowner Engagement and Management Plan as well as a Business Management and Assistance Strategy are to be implemented by TfNSW to proactively work with businesses. UNSW again requests that it is defined as a business for the purposes of these plans and strategies. Suggested conditions at **Appendix B** seek this.

Lastly, UNSW will also be party to a Development Agreement as part of CSELR project and, as relevant, this will seek to further address management and issues mitigation procedures and a range of development and construction matters in that agreement.

4.0 Conclusion

UNSW is a significant contributor to the ongoing success of the Sydney public transport network and the success of the CSELR project, bringing some 25,000 passengers to the Kensington campus weekdays, including 17,000 alone on buses between Central and the campus. Additional to this are the visitors to campus for special events both during the week and at weekends.

To that end alone it is Sydney Buses biggest single customer destination. This is expected to continue to grow as UNSW itself grows. Indeed, UNSW provides "special event" status to the network on a twice daily basis. The EIS has noted this in nominating the two proposed UNSW stops as the 4th and 5th busiest in the CSELR project, and the two busiest on the south-eastern corridors. This UNSW daily passenger load clearly provides the single greatest driver of the benefit case for the light rail.

As a key partner in the CSELR project UNSW will continue to liaise with TfNSW (and the contractor) to clarify and resolve any issues raised in this submission and to find appropriate outcomes that enhance the facilitation and delivery of the light rail network. UNSW has sought to work collaboratively with TfNSW in achieving optimal outcomes for the UNSW and the wider community.

This submission addresses remaining concerns arising from both the EIS and the Submissions Report in relation to both stops at UNSW (at Anzac Parade and at High Street), as well as a range of remaining construction and operational issues. Where relevant, UNSW and its consultant team has prepared a set of suggested conditions of approval to further mitigate against environmental impacts of the project and to ensure appropriate outcomes in relation to both short and long-term impacts.

Key remaining issues are:

- The capacity of the UNSW stops, including platform sizes, and assumptions around Level of Service (LoS) benchmarking;
- Concept designs for each of the UNSW stops having regard to the above, including stop architecture;
- Creation of a pedestrian plaza in High Street between Wansey Road and Botany Street;
- Impacts of noise, vibration, electromagnetic interference (EMI) and radio frequency interference (RFI) upon sensitive teaching, research and other University environments during construction and operation of the light rail; and
- Impacts upon general UNSW operations and maintaining 'business-as-usual' in terms of traffic and access, and bus services; and
- Ongoing consultation with UNSW.

In general, suggested conditions of approval seek to ensure that UNSW's typical daily operations can continue as unaffected as possible in recognition of the importance the University plays in the Precinct and to the economy in general. As discussed in the original submission by UNSW, significant detrimental effects have the potential to introduce wider-ranging and longer-term impacts upon the Precinct's and University's viability, amenity, character, reputation, business continuity and capacity and capability for the future.

Commentary to TfNSW Response to UNSW Submission

UNSW and its consultant team

Appendix A

Appendix A - Commentary to TfNSW Response to UNSW Submission

EIS Reference Document	Page	Section	Summary of issues	Response	UNSW Response
Executive summary	E7	Table: key regional impacts and benefits of the CSELR – regional traffic, transport and access	It is essential that the UNSW campus remains accessible during construction of the light rail for retail and other delivery vehicles, construction vehicles for sites on the campus, staff and student parking, cyclists and pedestrians.	Agreed. Transport for NSW would work closely with UNSW to ensure safe access is maintained during construction. Specific traffic management plans would be prepared for construction worksites by the selected contractor.	The proposed mitigation measures for traffic and access impacts are insufficient. A Traffic Management Plan and/or Access Management Plan for the UNSW Kensington Campus is specifically required. The Plan should be prepared in consultation with UNSW. During construction UNSW would seek a review of the traffic signal operations and intersections in close proximity to the proposed stops. Note also that UNSW transport peaks represent buses travelling in opposite directions to the general commuter peaks. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report, Sections 3.5, 3.6 and Appendix B: Suggested Conditions of Approval no B4 - B8 and C1-C5.
	E9	Table: Key regional impacts and benefits of the CSELR - Local traffic, transport & access			
	E10	Table: Key regional impacts and benefits of the CSELR - Impacts on planted trees	It is noted that a large number of trees will be removed along Anzac Parade, Wansey Road and probably High Street. UNSW is concerned at the loss of these trees and the consequential adverse impact on landscape amenity and historical significance of the district in general and the UNSW campus in particular.	It is acknowledged that the removal of trees in these locations represents a substantial impact. Details are provided in sections 15.6 and 16.6, Volume 1B of the EIS. To reduce the extent of tree removal on Anzac Parade it is proposed to relocate the UNSW Anzac Parade stop to the centre of Anzac Parade. This would prevent the removal of approximately 23 significant	Noted The loss of trees in in the vicinity of the relocated UNSW High Street stop is not responded to. The proposed mitigation measures for visual and landscape impacts are insufficient.

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				trees. Details of this proposed design change are provided in section 6.13 of this report. Trees which are removed would be replaced in accordance with the Transport for NSW's *Vegetation Offset Guide (2013)* which provides for replacement at a ratio of between 2:1 and 8:1 depending on the size of tree to be removed.	UNSW has prepared alternative concept designs for the UNSW Anzac Parade and High Street stops. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report: Sections 3.2, 3.3 and Appendix D: Concept Designs for UNSW Stops. A strategy for tree maintenance by the operator for an agreed period is required in consultation with UNSW. See the Review of Submissions Report, Appendix B: Suggested Conditions of Approval no. B14-B19
	E12	Table: Key regional impacts and benefits of the CSELR - Surface water, hydrology/drainage	The existing local stormwater flooding along Anzac Parade from High Street to Day Street adjacent to UNSW is not addressed. The UNSW overland stormwater flood path drains onto Anzac Parade across the proposed construction compound and the UNSW Anzac Parade stop.	Transport for NSW is aware of this issue and it is acknowledged in the EIS in section 10.2, Volume 1A. Further detailed analysis of flooding and stormwater drainage would be undertaken during detailed design.	No mitigation measures for flooding and stormwater drainage impacts are indicated. UNSW has prepared alternative concept designs for the UNSW Anzac Parade and High Street stops. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Appendix D: Concept Designs for UNSW Stops. Overland flooding, stormwater analysis and management at these stops are required in consultation with UNSW. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.6, Appendix B Suggested Conditions of Approval no. C4 - C11.
Part B: The proposal and its development. Chapter 4 Definition	4-5	Table 4.1 Alignment strategies	It is unclear how the Park typology will apply at the UNSW High Street stop and the Boulevard typology at the UNSW Anzac Parade stop, given that grass tracks will not be implemented and the track	The typologies relate to the overall CSELR alignment. An overview of each stop design is provided in Section 5.2.3, Volume 1A of the EIS (page 5-52). Specific architectural treatment would be addressed	The proposed mitigation measures for visual and landscape impacts are insufficient. UNSW has prepared alternative Concept Designs

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design development			treatment for each will be Park/Concrete and Boulevard/Concrete. The statement within the column 'Response to requirements' to allow for interchange facilities at the UNSW Anzac Parade stop is incorrect. The interchange is at the Kingsford stop.	during detailed design and UNSW would be consulted in relation to the design of the UNSW High Street and UNSW Anzac Parade stops. Proposed design changes to these stops are described in section 6.11 (UNSW High Street) and section 6.13 (UNSW Anzac Parade) of this report. It is agreed that the UNSW Anzac Parade stop would not be a formal interchange; however some interchange between light rail and local bus services is anticipated at this location.	for the UNSW Anzac Parade and High Street stops. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Appendix D: Concept Designs for UNSW Stops. Agreement to the architectural design of these stops is required in consultation with UNSW. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Sections 3.2 and 3.3, Appendix B: Suggested Conditions of Approval no. B9 and B10.
	4-9	Figure 4.3 Key design options considered	It is noted and supported that the use of the King Street tram shed for maintenance and the use of Racecourse land near the intersection of Wansey Road and High Street for stabling, were not considered further as options.	Noted.	Noted
	4-17 & 4-18	4.3.3 Alignment on Wansey Road and Figure 4.8 Wansey Road alignment options	Option 1 is supported as the preferred alignment option along Wansey Road.	Response noted. Following consultation with Wansey Road residents and Royal Randwick racecourse, design changes to the scheme along Wansey Road are now proposed. This change essentially provides for the alignment presented in Option 2 with one lane of traffic in the southbound direction and retention of parking along the eastern side of Wansey Road. Details are provided in section 6.11 of this report.	Noted See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3. 3.3, and Appendix B: Suggested Condition of Approval no. B10.
Part B: The proposal and its development. Chapter 4 Definition design development	4-23	Table 4.4 Short-listed alternative stop locations considered for the CSELR proposal	The statement for the proposed side running track option that 'pedestrian movements between the light rail platforms and the lower campus of UNSW would not require crossing of Anzac Parade', is incorrect. Pedestrians on the western side of Anzac Parade will have to cross the road to access the platforms. Similarly, those alighting from the light rail carriages	Following consultation with UNSW regarding the UNSW Anzac Parade stop, it is proposed to relocate the stop to the centre of Anzac Parade as requested. Further detail is provided in section 6.13 of this report. The proposed design change would allow for the retention of approximately 23 significant trees along	The proposed mitigation measures for visual and landscape impacts are insufficient. The proposed mitigation measures for traffic and access are also insufficient. UNSW has prepared alternative concept designs for the UNSW Anzac Parade and High Street stops.

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			who wish to access the western side of Anzac Parade will have to cross the road. The side running track on UNSW land is not supported and it should be changed to a centre running track with an island platform so as to avoid loss of UNSW land, relocation of underground services, removal of significant trees and landscaping along the campus frontage. The preservation and maintenance of all significant fig trees along Anzac Parade in the vicinity of the UNSW campus is considered essential to preserve the amenity and character of the campus. No tree replacement strategy is provided. It is unclear how the Boulevard typology will apply at the UNSW Anzac Parade stop, given that grass tracks will not be implemented and the track treatment will be Boulevard/Concrete. Further discussion with UNSW is required as to how pedestrians, cyclists and buses will be managed at this stop.	Anzac Parade within the UNSW campus in comparison to the alignment presented in the EIS. Construction may require the removal of some existing trees within the University boundary (south of University Mall) adjacent to the footpath. Existing landscape areas associated with the Tyree Building forecourt would also be removed for the bus stop. Details of tree replacement and landscape design would be addressed during the detailed design phase. An overall strategy for tree replacement is described in the EIS. Transport for NSW would consult with UNSW regarding these matters. Further discussion would be undertaken in relation to the management of pedestrians, cyclists and buses as requested. The boulevard typology applies to the CSELR alignment. Specific architectural details of the stops would be developed during detailed design.	See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Appendix D: Concept Designs for UNSW Stops. A strategy for tree maintenance by the operator for an agreed period is required. Agreement to the architectural design of these stops is required. Detailed management of pedestrians and traffic during construction via Traffic Management Plans for these two stops is also required. All of the above in consultation with UNSW. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Sections 3.2 and 3.3, and Appendix B: Suggested Conditions of Approval no. B9 and B10, and B14-B19.
	4-29	4.5.1 Stabling and maintenance facility options	It is noted and supported that the use of the King Street tram shed for maintenance and the use of Racecourse land near the intersection of Wansey Road and High Street for stabling, were not considered further as options	Noted.	Noted
Part B: The proposal and its development. Chapter 5 Proposed infrastructure &	5-16	5.2.2 The CSELR stops - bicycle parking facilities	The statement that 'Convenient bicycle parking facilities would be provided near platforms'. Requires clarification. For the two UNSW stops, bicycle parking facilities are already provided on the campus.	As noted on Page 5-16 of the EIS (Volume 1A), bike parking facilities are proposed to be provided at the UNSW High Street and UNSW Anzac Parade stops. The integration of these facilities with existing campus	No bike parking facilities have been shown in TfNSW drawings for the UNSW stops. UNSW has prepared alternative concept designs for the UNSW Anzac Parade and High Street stops. See the UNSW Submission to the CBD & South East Light Rail Project

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operations				bicycle facilities would be discussed further with UNSW during the detailed design phase and outlined in the project agreement to be negotiated between UNSW and Transport for NSW.	Submissions Report Sections 3.2 and 3.3 and Appendix D: Concept Designs for UNSW Stops. UNSW does not seek bike parking facilities at these two stops.
	5-44 & 5-45	Figure 5.31 Indicative section - UNSW High Street stop & Figure 5.32 Indicative plan - UNSW High Street stop	Further discussion with UNSW is required as to how pedestrians, bicycles, buses and other vehicular traffic will be managed at this stop and at the intersection of Wansey Road and High Street. Clarity is required on integration of the existing share bike path along Wansey Road. It is unclear how the Park typology will apply at the UNSW High Street stop, given that grass tracks will not be implemented. The loss of the mature fig tree on the corner of Wansey Road and High Street is not shown. No tree replacement strategy is provided. Both figures show a 2-way traffic flow in Wansey Road that conflicts with the statement on page 5.44 that the narrowing of Wansey Road around the stop 'would require the reduction of existing traffic along Wansey Road into a one-way configuration'.	Further consultation would be undertaken with UNSW during detailed design in relation to management of pedestrians and traffic at the UNSW High Street stop. Specific details of tree removal and replacement would be determined during detailed design. The assessment provided in section 15.6 of the EIS (Volume 1B) provides an upper limit vale for the total number of trees removed. The Park typology relates to the alignment in this location rather than the stop design. Architectural design for the stops would be undertaken during the detailed design phase of the proposal and UNSW would be consulted during this phase. Outcomes of this consultation would be outlined in the project agreement to be negotiated between UNSW and Transport for NSW. The statement on page 5-44 of the EIS (Volume 1A) that Wansey Road would be one-way is incorrect. The design for the UNSW High Street stop described in the EIS provides for two-way traffic along Wansey Road and removal of all on-street parking from Wansey Road.	The proposed mitigation measures for visual and landscape impacts are insufficient. The proposed mitigation measures for traffic and access impacts are also insufficient. UNSW has prepared alternative concept designs for the UNSW Anzac Parade and High Street stops. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Sections 3.2 and 3.3 and Appendix D: Concept Designs for UNSW Stops. A strategy for tree maintenance by the operator for an agreed period is required. Agreement to the architectural design of these stops is required. Detailed management of pedestrians and traffic during construction via Traffic Management Plans for these two stops is also required. All of the above in consultation with UNSW. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report , Appendix B: Suggested Conditions of Approval no. B9 and B10, and B14-B19. Noted Noted

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				However, in response to concerns raised by Wansey Road residents, a design change is now proposed to retain on-street parking adjacent to residential properties between Alison Road and Arthur Street. Wansey Road would be one-way southbound. Refer to section 6.11 of this report for further detail.	Noted
Part B: The proposal and its development. Chapter 5 Proposed infrastructure & operations	5-52 & 5-53	Figure 5.39 Indicative section - UNSW Anzac Parade stop & Figure 5.40 Indicative plan - UNSW Anzac Parade stop	The side running track on UNSW land is not supported and it should be changed to a centre running track with an island platform so as to avoid loss of UNSW land, relocation of underground services, removal of significant trees and landscaping along the campus frontage. The preservation and maintenance of all significant fig trees along Anzac Parade in the vicinity of the UNSW campus is considered essential to preserve the amenity and character of the campus. No tree replacement strategy is provided. Further discussion with UNSW is required as to how pedestrians, cyclists and buses will be managed at this stop.	Please refer to response for page 4-23 above in relation to the proposed relocation of the UNSW Anzac Parade stop to the centre of Anzac Parade and associated issues.	The proposed mitigation measures for visual and landscape impacts are insufficient. The proposed mitigation measures for traffic and access impacts are also insufficient. UNSW has prepared alternative concept designs for the UNSW Anzac Parade and High Street stops. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Sections 3.2 and 3.3 and Appendix D: Concept Designs for UNSW Stops. A strategy for tree maintenance by the operator for an agreed period is required. Agreement to the architectural design of these stops is required. Detailed management of pedestrians and traffic during construction via Traffic Management Plans for these two stops is also required. All of the above in consultation with UNSW.
			UNSW trade waste, water supply bores and associated reticulation and stormwater will be affected. More specifically, existing underground services include:	The proposed relocation of the stop would prevent impact on the water supply bores and other utilities nominated.	See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report, Appendix B: Suggested Conditions of Approval no. B9 and B10, and B14-B19. The proposed mitigation measures for utilities and services impacts are insufficient. UNSW is also a

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			– Location of two of the three large water production bores and associated services for the city of Kensington Campus which draws some – 200kL/day of groundwater for 'commercial' uses. – UNSW main stormwater pipeline runs within part of this strip of land.* Bore water reticulation drain point lies immediately beneath the platform. – Irrigation pipelines run the length of the proposed land acquisition. – Trade waste grease arrester and associated sewer drainage. – Bore water mains exist across Anzac Parade to provide supply to Western Campus and to L5 site. Substantial relocation of stormwater services will be required to remove them from the acquired land.		service provider and needs to be consulted during the design and construction stages of the project with regards to any field surveys, the location of water supply bores and other utilities and any protection, relocation or replacement measures required. The risk of interruptions to UNSW utilities, services and infrastructure during construction needs to be specifically addressed by considering key notification periods required. See also Section 3.6 of the UNSW Submission to the CBD & South East Light Rail Project Submissions Report. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report, Appendix B: Suggested Conditions of Approval no. B44.
	5-65	5.2.6 Associated light rail infrastructure and services - security and services	The security systems at the UNSW Anzac Parade stop and the UNSW High Street stop will need to integrate with 24/7 on UNSW on-campus security systems. UNSW will require access to CCTV footage at these stops and at the Chalmers Street stop.	Transport for NSW would liaise with UNSW to determine whether the requested integration of stop and campus security systems is reasonable and feasible. Outcomes would be outlined in the project agreement to be negotiated between UNSW and Transport for NSW.	The proposed mitigation measures for safety and security impacts at the two UNSW stops are insufficient. UNSW has prepared alternative concept designs for the UNSW Anzac Parade and High Street stops. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report at Sections 3.2 and 3.3 and Appendix D: Concept Designs for UNSW Stops. Specific safety and security measures addressing emergency incidents, road safety, pedestrian/vehicle conflicts, the transport of hazardous materials, disabled persons etc tailored around the redesigns are required in consultation with UNSW. See the UNSW Submission to the CBD & South East

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					Light Rail Project Submissions Report, Appendix B: Suggested Conditions of Approval no. B9 and B10.
	5-67 & 5-68	5.2.7 Road configuration changes	The provision of an indented bus bay within UNSW for westbound buses on High Street is not supported. No discussion with UNSW on this matter has taken place. Adverse impact on UNSW underground services and loss of large mature trees will result. Clarity is required as to whether this land is to be acquired from UNSW as it is not shown in Table 5.2 on page 5-74. The temporary westbound bus stop west of Wansey Road during construction should become the permanent westbound bus stop in High Street. Consultation with UNSW is required on any restrictions to right hand turns from Anzac Parade into Barker Street and from Anzac Parade into High Street. These streets are used to access the campus vehicle entrances.	This bus bay is no longer proposed due to the proposed relocation of the UNSW High Street stop to the centre of High Street. Refer section 6.11 of this report for further detail. It is proposed that the bus stop would be relocated to the west of Wansey Road on the existing kerb. Transport for NSW would consult with UNSW during detailed design in relation to the issues raised at this location. Outcomes of this consultation would be outlined in the project agreement to be negotiated between UNSW and Transport for NSW. Details of tree removal and proposed mitigation would be developed during detailed design and discussed with UNSW.	Noted Noted The proposed mitigation measures for visual and landscape impacts are insufficient. The proposed mitigation measures for traffic and access are also insufficient. UNSW has prepared alternative concept designs for the UNSW Anzac Parade and High Street stops. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report at Sections 3.2 and 3.3 and Appendix D: Concept Designs for UNSW Stops. A strategy for tree maintenance by the operator for an agreed period is required. Agreement to the architectural design of these stops is required. Detailed management of pedestrians and traffic during construction via Traffic Management Plans for these two stops is also required. All of the above in consultation with UNSW. See also Sections 3.5 and 3.6 of the Submission regarding traffic impacts and ongoing consultation, respectively. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report, Appendix B: Suggested Conditions of Approval no. B9 and B10, and B14-B19.

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	5-69	5.2.9 Street trees	This section does not address the existing significant trees on Anzac Parade between High Street and Barker Street along the campus frontage.	Discussion of potential impacts to these trees is provided in section 16.6, Volume 1B of the EIS. The impacts to trees would be reduced (by approximately 23 significant trees) due to the proposed relocation of the UNSW Anzac Parade stop to the centre of Anzac Parade. Refer section 6.13 of this report for further detail.	Refer to responses on these issues above
	5-74	Table 5.2 Permanent land acquisitions	Permanent acquisition of UNSW land at the UNSW Anzac Parade stop is not supported because the side running track on UNSW land is not supported (see comments above re pages 4-23 and 5-52).	As discussed above the UNSW Anzac Parade stop is proposed to be relocated to the centre of Anzac Parade (refer section 6.13 of this report). No land acquisition at this location is anticipated for the CSELR.	Refer to responses on these issues above. Additional UNSW land is available under the Concept Design for Anzac Parade to ensure a suitable design to ensure suitable safety, urban design and traffic outcomes.
	5-75	Table 5.3 Temporary leases for construction	The temporary lease of UNSW land off Anzac Parade is not supported because the need for a construction compound in on the UNSW campus is not supported. The location of a compound on the lower campus will require the relocation of UNSW underground services, removal of trees, landscaping and lawn and adversely affect pedestrian routes and teaching. The underground services will be inaccessible for repairs and maintenance and may also be damaged during construction due to ground settlement and compaction. The UNSW overland stormwater flood path drains onto Anzac Parade across the proposed construction compound.	A construction compound at the site of the UNSW Anzac Parade stop is no longer proposed due to the relocation of stop further south and into the centre of Anzac Parade. Refer section 6.13 of this report for further detail. This design change also includes the relocation of the construction worksite from the University boundary on the eastern side of Anzac Parade, to the existing University car park adjacent to the NIDA building (refer to section 6.15 of this report for details).	Noted No proposed mitigation measures for impacts from the relocated UNSW construction compound are indicated. It is unclear what measures are to be included in a Construction Environmental Management Plan and/or a Construction Noise and Vibration Management Plan for this site. Consultation with UNSW is required on the impacts on adjoining and nearby UNSW residential colleges and other buildings of hours of operation, noise, vibration, EMI, RFI and light spill. Consultation is also required on access, safety and security. No construction activity can take place in the vicinity of exam venues during exam periods. See Sections 3.4 and 3.6 of the UNSW Submission to the CBD & South East Light Rail Project Submissions Report and Appendix B: Suggested Conditions of Approval no. B20-B37 and

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					C1-C5.
	5-82	5.4.7 Ticketing system and passenger information	Ticketing machines and PIDS need to be installed at the Chalmers Street stop and the UNSW Anzac Parade and UNSW High Street stops.	Passenger information display systems (PIDS) would be installed at the Chalmers Street, UNSW High Street and UNSW Anzac Parade stops. The Opal card electronic system would be used for ticketing. The location of Opal card top-up machines would be determined during detailed design.	This has to be done in consultation with UNSW. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.6 and Appendix B: Suggested Conditions of Approval no. B11. The card validation system should be located prior to entering the platform in order to reduce delays in passenger boarding. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report, Appendix B: Suggested Conditions of Approval no. B9 and B10.
	5-84	5.4.10 Communications system	The proposed communications system should not interrupt UNSW campus activities in terms of public address announcements or electro-magnetic radiation interference to sensitive research equipment. The EIS does not address the issue of possible electro-magnetic radiation interference.	The proposed communications system is not anticipated to interrupt public address announcements in the UNSW campus. Discussion of electro-magnetic radiation is provided in section 10.10 of the EIS (Volume 1A). Equipment that is sensitive to electro-magnetic radiation would be further investigated during detail design to understand the specific nature of the sensitivity and inform the strategies and approach to minimise	UNSW does not make announcements over a PA system. The issue is the public address announcements from the light rail stops themselves and their impact on the quiet enjoyment of the residential colleges nearby and the workplace amenity for nearby administration, teaching and research staff. The proposed mitigation measure for noise impacts from PA systems is insufficient. It is unclear who will be controlling and reviewing the need for announcements at the two UNSW stops. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.4 and Appendix B: Suggested Conditions of Approval no. B27. No proposed mitigation measures for EMI and RFI impacts are indicated. UNSW has major concerns with the impact of EMI and RFI on its sensitive research equipment and this matter is addressed in more detail

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				impacts on such equipment in consultation with UNSW. Transport for NSW would ensure there is no material adverse impact on existing sensitive equipment resulting from the proposal.	in the UNSW Submission to the CBD & South East Light Rail Project Submissions Report at Section 3.4 and in the alternative concept design for the UNSW High Street stop in Appendix D to that report. See also the UNSW Submission to the CBD & South East Light Rail Project Submissions Report, Appendix B: Suggested Conditions of Approval no.B20, and B30-B37.
Part B: The proposal and its development. Chapter 6 Proposed construction	6-22	Figure 6.2h Construction compounds and footprint for the CSELR proposal	The provision of a construction compound on the UNSW campus is not supported. The location of a compound on the lower campus will require the relocation of UNSW underground services, removal of trees, landscaping and lawn and adversely affect pedestrian routes and teaching. The underground services will be inaccessible for repairs and maintenance and may also be damaged during construction due to ground settlement and compaction. The UNSW overland stormwater flood path drains onto Anzac Parade across the proposed construction compound and the UNSW Anzac Parade stop. Furthermore, noise and light interference will adversely affect nearby student accommodation on the campus, particularly during exam study periods.	Refer to response for page 5-75 above. The construction compounds would be used to store equipment and materials. Noise generating activity in the compound would be intermittent throughout the construction period, depending on the level of activity undertaken. For much of the time, the noise impacts of construction compounds would be much less than the worst-case impacts identified in the EIS, which were associated with activities such as site establishment and the delivery of materials and equipment. Student accommodation on campus is considered to be noise sensitive (consistent with residential land use), and the potential impacts on these locations would need to be minimised where reasonable and feasible. As identified in the EIS (and mitigation measure S.1 in Chapter 8 of this report), when working adjacent to educational facilities, there is a requirement for particularly noisy activities to be scheduled outside sensitive times such as exam periods where reasonable and feasible. Consultation and liaison with	No proposed mitigation measures for impacts from the relocated UNSW construction compound are indicated. It is unclear what measures are to be included in a Construction Environmental Management Plan and/or a Construction Noise and Vibration Management Plan for this site. Consultation with UNSW is required on the impacts on adjoining and nearby UNSW residential colleges and other buildings of hours of operation, noise, vibration and light spill. Consultation is also required on access, safety and security. No construction activity can take place in the vicinity of exam venues during exam periods and in the vicinity of UNSW residential facilities in the 2 weeks prior to exam periods. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.4 and, Appendix B: Suggested Conditions of Approval no. B13, and B20-B37, and C1-C5.
	6-25	Table 6.4 Proposed			

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		primary construction compounds - UNSW		the University would be required to inform the University of expected impacts, and the timing and duration of upcoming works.	
	6-27	Table 6.5 Proposed environmental management measures for primary construction compounds - UNSW			
	6-32 & 6-36	Figures 6.3 to 6.7 Proposed construction haulage routes	The indication of a construction compound at UNSW in these Figures is not supported for the reasons given in the comment above.	Refer to response to page 5-75 above.	Refer to responses on these issues above
	6-43	6.10.5 Road changes	The changes to Anzac Parade, High Street and Wansey Road are noted. It is essential that the UNSW campus remains accessible during construction of the light rail for retail and other delivery vehicles, construction vehicles for sites on the campus, staff and student parking, cyclists and pedestrians.	A traffic management plan would be prepared by the contractor prior to construction which would address the access issues noted.	The proposed mitigation measures for traffic and access impacts are insufficient. A Traffic Management Plan and/or Access Management Plan for the UNSW Kensington Campus is specifically required. The Plan should be prepared in consultation with UNSW. During construction UNSW would seek a review of the traffic signal operations at Anzac Parade/Barker Street, Anzac Parade/University Mall, Anzac Parade/High Street and at High Street/Botany Street as well as key intersections of High Street and Wansey Road, Wansey Road and Arthur Street and Arthur Street and Botany Street. Note also that UNSW transport peaks represent buses travelling in opposite directions to the general commuter peaks. UNSW has also prepared alternative concept designs for the UNSW Anzac Parade and High Street stops. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report at

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					Sections 3.2, 3.3 and 3.5 and Appendix D: Concept Designs for UNSW Stops. Detailed management of pedestrians and traffic during construction via Traffic Management Plans for these two stops is also required in consultation with UNSW. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report, Appendix B: Suggested Conditions of Approval no. B45-B47 and C1-C5.
	6.44	6.10.6 Bus operations	It is essential that Eddy Avenue, Anzac Parade and High Street (and Alison Road during exam periods) remain operable for UNSW express bus services set downs and pick ups during light rail construction.	The proposal would not include any works that would prevent the operation of these services.	The proposed mitigation measures for traffic and access impacts are insufficient. It is essential that buses operate not only during construction of the project, but in accordance with published timetables for both morning and afternoon services from the Kensington campus, and particularly during exam periods. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report at Section 3.5 and , Appendix B: Suggested Conditions of Approval no. B4, B45, and C1-C5.
Part B: The proposal and its development. Chapter 6 Proposed construction	6-46	6.10.13 Property and utility access	It is essential that the UNSW campus remains accessible during construction of the light rail for retail and other delivery vehicles, construction vehicles for sites on the campus, staff and student parking, cyclists and pedestrians.	A traffic management plan would be prepared by the contractor prior to construction which would address the access issues noted.	Refer to responses on these issues above

Part B: The proposal and its development. Chapter 7 Proposed sustainability	7-23	Table 7.6 Medium and high climate change risks identified for the operational phase of the CSELR proposal - flooding of CSELR infrastructure	The existing local stormwater flooding along Anzac Parade from High Street to Day Street adjacent to UNSW is not addressed. The UNSW overland stormwater flood path drains onto Anzac Parade across the proposed construction compound and the UNSW Anzac Parade stop.	Issue noted. Further detailed analysis of flooding and stormwater drainage would be undertaken during detailed design.	No mitigation measures for flooding and stormwater drainage impacts are indicated. UNSW has prepared alternative concept designs for the UNSW Anzac Parade and High Street stops. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Appendix D: Concept Designs for UNSW Stops. Overland flooding and stormwater analysis and management at these stops are required in consultation with UNSW.
				The construction compound for the UNSW Anzac Parade stop is no longer proposed due to the relocation of the stop further south and in the centre of Anzac Parade. This change includes the relocation of the construction worksite from the University boundary on the eastern side of Anzac Parade, to the existing University car park adjacent to the NIDA building (refer to section 6.15 for details).	Compound relocation noted, details to be agreed with UNSW, particularly in relation to access and impacts on sensitive environments in close proximity. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Sections 3.4 and 3.6 and Appendix B Suggested Conditions of Approval no. B44 and C1-C5.
Part C: Regional environmental impact assessment. Chapter 9 Regional planning, transport & socio-economic impacts	9-18	Table 9.6 Key road network changes proposed as part of the CSELR - Wansey Road, High Street	No statement is made with regard to the introduction of traffic signals at the intersection of High Street and Wansey Road at the UNSW High Street stop. Further discussion with UNSW is required as to how pedestrians, bicycles, buses and other vehicular traffic will be managed at this stop and at the intersection of Wansey Road and High Street. The provision of an indented bus bay within UNSW for westbound buses on High Street between Botany Street and Wansey Road is not supported. No discussion with UNSW on this matter has taken	Traffic signals would be installed at the intersection of High Street and Wansey Road. The UNSW High Street stop is proposed to be relocated into High Street. Further detail is provided in section 6.11 of this report. Refer to responses for pages 5-67 and 5-68 above for other issues.	The proposed mitigation measures for traffic and access impacts are insufficient. A Traffic Management Plan and/or Access Management Plan for the UNSW Kensington Campus is specifically required. The Plan should be prepared in consultation with UNSW. During construction UNSW would seek a review of the traffic signal operations at Anzac Parade/Barker Street, Anzac Parade/University Mall, Anzac Parade/High Street and at High Street/Botany Street and key intersections at Wansey Road/High Street, Wansey

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		place. Adverse impact on UNSW underground services and loss of large mature trees will result. The temporary westbound bus stop west of Wansey Road during construction should become the permanent westbound bus stop in High Street.		Road /Arthur Street and Arthur Street/Botany Street. Note also that UNSW transport peaks represent buses travelling in opposite directions to the general commuter peaks. UNSW has prepared an alternative concept design for the UNSW High Street stop. See the Review of Submissions Report Appendix D: Concept Designs for UNSW Stops. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.5 and Appendix B: Suggested Conditions of Approval no. B9 and B10, and B45-B47, and C1-C5.
9-29	9.2.2 Impacts during operation - Traffic flow changes - performance of intersections within the CSELR corridor - South East corridors - Anzac Parade/High Street	It is noted that the Anzac Parade/High Street intersection will suffer a loss of service as a result of the proposed switch in the track alignment from centre running to enter UNSW land on the eastern side of Anzac Parade. Under the Randwick Urban Activation Precinct proposals substantial redevelopment for mixed use and residential will occur at this intersection and along High Street on Racecourse land. Therefore any loss of service at the intersection will have adverse effects on traffic flow and access to the UNSW campus via Gate 2 High Street. The side running track on UNSW land is not supported and it should be changed to a centre running track with an island platform for reasons previously explained in the comments above, and to return the Anzac Parade/High Street intersection to its current level of service as a minimum.	Refer to response for page 4-23 in relation to the proposed relocation of the UNSW Anzac Parade stop to the centre of Anzac Parade. The Randwick Urban Activation Precinct (UAP) is subject to separate consideration by the P&I. P&I would need to consider traffic issues in relation to the UAP and interaction with CSELR.	Refer to responses on these issues above Noted. Nevertheless stop design needs to have the capacity for future demand. See response to 9.36 below and the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.2 and Appendix B: Suggested Conditions of Approval.
9-36	Figure 9.7 2021 morning peak CSELR boarding and	The bar graph for Central Station appears incorrect as no transfers from the rail network are shown and the	Noted. An error exists in the graph. The corrected figure is included in Figure C.1 below. Correct	UNSW has major concerns with the adequacy of the platform size calculations for the Central Station,

	mode of access by light rail stop	number of passengers appears unrealistically low. The numbers do not correlate with UNSW arrivals and departure data at the two UNSW stops.	boarding and alighting figures for 2021 and 2036 can also be found in the Precinct Plan for Central Station (section 7.3.10 of the EIS Transport Operations Report in Volume 2 of the EIS).	UNSW Anzac Parade and the UNSW High Street stops and the relevance of the level of service calculations by TfNSW. These issues are addressed in more detail in the UNSW Submission to the CBD & South East Light Rail Project Submissions Report and Sections 3.1-3.3 and Appendix B: Suggested Conditions of Approval no. B9 and B10, and B45-B47, and C1-C5.and in the alternative concept designs for the two UNSW stops in Appendix D, plus in Appendices E: Platform Size Calculations and F: Level of Service Calculations to that report.
9-45	9.2.3 Impacts during construction - impacts on bus services	It is essential that Eddy Avenue, Anzac Parade and High Street (and Alison Road during exam periods) remain operable for UNSW express bus services set downs and pick ups during light rail construction.	The proposal would not include any works that would prevent the operation of these services.	The proposed mitigation measures for traffic and access impacts are insufficient. It is essential that buses operate not only during construction of the project, but in accordance with published timetables for both morning and afternoon services from the Kensington campus, and particularly during exam periods. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.5 and Appendix B: Suggested Conditions of Approval no. B4, B45, and C1-C5.
9-67 & 9-68	9.4.4 Impacts during construction	It is essential that the UNSW campus remains accessible during construction of the light rail for retail and other delivery vehicles, construction vehicles for sites on the campus, staff and student parking, cyclists and pedestrians. The statement is noted that 'A noticeable level of noise is likely to be generated during the construction phase of the CSELR proposal, with particular concentrations likely to be experienced around construction compounds'. The current proposed location for a compound on the UNSW campus is not supported for the reasons already given in the comments above.	Once a more detailed construction methodology and program have been formalised, a traffic management plan would be prepared by the contractor prior to construction, which would address the access issues noted.	The proposed mitigation measures for traffic and access impacts are insufficient. A Traffic Management Plan and/or Access Management Plan for the UNSW Kensington Campus is specifically required. The Plan should be prepared in consultation with UNSW. During construction UNSW would seek a review of the traffic signal operations at Anzac Parade/Barker Street, Anzac Parade/University Mall, Anzac Parade/High Street and at High Street/Botany Street.

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	Note also that UNSW transport peaks represent buses travelling in opposite directions to the general commuter peaks.
The construction compound for the UNSW Anzac Parade stop is no longer proposed due to the relocation of the stop further south and in the centre of Anzac Parade.	No proposed mitigation measures for the impacts of the relocated UNSW construction compound are indicated. It is unclear what measures are to be included in a Construction Environmental Management Plan and/or a Construction Noise and Vibration Management Plan for this site.
As a result of the aforementioned design change, the construction worksite previously proposed along the University boundary on the eastern side of Anzac Parade would be instead located in the existing University car park adjacent to the NIDA building (refer to section 6.15 of this report for details).	Consultation with UNSW is required on the impacts on adjoining and nearby UNSW residential colleges and other buildings of hours of operation, noise, vibration and light spill. Consultation is also required on access, safety and security.
Noise generating activity in construction compounds would be intermittent throughout the construction period, depending on the level of activity in the compound. For much of the time, the noise impacts of construction compounds would be much less than the worst-case impacts identified in the EIS, which were associated with activities such as site establishment and the delivery of materials and equipment. Refer to the noise and vibration impact assessment, Technical Paper 11 of the EIS (Volume 6), specifically Table 51 in reference to noise catchment area 04.2. Site-specific Construction Noise and Vibration Management Plans (CNVMPs) would be developed in the detailed design phase, when more information is available on the schedule for the works and the equipment to be used. A CNVMP would be prepared specific to each of the construction compounds with consideration of the noise impacts on surrounding noise sensitive receivers.	No construction activity can take place in the vicinity of exam venues during UNSW exam periods or in close proximity to UNSW residential facilities in the two weeks prior to exam periods. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.5 and Appendix B: Suggested Conditions of Approval no. B9 and B10, B20-B37, B44, B45-B47, B49, B50, C1-C5and B45-B47, and C1-C5.

				As identified in the EIS, when working adjacent to educational facilities, as much as reasonably possible, particularly noisy activities would be scheduled outside sensitive times such as exam periods. Consultation and liaison with the university would be undertaken to inform the school of expected impacts, and the timing and duration of upcoming works.	
Part C: Regional environmental impact assessment. Chapter 10 Other regional impacts	10-26	Table 10.9 Depth of groundwater in the Sydney Central Basin and Botany Sands aquifers	UNSW's use of a significant daily volume of borewater for its commercial building services has not been mentioned. It is not evident from the Table that any effect on borewater quality, static levels or availability will bring significant cost penalty to UNSW. UNSW should be added as a Precinct/Area with Purpose of Bore being 'commercial water harvesting for building services' UNSW usage of borewater or ownership of several bores has not been considered anywhere in the EIS.	The purpose of the bores in each of the precincts has been summarised in Table 10.9 of the EIS (Volume 1A). The eight registered bores owned by UNSW are located within the Kensington/Kingsford Precinct. The UNSW bores are categorised for monitoring, irrigation, industrial and recreation purposes. The area of highest risk to groundwater from the proposal is from the proposed cut-and-cover tunnel at Moore Park, which the UNSW bores are located a considerable distance from. However, as identified in the EIS and according to the *NSW Aquifer Interference Policy* (NSW Department of Primary Industries 2012), if more than a two metre decline in groundwater level at any water supply work is obtained, then 'make good' provisions (which could involve deepening a bore or drilling a new bore) should apply.	Noted The proposed mitigation measures for groundwater impacts are insufficient. UNSW has prepared an alternative concept design for the UNSW Anzac Parade stop. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.6 and Appendix B: Suggested Conditions of Approval no. B9 and B10, B44 and B45-B47, and C1-C5. D: Concept Designs for UNSW Stops. Analysis and management for the potential loss of groundwater at this stop is required in consultation with UNSW.
	10-29 10-30 to 10-32	10.4.2 Impacts during operation 10.4.3 Impacts during construction	The proposed UNSW Anzac Parade stop will result in the destruction of water supply production bore water and another bore alienated from service vehicles. The UNSW overland stormwater flood path will be disrupted because it drains onto Anzac Parade across the proposed construction compound and the UNSW Anzac Parade stop. This results in the requirement for: at least one new production bore to be constructed along with all associated controls and	The proposed relocation of the UNSW Anzac Parade stop to the centre of Anzac Parade would prevent impact to the bore and associated infrastructure. Refer to section 6.13 of this report for further detail.	The proposed mitigation measures for utilities, services and infrastructure impacts are insufficient. UNSW is also a service provider and needs to be consulted during the design and construction stages of the project with regards to any field surveys, the location of water supply bores and other utilities and any protection, relocation or replacement measures

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		connecting pipelines, power and controls; new borewater connecting water mains; new drain valve and pipeline connection to the stormwater pipework system; and new stormwater pipeline and pits with connection to the stormwater pipework system. Substantial design work will be required to investigate suitable sites for new production bore water and to design the bore construction, including pumping and controls, etc. Costs for bore relocation and all associated services infrastructure are very significant. Pumps need to be chosen to suit the hydraulic properties of the new bores. All such work must be done to meet strict UNSW requirements for production bore water.		required. The risk of interruptions to UNSW utilities, services and infrastructure during construction needs to be specifically addressed. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.6 and Appendix B: Suggested Conditions of Approval no. 44.
10-32 & 10-33	10.4.4 Management and mitigation			
10-52	10.8.1 Existing utilities	To those utilities already listed, add 'borewater' and 'UNSW borewater system and underground utilities'.	These additional utilities are noted and would be considered during the detailed design phase. Liaison would be undertaken with UNSW in relation to these services in order to protect them from damage.	Refer to responses on these issues above See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.6 and Appendix B: Suggested Conditions of Approval no. B44.
10-56	Figure 10.8 Typical treatment zones for utilities under the propose CSELR alignment	The impact zone along the UNSW campus boundary adjacent to Anzac Parade between High Street and Barker Street contains underground potable water pipework and valves serving UNSW buildings. UNSW has a significant amount of large stormwater pipework, drains and pits serving the immediate buildings as well as the wider campus. UNSW also has several hydrant booster points including both underground services and surface installations for firefighting, plus trade waste infrastructure serving the Square House consisting of pipework, pits and control and monitoring equipment. This infrastructure is critical to UNSW's ongoing operations and maintaining service. Relocating the infrastructure outside the impact zones is critical.	Transport for NSW is currently undertaking detailed utilities investigations and would liaise with UNSW in relation to the identified utilities. The proposed relocation of the UNSW Anzac Parade stop to the centre of Anzac Parade would prevent impact to the utilities identified. Refer to section 6.13 of this report for further detail. The CSELR design addressed in the EIS is based on a preliminary level of design called a definition design. As more detailed design work progresses more information would be addressed at a greater detail. The project agreement to be signed with UNSW would detail this involvement and consultation.	Refer to responses on these issues above
10-56	10.8 Consultation with	The list of utility owners consulted to date does not	Consultation with AARnet, as a utility provider, has	Noted

		utility owners and service providers	include AARnet. As AARnet is a major service provider to UNSW it is recommended that they are included on all lists of affected utility providers and consulted throughout the proposal.	taken place regarding potential impacts (if any) on its assets.	
	10-65 to 10-66	10.10.2 Hazards and risks during construction	There is no mention of the risk of services interruptions to UNSW's infrastructure during construction or the impact on UNSW operations if this occurs. It is essential that teaching and research projects on the campus are able to continue uninterrupted during the construction phase.	This issue would be addressed by the contractor during construction planning. Consultation with UNSW would be undertaken in relation to potential interruptions to services.	Refer to responses on these issues above
Part D: Local environmental impact assessment. Chapter 15 Local impacts - Randwick precinct	15-14	15.3.2 Impacts during operation	It is noted that the High Street/Wansey Road intersection will be signalised to accommodate pedestrians and light rail turning movements between Wansey Road and High Street. Also that pedestrian crossings will be provided at this intersection. Further discussion with UNSW is required as to how pedestrians, bicycles, buses and other vehicular traffic will be managed at the UNSW High Street stop and at the intersection of Wansey Road and High Street. Clarity is required on integration of the existing share bike path along Wansey Road. The provision of an indented bus bay within UNSW for westbound buses on High Street between Botany Street and Wansey Road is not supported. No discussion with UNSW on this matter has taken place. Adverse impact on UNSW underground services and loss of large mature trees will result. The temporary westbound stop west of Wansey Road during construction should become the permanent westbound stop in High Street.	Refer to response provided to section 5.2.7 Road Configuration Changes above.	The proposed mitigation measures for traffic and access impacts are insufficient. A Traffic Management Plan and/or Access Management Plan for the UNSW Kensington Campus is specifically required. The Plan should be prepared in consultation with UNSW. During construction UNSW would seek a review of the traffic signal operations at Anzac Parade/Barker Street, Anzac Parade/University Mall, Anzac Parade/High Street and at High Street/Botany Street. Note also that UNSW transport peaks represent buses travelling in opposite directions to the general commuter peaks. UNSW has prepared an alternative concept design for the UNSW High Street stop. See the Review of Submissions Report Sections 3.2 and 3.3 and Appendix D: Concept Designs for UNSW Stops. See the Review of Submissions Report, Appendix B: Suggested Conditions of Approval no. B4, B9 and B10, B45-B47, and C1-C5.
	15-17	Table 15.8 Impacts on	Access arrangements for UNSW Gate 9 in High	Refer to section 6.11 of this report for details of the	Refer to responses on these issues above

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	property access during operation of the CSELR proposal	Street are unclear given the statement that most property access arrangements in High Street will be restricted to left-in-left-out operation with the exception of right turn access into the hospital. Further discussion with UNSW is required as to how pedestrians, bicycles, buses and other vehicular traffic will be managed at the UNSW High Street stop and at the intersection of Wansey Road and High Street.	revised CSELR alignment and stops along Alison Road and Wansey Road. Transport for NSW would consult further with UNSW in relation to outstanding issues during detailed design.	
15-18	Table 15.9 Impacts on cyclists during operation of the CSELR proposal	Integration of the existing share bike path along Wansey Road is unclear. Further discussion with UNSW is required as to how pedestrians, bicycles, buses and other vehicular traffic will be managed at the UNSW High Street stop and at the intersection of Wansey Road and High Street. The statement that Arthur Street will be designated as an alternative route for cyclists requires further discussion with Transport for NSW, UNSW and Randwick City Council.	Further detail in relation to the shared path along Wansey Road is provided in section 6.11 of this report. A design change is proposed to locate this path adjacent to Wansey Road with the CSELR alignment adjacent to Royal Randwick racecourse. Further discussion would be held in relation to the proposed alternative route for cyclists via Arthur Street as requested.	Refer to responses on these issues above
15-19	Table 15.10 Impacts on pedestrians during operation of the CSELR proposal	Further discussion with UNSW is required as to how pedestrians, bicycles, buses and other vehicular traffic will be managed at the UNSW High Street stop and at the intersection of Wansey Road and High Street. The impact on the kerb both sides of High Street will reduce the width of the verges and may also have an impact on existing trees and services within the verge. The section of High Street between Wansey Road and Botany Street is highly pedestrianised on both sides. Any loss of verge width should not reduce the existing footpath widths.	With the proposed relocation of the High Street stop into High Street, these issues would be resolved. Refer to section 6.11 of this report. Transport for NSW would consult with UNSW in relation to these issues during detailed design.	Refer to responses on these issues above
15-19	Table 15.11 Impacts on bus operations during operation of the CSELR proposal	The provision of an indented bus bay within UNSW for westbound buses on High Street between Botany Street and Wansey Road is not supported. No discussion with UNSW on this matter has taken place. Adverse impact on UNSW underground services and loss of large mature trees will result. The temporary westbound stop west of Wansey	Refer to responses on these issues above.	Refer to responses on these issues above
15-20	Operational impacts on buses - High Street bus stops			

		Road during construction should become the permanent westbound stop in High Street.		
15-23 & 15-24	15.3.3 Impacts during construction and Table 15.13 Proposed traffic management for key roads directly impacted by construction of the CSELR proposal	It is essential that the UNSW campus remains accessible during construction of the light rail for retail and other delivery vehicles, construction vehicles for sites on the campus, staff and student parking, cyclists and pedestrians.	Transport for NSW would consult with UNSW in relation to these issues during detailed design.	The proposed mitigation measures for traffic and access impacts are insufficient. A Traffic Management Plan and/or Access Management Plan for the UNSW Kensington Campus is specifically required. The Plan should be prepared in consultation with UNSW. During construction UNSW would seek a review of the traffic signal operations at Anzac Parade/Barker Street, Anzac Parade/University Mall, Anzac Parade/High Street and at High Street/Botany Street and the intersections of High Street/Wansey Road, Wansey Road/ Arthur Street and Arthur Street/Botany Street. Note also that UNSW transport peaks represent buses travelling in opposite directions to the general commuter peaks. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section3.5 and Appendix B: Suggested Conditions of Approval no. B4, B45-B47, and C1-C5.
15-25 & 15-26	15.3.3 Impacts during construction. Construction impacts on existing bus services. University express bus services 890,891 and 892	It is essential that Eddy Avenue, Anzac Parade and High Street (and Alison Road during exam periods) remain operable for UNSW express bus services set downs and pick ups during light rail construction.	The proposal would not include any works that would prevent the operation of these services.	The proposed mitigation measures for traffic and access impacts are insufficient. It is essential that buses operate not only during construction of the project, but in accordance with published timetables for both morning and afternoon services from the Kensington campus, and particularly during exam periods. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.4 and

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				Appendix B: Suggested Conditions of Approval no. B4, B45-B47, and C1-C5.
15-26 & 15-27	University bus service 890, 891 and 892 and Figure 15.9 UNSW High Street bus relocation.	The existing westbound bus stop between Botany Street and Wansey Road will be relocated west of Wansey Road near Gate 8 during construction. This should be the permanent location following construction. This will alleviate the need for an indented bus bay on UNSW land between Botany Street and Wansey Road as is currently proposed and which is not supported by UNSW.	Transport for NSW would liaise with UNSW in relation to the requested location of the bus bay during detailed design. Following the opening of CSELR these stops would be used by cross-regional services including the 400, 410 and 370.	The proposed mitigation measures for traffic and access impacts are insufficient. A Traffic Management Plan and/or Access Management Plan for the UNSW Kensington Campus is specifically required. The Plan should be prepared in consultation with UNSW. During construction UNSW would seek a review of the traffic signal operations at Anzac Parade/Barker Street, Anzac Parade/University Mall, Anzac Parade/High Street and at High Street/Botany Street and the intersections of High Street/Wansey Road, Wansey Road/ Arthur Street and Arthur Street/Botany Street. Note also that UNSW transport peaks represent buses travelling in opposite directions to the general commuter peaks. UNSW has prepared an alternative concept design for the UNSW High Street stop. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Appendix D: Concept Designs for UNSW Stops. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.5 and Appendix B: Suggested Conditions of Approval no. B4, B9 and B10, B45-B47, and C1-C5.
15-31	15.3.4 Management and mitigation - operation	Further discussion with UNSW is required as to how pedestrians, bicycles, buses and other vehicular traffic will be managed at the UNSW High Street stop and at the intersection of Wansey Road and High Street. Clarity is sought on what access	Noted. The proposed relocation of the stop to High Street would require the relocation of Gate 9 to form a four way intersection with Wansey Road and High Street. Refer to section 6.11 of this report for details of the proposed design change. This would	Refer to responses on these issues above

			arrangements are proposed for UNSW Gate 9 in High Street given that most property access arrangements in High Street will be restricted to left- in-left-out operation with the exception of right turn access into the hospital. The temporary westbound stop west of Wansey Road during construction should become the permanent westbound stop in High Street.	allow for all movements if required. These access arrangements would be determined during detailed design. Transport for NSW would continue to liaise with UNSW in relation to future access arrangements.	
	15-32	15.3.4 Management and mitigation - construction	It is essential that the UNSW campus remains accessible during construction of the light rail for retail and other delivery vehicles, construction vehicles for sites on the campus, staff and student parking, cyclists and pedestrians. Eddy Avenue, Anzac Parade and High Street (and Alison Road during exam periods) must remain operable for UNSW express bus services set downs and pickups during light rail construction.	A traffic management plan would be prepared by the contractor prior to construction which would address the access issues noted. The proposal would not include any works that would prevent the operation of these services.	The proposed mitigation measures for traffic and access impacts are insufficient. A Traffic Management Plan and/or Access Management Plan for the UNSW Kensington Campus is specifically required. The Plan should be prepared in consultation with UNSW. During construction UNSW would seek a review of the traffic signal operations at Anzac Parade/Barker Street, Anzac Parade/University Mall, Anzac Parade/High Street and at High Street/Botany Street and the intersections of High Street/Wansey Road, Wansey Road/ Arthur Street and Arthur Street/Botany Street. Note also that UNSW transport peaks represent buses travelling in opposite directions to the general commuter peaks. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.5 and Appendix B: Suggested Conditions of Approval no. B4, B45-B47, and C1-C5.
Part D: Local environmental impact assessment. Chapter 15 Local impacts	15-45	15.4.4 Management and mitigation	Consultation with UNSW is essential during study and exam periods, for both the UNSW campus and for exam venues on the Randwick Racecourse.	Refer to response for page 9-67 and 9-68 above.	The proposed mitigation measures for stakeholder engagement are insufficient. A Stakeholder Involvement Plan and/or a Business Landowner and Engagement Management Plan is required specifically for UNSW. The Plan should detail

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- Randwick precinct				by whom, when and how UNSW will be informed on progress, activities and impacts of the project, the management of complaints and other protocols. A Place Manager is required for the Kensington campus to provide a single point of contact during construction. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.6 and Appendix B: Suggested Conditions of Approval no. B49 and B50.
15-45	15.5 Noise and vibration.	It is unclear how existing noise and vibration adjacent to the UNSW campus at High Street has been measured and what the differences will be with the operation of the UNSW High Street stop. There is no reference to electro-magnetic impacts emanating from operation of the light rail tracks or from communications equipment at the UNSW High Street stop or on the light rail carriages. There are UNSW buildings on High Street containing equipment highly sensitive to vibration and electro-magnetic interference. Further discussion is required with UNSW on mitigation measures for noise, vibration and electro-magnetic impacts during both construction and operation.	The existing road traffic noise environment on High Street has not been measured at this stage of the proposal design, because the light rail operational noise goals are absolute, and do not depend on the background. The same applies for construction noise at educational receivers. As an educational institution, the construction and operational noise management levels and noise goals respectively for the UNSW campus are independent of the existing ambient noise environment. While the predicted operational noise impacts on the Lowy Building are identified as being4 dB above the noise goals, this situation arises from the conservative assumption that this building has open windows and hence an outside-to-inside attenuation of only 10 dB. Further investigation in the detailed design stage would confirm the predicted operational noise impacts on UNSW High Street buildings, and identify if any noise mitigation measures are required (with consideration of the existing road traffic noise environment and the attenuation across the building facade). Measurements of existing vibration levels have not	The proposed mitigation measures for noise and vibration impacts are insufficient. UNSW has major concerns with the impact of noise and vibration on its sensitive environments. This matter is addressed in more detail in the UNSW Submission to the CBD & South East Light Rail Project Submissions Report and in the alternative concept designs for the UNSW Anzac Parade stop and the UNSW High Street stop in Appendix D to that report. It is unclear what measures are to be included in a Construction Environmental Management Plan and/or a Construction Noise, and Vibration Management Plan. A Plan is required specifically for the Kensington campus that documents all necessary measures to manage and mitigate potential noise, and vibration impacts I during standard daytime and out-of-hours construction activities and during operation. Noisy activities are not to occur in the vicinity of exam venues during UNSW exam periods or adjacent to residential facilities 2 weeks prior to exam periods. This includes those venues on the campus and the Randwick Racecourse.

			been undertaken at this stage. The EIS notes that consultation would be required during the detailed design phase to establish the vibration specifications for sensitive equipment and the level to which any sensitive equipment is isolated. Where vibration sensitive equipment is identified, more detailed investigations would be conducted including measurement of existing ambient vibration levels at the facade and at the equipment location, and measurement of the vibration transmitting characteristics of the ground at that specific location. These investigations would inform the required trackform design in these locations.	See also the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.4 and Appendix B: Suggested Conditions of Approval no. B9 and B10, and B20-B37.
			Electro-magnetic fields (EMF) from the overhead wiring is assessed in section 10.10, Volume 1A of the EIS. Equipment that is sensitive to electro-magnetic radiation would be further investigated during detail design to understand the specific nature of the sensitivity and inform the strategies and approach to minimise impacts on such equipment in consultation with UNSW. Transport for NSW would ensure there is no material adverse impact on existing sensitive equipment resulting from the proposal.	No proposed mitigation measures for EMI and RFI impacts are indicated. UNSW has major concerns with the impact of EMI and RFI on its sensitive environments and this matter is addressed in more detail in the UNSW Submission to the CBD & South East Light Rail Project Submissions Report and in the alternative concept design for the UNSW High Street stop in Appendix D to that report. See also the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.4 and Appendix B: Suggested Conditions of Approval no. B9 and B10, and B20-B37.
15-65	15.6.2 Direct impact to planted trees	The provision of an indented bus bay within UNSW for westbound buses on High Street is not supported. No discussion with UNSW on this matter has taken place. Adverse impact on UNSW underground services and loss of large mature trees will result. The temporary westbound stop west of Wansey Road during construction should become the permanent	Refer to responses above in relation to executive summary E-10.	The proposed mitigation measures for visual and landscape impacts are insufficient. UNSW has prepared an alternative Concept Design for the UNSW High Street stop. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Appendix D: Concept Designs

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			westbound stop in High Street, leaving the trees unaffected. The section of High Street between Wansey Road and Botany Street is highly pedestrianised and concern is expressed at the potential loss of street trees in this location given that this part of High Street provides an important frontage to the upper campus. There is no statement regarding the loss of the mature fig tree on the corner of Wansey Road and High Street. No tree replacement strategy is provided for this location.		for UNSW Stops. A strategy for tree maintenance by the operator for an agreed period is required in consultation with UNSW. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.3 and Appendix B: Suggested Conditions of Approval no. B10. And B14-B19.
	15-68	15.7.2 Visual sensitivity	The statement that 'High Street from UNSW to the Prince of Wales Hospital is part of the institutional setting of Randwick and is considered to be of regional sensitivity' is noted. It is therefore unclear how the Park typology will apply at the UNSW High Street stop, given that grass tracks will not be implemented, the track treatment will be Park/ Concrete and there will be loss of street trees in High Street between Botany Street and Wansey Road.	The Park typology relates to the overall alignment in this location rather than the stop design. Architectural design for the stops would be undertaken during the detailed design phase of the proposal and UNSW would be consulted during this phase.	Refer to responses on these issues above
	15-77	15.7.7	No mitigation strategies are proposed with regards to the loss of trees referred to in the comment above relative to page 15-65. Given the regional sensitivity referred to on page 15-68, UNSW requests that tree planting strategies be put in place for High Street.	Section 15.7.7 of the EIS (Volume 1B) provides general mitigation measures in relation to trees in this location. Specific details of tree replacement and landscaping would be developed during detailed design and consultation would be undertaken with UNSW on this issue.	Refer to responses on these issues above
Part D: Local environmental impact assessment. Chapter 16 Kensington/Kingsford precinct	16-18 & 16-20	16.3.2 Impacts during operation - UNSW Anzac Parade stop. Figure 16.9b Functional changes to the road network	The side running track on UNSW land is not supported and it should be changed to a centre running track with an island platform so as to avoid loss of UNSW land, removal of significant trees and landscaping along the campus frontage. The preservation and maintenance of all significant fig trees along Anzac Parade in the vicinity of the UNSW campus is considered essential to preserve the amenity and character of the campus. No tree replacement strategy is provided. It is unclear how the Boulevard typology will apply at	Refer to responses above in relation to page 4-23 for alternative stop locations considered for the CSELR.	The proposed mitigation measures for visual and landscape impacts, and for traffic and access impacts are insufficient. UNSW has prepared an alternative Concept Design for the UNSW Anzac Parade stop. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Appendix D: Concept Designs for UNSW Stops. A strategy for tree maintenance by the operator for an agreed period is required. Agreement to the architectural design of these stops is required. Detailed management of

		the UNSW Anzac Parade stop, given that grass tracks will not be implemented and the track treatment will be Boulevard/Concrete. Further discussion with UNSW is required as to how pedestrians, cyclists and buses will be managed at this stop.		pedestrians and traffic during construction via a Traffic Management Plan for this stop is also required. All of the above in consultation and agreement with UNSW. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Sections 3.2 and 3.3 and Appendix B: Suggested Conditions of Approval no. B9, B4, B14-B19, and B45-B47.
16-26 & 16-27	16.3.3 Impacts during construction - construction impacts on property access. Table 16.9 Proposed traffic management for key roads impacted by the construction of the CSELR proposal.	For the Anzac Parade/High Street intersection, concern is expressed at the statement in the Table that 'vehicles exceeding 12.5 metres long would be prohibited from turning at this intersection'. Barker Street as an alternative access route to the UNSW campus via Gate 14 is not possible for liquid gas deliveries that can only access the northern half of the campus via High Street and Gate 2. It is unclear if vehicles greater than 12.5 metres long are prohibited from this intersection only during weekend construction works, or during operation of the light rail as well. Eddy Avenue, Anzac Parade and High Street (and Alison Road during exam periods) must remain operable for UNSW express bus services set downs and pick ups during light rail construction.	The restriction on vehicle size would only be required during weekend works. Deliveries would need to be scheduled outside these time periods or via alternative access routes to Gate 2. Details of the specific measures to facilitate delivery and access for larger vehicles would be provided by the contractor in the site-specific construction traffic management plans prior to the commencement of any works.	The proposed mitigation measures for traffic and access impacts are insufficient. A Traffic Management Plan for the UNSW Kensington Campus is specifically required. The Plan should be prepared in consultation with UNSW. Note that UNSW may need to allow access for large vehicles for crane installations during construction of the project. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.5 and Appendix B: Suggested Conditions of Approval no. B45-B47.
16-30	16.3.4 Management and mitigation	Clarity is required around the statement that 'The staging of the intersection of Anzac Parade and High Street would maintain all existing movements at this intersection'. This does not relate to the statement in Table 16.9 that vehicles exceeding 12.5 metres long would be prohibited from this intersection - see comment above.	Whilst a restriction may need to be applied to the maximum vehicle size permitted, all existing turning movements currently permitted at the intersection would be retained. Any temporary restrictions required would be provided by the contractor in the site-specific construction traffic management plans prior to the commencement of any works.	Refer to responses on these issues above
16-34	Figure 16.10b Kensington/Kingsford Precinct - land use and	The temporary and permanent acquisition of land on the UNSW campus for a construction compound and	Refer to response above in relation to page 5-74 for permanent land acquisitions.	Refer to responses on these issues above

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	property	side running track at the UNSW Anzac Parade stop is not supported for the reasons previously given above.		
16-42	16.4.3 Impacts during construction	The use of land on the UNSW campus for a construction compound and a side running track at the UNSW Anzac Parade stop is not supported for the reasons previously given above.	Refer to previous response for page 16-34.	Refer to responses on these issues above
16-43 to 16-57	16.5 Noise and vibration	It is unclear how existing noise and vibration adjacent to the UNSW campus at Anzac Parade has been measured and what the differences will be with the operation of the UNSW Anzac Parade stop. There is no reference to electro-magnetic impacts emanating from operation of the light rail tracks or from communications equipment at the UNSW Anzac Parade stop or on the light rail carriages. There are UNSW buildings on Anzac Parade containing equipment highly sensitive to vibration and electro-magnetic interference. There are also a number of residential colleges on the campus fronting Anzac Parade. Further discussion is required with UNSW on mitigation measures for noise, vibration and electro-magnetic impacts during both construction and operation.	*Existing noise environment on Anzac Parade* The existing noise environment on Anzac Parade has been measured, with a noise logger at New College Village (Location BG10 in the Technical Paper 11, Volume 6 of the EIS). As an educational institution, the construction and operational noise management levels and noise goals respectively for the majority of buildings on the UNSW campus (except for residential buildings) are independent of the existing ambient noise environment. Construction Noise Management Levels at residential receivers including UNSW college accommodation are determined on the basis of the noise measurements. *Predicted operational noise impacts* The predicted operational noise impacts on NIDA and on UNSW Buildings on Anzac Parade are identified as being up to 7 dB above the noise goals. However, the predicted CSELR noise levels remain more than 10 dB below the existing daytime and night-time ambient noise which is dominated by road traffic noise. The CSELR is predicted to comply with the operational noise goals at residential receivers including residential colleges. *Vibration sensitive equipment* Measurements of existing vibration levels have not been undertaken at this stage. The EIS states that	The proposed mitigation measures for noise and vibration impacts are insufficient. UNSW has major concerns with the impact of noise and vibration on its sensitive environments. Particular current and future facilities on the Kensington campus are affected. This matter is addressed in more detail in the UNSW Submission to the CBD & South East Light Rail Project Submissions Report and in the alternative concept designs for the UNSW Anzac Parade stop and the UNSW High Street stop in Appendix D to that report. It is unclear what measures are to be included in a Construction Environmental Management Plan and/or a Construction Noise and Vibration Management Plan. A Plan is required specifically for the Kensington campus that documents all necessary measures to manage and mitigate potential noise and vibration levels during standard daytime and out-of-hours construction activities. Noisy activities are not to occur in the vicinity of exam venues during UNSW exam periods. This includes those venues on the campus and the Randwick Racecourse. See also the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.4 and Appendix B: Suggested Conditions of Approval no. B20-B37, and C1-C5.

			consultation would be required during the detailed design phase to establish the vibration specifications for sensitive equipment and the level to which any sensitive equipment is isolated. Where vibration sensitive equipment is identified, more detailed investigations would be conducted including measurement of existing ambient vibration levels at the facade and at the equipment location, and measurement of the vibration transmitting characteristics of the ground at that specific location. These investigations would inform the required trackform design in these locations. *Electro-magnetic radiation* Discussion of electro-magnetic radiation/fields is provided in section 10.10 of the EIS (Volume 1A). Equipment that is sensitive to electro-magnetic radiation would be further investigated during detail design to understand the specific nature of the sensitivity and inform the strategies and approach to minimise impacts on such equipment in consultation with UNSW. Transport for NSW would ensure there is no material adverse impact on existing sensitive equipment resulting from the proposal.	No proposed mitigation measures for EMI and RFI impacts are indicated. UNSW has major concerns with the impact of EMI and RFI on its sensitive environments and this matter is addressed in more detail in the UNSW Submission to the CBD & South East Light Rail Project Submissions Report and in the alternative concept design for the UNSW High Street stop in Appendix D to that report. See also the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.4 and Appendix B: Suggested Conditions of Approval no. B20-B37.
16-58	Table 16.18	The statement that the trees on UNSW land 'currently make a substantial contribution to the landscape amenity of the campus and the adjacent section of Anzac Parade', is supported. The preservation and maintenance of all significant fig trees along Anzac Parade in the vicinity of the UNSW campus is considered essential to preserve the	Transport for NSW would work with UNSW to manage and mitigate impacts to trees along Anzac Parade. These impacts would be substantially reduced due to the proposed relocation of the UNSW Anzac Parade stop to the centre of Anzac Parade. Refer to section 6.13 of this report for further detail.	The proposed mitigation measures for visual and landscape impacts are insufficient. UNSW has prepared an alternative Concept Design for the UNSW Anzac Parade stop. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.2 and Appendix D:

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			amenity and character of the campus. It is unclear how the Boulevard typology will apply at the UNSW Anzac Parade stop, given that grass tracks will not be implemented and the track treatment will be Boulevard/Concrete.	Refer to previous comment relating to alignment typologies.	Concept Designs for UNSW Stops. A strategy for tree maintenance by the operator for an agreed period is required in consultation with UNSW. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report, Appendix B: Suggested Conditions of Approval no. B9 and B14-B19.
Part D: Local environmental impact assessment. Chapter 16 Kensington/Kingsford precinct	16-60 & 16-61	Figure 16.19b Impacts to planted trees. 16.6.2 Direct impact to planted trees	The removal of planted trees on the UNSW campus is not supported because the construction compound, the side running track and UNSW Anzac Parade stop on UNSW land are not supported - for the reasons previously given above.	Refer to responses above in relation to these issues.	Refer to responses on these issues above
	16-61 & 16-62	16.6.3 Mitigation measures	The proposed mitigation measures are not supported because the construction compound, the side running track and UNSW Anzac Parade stop on UNSW land that requires the removal of the fig trees is not supported - for the reasons previously given above.	Refer to responses above in relation to these issues.	Refer to responses on these issues above
	16-63	16.7.2 Visual sensitivity	UNSW supports the statement that the 'UNSW campus .... is a clearly defined precinct characterised by mature trees and green lawns, pedestrian plazas and modern institutional buildings. The landscape and visual character of this area is considered to be of regional sensitivity as this precinct is a feature of the locality'. Therefore the removal of planted trees on the UNSW campus is not supported because the construction compound, the side running track and UNSW Anzac Parade stop on UNSW land are not supported - for the reasons previously given above.	Refer to responses above in relation to these issues.	Refer to responses on these issues above
	16-67	Table 16.20 Kensington/Kingsford precinct - assessment of representative viewpoints	For Anzac Parade at the UNSW campus the table is not supported because the construction compound, the side running track and UNSW Anzac Parade stop on UNSW land are not supported - for the reasons previously given above.	Refer to responses above in relation to these issues.	Refer to responses on these issues above
	16-79	16.8.2 Impacts on heritage	It is noted that the trees along the western Anzac	Refer to responses above in relation to these issues.	Refer to responses on these issues above

		items and Table 16.27 Summary of impacts on heritage listed items	Parade boundary of UNSW near the main entrance are listed on the Randwick City Council Register of Significant Trees. The proposed CSELR construction and the UNSW Anzac Parade stop will necessitate the removal of a number of these trees. The trees are identified as a significant group of plantings as well as being individual mature plantings with historic significance. The statement that removal of these trees and extensive pruning would have a major adverse impact on the group and result in the loss of individual elements that demonstrate the pre-UNSW racecourse phase of the site is supported. The construction compound, side running track and UNSW Anzac Parade stop on UNSW land is not supported for the reasons previously given above.		
	16-81 & 16-82	16.8.4 Management and mitigation	The statement that 'Where UNSW significant trees must be removed, suitable replacements would be made where possible' is not supported because the construction compound, side running track and UNSW Anzac Parade stop on UNSW land is not supported - for the reasons previously given above.	Refer to responses above in relation to these issues.	Refer to responses on these issues above
Part E: Environmental management & conclusions. Chapter 18 Environmental management & mitigation	18-6 to 18-40	Table 18.4 Environmental risk analysis for the CSELR proposal	The risk assessment fails to identify that UNSW is the service utility provider, owner and maintainer for the UNSW Kensington Campus and as a result has not been consulted on these issues. The risk matrix details that several of the risks identified in the Utilities and Services category have a medium/low residual risk rating. UNSW does not agree with this assessment. The risks include: – Significant number of services and utilities requiring relocation or protection as part of the CSELR proposal, increasing the area of disturbance. – Disruption to asset owner access to services and utilities. Damage to services and utilities during construction of the proposal (including associated safety risks, such as earth potential rise).	Transport for NSW would liaise with UNSW in its role as a service utility provider. Protection and relocation of utilities would be addressed through a project agreement between the parties. Refer to section 10.8.3 of the EIS (Volume 1A) for information about the interaction with existing and proposed services and utilities. Further detailed analysis of flooding and stormwater drainage would be undertaken during detailed design Further detailed assessment of potential groundwater issues would be undertaken during detailed design, and in consultation with UNSW. Risks associated with groundwater and flooding impacts were	The proposed mitigation measures for utilities, services and infrastructure impacts are insufficient. UNSW is also a service provider and needs to be consulted during the design and construction stages of the project with regards to any field surveys, the location of water supply bores and other utilities, services and infrastructure and any protection, relocation or replacement measures required as for any other service provider. The risk of interruptions to UNSW utilities, services and infrastructure during construction needs to be specifically addressed.

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– Additional draw of electrical power (and thus additional power supply required in the local area) to run the light rail vehicles and electrical equipment at each of the stops, maintenance facility and stabling yard. – Buried cables and stray leakage currents from the running rails into surrounding earth causing – cause electrolysis corrosion of nearby buried metalwork. The risk matrix details that several of – the risks identified in the Hydrology, drainage and surface water quality category have a high/medium/low residual risk rating. UNSW does not agree with this assessment. The risks include: – Potential stormwater ponding along the alignment affecting operation of the LRVs. – Potential for the proposal to result in exacerbation of existing localised stormwater flooding events during operation. The risk matrix details that several of the risks identified in the Groundwater category have a medium/low residual risk rating. UNSW does not agree with this assessment. The risks include: – Localised drawdown of the water table, resulting in a change in groundwater flow direction due to groundwater intersection and dewatering. – Ground settlement risks to existing buildings and infrastructure due to groundwater drawdown during construction. – Impacts to bores. Contamination of groundwater aquifers due to accidental chemical spills or leakage from construction and maintenance plant, vehicles,	assessed in section 10.2 of the EIS (Volume 1A). Additional consideration of these issues was outlined in Table 18.4 of the EIS – Environmental Risk Analysis (Volume 1B).	No mitigation measures for flooding and stormwater drainage impacts are indicated and the proposed mitigation measures for groundwater impacts are insufficient. UNSW has prepared alternative concept designs for the UNSW Anzac Parade and High Street stops. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Sections 3.2 and 3.3 and Appendix D: Concept Designs for UNSW Stops. Overland flooding and stormwater analysis and management at these stops are required in consultation with UNSW. Analysis and management for the potential loss of groundwater are also required in consultation with UNSW. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report, Appendix B: Suggested Conditions of Approval no. B9 and B10 and B44.

			equipment and storage areas.		
Appendix I. Proposed mitigation measures	I-5	Table I.1 Detailed design and preconstruction phase environmental management measures - hydrology, drainage and surface water	The current design finished levels along Anzac Parade will potentially dam the north west corner of the UNSW campus, causing medium level flooding to at least three buildings. The design needs to be revisited to reduce the rail levels to suit. A new land detailed level survey is required to ascertain an appropriate design level to provide the same protection as can be provided with the ground levels existing at present	This would be addressed during the detailed design phase.	Refer to responses on these issues above
Appendix I. Proposed mitigation measures	I-5	Table I.1 Detailed design and preconstruction phase environmental management measures - groundwater	A field survey would be undertaken to confirm the existence, usage and condition of any bore located within the construction footprint of the CSELR proposal, or potentially affected by the CSELR proposal (e.g. those located in the vicinity of proposed excavations). This would cover an area appropriate to identify potential dewatering impacts. There is no evidence that the three production bores on UNSW land were included in this field survey.	The bores noted would be included in the field survey as requested. Please refer to mitigation measure H.3 in Chapter 8 of this Submissions Report.	Refer to responses on these issues above
	I-5	Table I.1 Detailed design and preconstruction phase environmental management measures - groundwater	UNSW Production Bores No3 and 4 are to be relocated to available sites within UNSW campus, to sites which will provide a long term pumping rate for each bore of 18L/sec. This will require the bores to be located in the NW corner of the site to a depth to rock of about 30m (identical to the existing bores). Full hydraulic/mechanical design is required for the bore, casing, pump, controls, power supply, new 150 millimetres bore water connecting mains and a new system drain to stormwater, relocation of associated buried pipeline and valves away from the site to be acquired. All designs are to be as approved by UNSW. Lead time for this work is at least 6 months with design and construction costs estimated at some $1m.	These additional utilities are noted and would be considered during the detailed design phase. Liaison would be undertaken with UNSW in relation to these services in order to protect them from damage.	Refer to responses on these issues above

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Technical Paper 1. Traffic Operations	20 & 21	1.5.2 Project Definition	Special event platforms are to be installed at Chalmers, Randwick Racecourse and Moore Park to accommodate 45 metre and 90 metre (double length) light rail vehicles. UNSW Anzac Parade and UNSW High Street stops are listed as only having 45 metre platforms. The numbers of passengers listed for the other locations are below the numbers listed for UNSW on a daily basis.	The 90-metre LRVs and associated stops are only proposed for the purpose of a shuttle service between Central and Moore Park during special events at these locations. The forecast patronage for UNSW is anticipated to be accommodated through standard 45-metre LRVs servicing the full length of the corridor. Royal Randwick racecourse stop is proposed to be 45 metres in length.	UNSW has major concerns with the adequacy of the platform size calculations for the Central Station, UNSW Anzac Parade and the UNSW High Street stops and the relevance of the level of service calculations by TfNSW. These issues are addressed in more detail in the UNSW Submission to the CBD & South East Light Rail Project Submissions Reportand in the alternative concept designs for the two UNSW stops in Appendix D to that report plus in Appendices E: Platform Size Calculations and F: Level of Service Calculations to that report. See also Sections 3.1-3.3 of the submission. See also the UNSW Submission to the CBD & South East Light Rail Project Submissions Report, Appendix B: Suggested Conditions of Approval no. B9 and B10.
	41	2.4 Special Events 2.4.1 Overview	Special events as listed have over 15,000 in attendance. UNSW has a daily attendance of more than 15,000 however an extended platform is not proposed for the two UNSW stops.	Pedestrian modelling undertaken for the UNSW stops indicates that a platform length to accommodate a single 45-metre long LRVs would be adequate. The extended stops and 90-metre LRVs are required for special events at Moore Park to cater for peak crowds that occur immediately prior to and following the events. The UNSW demand would be more evenly distributed during peak periods.	Refer to responses on these issues above and below
	93	Figure 2.30 Existing bicycle network within the Kingsford precinct	The figure shows both existing and planned bicycle paths, not just existing. The on road bike path shown through the Kensington campus is incorrect - it does not exist. The planned off road bike path along Anzac Parade in the vicinity of the campus is not supported - there will be insufficient footpath widths as a consequence of the light rail construction.	The route through Kensington campus was shown in error – it should have been shown as a planned on-road cycle route not an existing cycle route. The off-road cycle route along Anzac Parade is planned by Randwick City Council. The source of this data is a publicly available Randwick City Council Cycling and Walking map.	Noted
	111	3.1.2.3 UNSW campus development	The numbers listed as arriving by public transport (25,000 to 30,000) supports the installation of special event platforms at UNSW/Chalmers.	Refer to response to page 41 of Technical Paper 1 above.	UNSW has major concerns with the adequacy of the platform size calculations for the Central Station, UNSW Anzac Parade and the UNSW High Street stops and the relevance of the level of service calculations by TfNSW. These issues are addressed in more detail in the UNSW Submission to the CBD &

				South East Light Rail Project Submissions Report and in the alternative concept designs for the two UNSW stops in Appendix D, plus in Appendices E: Platform Size Calculations and F: Level of Service Calculations to that report. See also Sections 3.1-3.3 of the submission. See also the UNSW Submission to the CBD & South East Light Rail Project Submissions Report, Appendix B: Suggested Conditions of Approval no. B9 and B10.
117	Table 3.11: 2021 AM peak CSELR boardings and mode of access by light rail stop	The bar graph for Central Station appears incorrect as no transfers from the rail network are shown and the number of passengers appears unrealistically low. The numbers do not correlate with UNSW arrivals and departure data for the two UNSW stops.	Noted. An error exists in the graph. Corrected figure is included below in Figure C.1. Correct boarding and alighting figures for 2021 and 2036 can also be found in the Precinct Plan for Central Station (section 7.3.10 of Technical Paper 1 in Volume 2 of the EIS).	Refer to responses on these issues above.
174 & 175	5.4.5.2 Wansey Road	Integration of the existing share bike path along Wansey Road is unclear. Further discussion with UNSW is required as to how pedestrians, bicycles, buses and other vehicular traffic will be managed at the UNSW High Street stop and at the intersection of Wansey Road and High Street.	Further detail in relation to the shared path is provided in section 6.11 of this report. Further discussion with UNSW would be undertaken in relation to the traffic and pedestrian issues noted.	The proposed mitigation measures for traffic and access impacts are insufficient. A Traffic Management Plan and/or Access Management Plan for the UNSW Kensington Campus is specifically required. The Plan should be prepared in consultation with UNSW. During construction UNSW would seek a review of the traffic signal operations at Anzac Parade/Barker Street, Anzac Parade/University Mall, Anzac Parade/High Street and at High Street/Botany Street and the intersections of High Street/Wansey Road, Wansey Road/ Arthur Street and Arthur Street/Botany Street Note also that UNSW transport peaks represent buses travelling in opposite directions to the general commuter peaks. UNSW has prepared an alternative concept design for the UNSW High Street stop. See the UNSW Submission to the CBD & South East Light Rail Project

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				Submissions Report Appendix D: Concept Designs for UNSW Stops. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.6 and Appendix B: Suggested Conditions of Approval no. B4, B45-B47, and C1-C5.
176 & 177	5.4.5.3 High Street	The provision of an indented bus bay within UNSW for westbound buses on High Street is not supported. No discussion with UNSW on this matter has taken place. Adverse impact on UNSW underground services and loss of large mature trees will result. The temporary westbound stop west of Wansey Road during construction should become the permanent westbound stop in High Street, leaving the trees unaffected.	Refer to response above in relation to this issue.	Refer to responses on these issues above
314	Table 7.11 Central Station Precinct Access Plan	Boarding and alighting numbers in the table are below UNSW arrivals and departures data for the UNSW Anzac Parade and UNSW High Street stops. The numbers do not correlate with UNSW arrivals and departure data for the two UNSW stops.	Boarding and alighting numbers quoted are forecasts based on the Bureau of Transport Statistics' round 5.2 Public Transport Patronage Model. The model was validated to bus ticket 'dip' data and bus load counts. The number of passengers boarding and alighting at Central Station is not expected to correlate directly with the number of passengers boarding and alighting at the two UNSW stops. For example, the number of passengers boarding at Central Station would include passengers heading both northbound and southbound to any of the 19 other stops on the network.	UNSW has major concerns with the adequacy of the platform size calculations for the Central Station, UNSW Anzac Parade and the UNSW High Street stops and the relevance of the level of service calculations by TfNSW. These issues are addressed in more detail in the UNSW Submission to the CBD & South East Light Rail Project Submissions Report and in the alternative concept designs for the two UNSW stops in Appendix D, plus in Appendices E: Platform Size Calculations and F: Level of Service Calculations to that report. See also Sections 3.1-3.3 of the submission. See also the UNSW Submission to the CBD & South East Light Rail Project Submissions Report, Appendix B: Suggested Conditions of Approval no. B9, B10 and B11.
327	7.3.15 UNSW Anzac Parade precinct access plan	The Precinct Plan as currently proposed is not supported because the side running track and UNSW Anzac Parade stop on UNSW is not supported - for	Refer to response above (page 314 of Technical Paper 1) in relation to UNSW Anzac Parade stop location.	Refer to responses on these issues above

	328	Table 7.16 UNSW Anzac Parade precinct access plan	the reasons previously given above. Boarding and alighting numbers in the table are below UNSW arrivals and departures data for this stop.		
	329	Figure 7-15 UNSW Anzac Parade precinct access plan			
	340	7.3.20 UNSW High Street precinct access plan	Further discussion with UNSW is required as to how pedestrians, bicycles, buses and other vehicular traffic will be managed at the UNSW High Street stop and at the intersection of Wansey Road and High Street. Clarity is required on integration of the existing share bike path along Wansey Road. The provision of an indented bus bay within UNSW for westbound buses on High Street between Botany Street and Wansey Road is not supported for the reasons given previously above. The temporary westbound stop west of Wansey Road during construction should become the permanent westbound stop in High Street. Boarding and alighting numbers in the table are below UNSW arrivals and departures data for this stop.	Refer to responses above in relation to these issues.	Refer to responses on these issues above
	340	Table 7.21 UNSW High Street precinct access plan			
	341	Figure 7-20 UNSW High Street precinct access plan			
Technical Paper 2. Construction Traffic & Transport Management Strategy	xvi	Executive Summary: Kingsford Precinct - construction impacts and mitigation	UNSW notes and supports Kingsford mitigation options of tidal flow operation on Anzac Parade and staged construction activities in the Anzac Parade and Alison Road corridors. It is essential that Anzac Parade and Alison Road (during exam periods) remain operable for UNSW express bus services set downs and pick ups during light rail construction.	Anzac Parade and Alison Road would remain operable for UNSW express buses during construction.	The proposed mitigation measures for traffic and access impacts are insufficient. It is essential that buses operate not only during construction of the project, but in accordance with published timetables for both morning and afternoon services from the Kensington campus, and particularly during exam periods. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Sections 3.5 and 3.6 and Appendix B: Suggested Conditions of Approval no. B4, B45-B47, B49-B50.
	xvi & xvii	Executive Summary: Randwick Precinct -	UNSW notes there are no mitigation options identified. It is essential that High Street and Alison	High Street and Alison Road would remain operable for UNSW express buses during construction.	Refer to responses on these issues above

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	construction impacts and mitigation	Road (during exam periods) remain operable for UNSW express bus services set downs and pick ups during light rail construction.		
7	1.4 CSELR Project Overview	Special event sidings 90 metres long are proposed at Chalmers Street and Moore Park but does not include UNSW. UNSW arrivals and departures equate to a special event every day during semester. Further discussion is required on platform lengths at the two UNSW stops.	Refer to response for page 41 of Technical Paper 1 above.	UNSW has major concerns with the adequacy of the platform size calculations for the Central Station, UNSW Anzac Parade and the UNSW High Street stops and the relevance of the level of service calculations by TfNSW. These issues are addressed in more detail in the UNSW Submission to the CBD & South East Light Rail Project Submissions Report and in the alternative concept designs for the two UNSW stops in Appendix D, plus in Appendices E: Platform Size Calculations and F: Level of Service Calculations to that report. See also Sections 3.1-3.3 of the submission. See also the UNSW Submission to the CBD & South East Light Rail Project Submissions Report, Appendix B: Suggested Conditions of Approval no. B9, B10, and B11.
19 & 20	2.5 Intersection Works	It is essential that the UNSW campus remains accessible during construction of the light rail for retail and other delivery vehicles, construction vehicles for sites on the campus, staff and student parking, cyclists and pedestrians. It is also essential that intersection works cease during exam study periods.	A traffic management plan would be prepared by the contractor prior to construction which would address the access issues noted.	The proposed mitigation measures for traffic and access impacts are insufficient. A Traffic Management Plan and/or Access Management Plan for the UNSW Kensington Campus is specifically required. The Plan should be prepared in consultation with UNSW. During construction UNSW would seek a review of the traffic signal operations at Anzac Parade/Barker Street, Anzac Parade/University Mall, Anzac Parade/High Street and at High Street/Botany Street and the intersections of High Street/Wansey Road, Wansey Road/ Arthur Street and Arthur Street/Botany Street Note also that UNSW transport peaks represent buses travelling in opposite directions to the general

				commuter peaks. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.5 and Appendix B: Suggested Conditions of Approval no. B4, B45-B47, and C1-C5.
26	2.10.5 Special Events	UNSW notes that Transport for NSW will seek agreement to ensure that Class 1 and 2 events do not occur concurrently and that known special events will be incorporated into the construction program with approval managed through the NCLG. UNSW express bus services should be identified as a special event.	The proposal would not include any works that would prevent the operation of these services. Detailed arrangements and management of pedestrian and bus stops would be developed as part of the site-specific traffic management plans produced by the contractor in consultation with stakeholders.	Refer to responses on these issues above
27	3.2.1 Bus Management	UNSW notes that a south east bus plan will be developed.	Noted.	Noted
30	3.2.1 Bus Management - Eddy Avenue	It is essential that Eddy Avenue remains operable for UNSW express bus services set downs and pick ups during light rail construction.	Eddy Avenue would remain operable for express bus services during construction.	The proposed mitigation measures for traffic and access impacts are insufficient. It is essential that buses operate not only during construction of the project, but in accordance with published timetables for both morning and afternoon services from the Kensington campus, and particularly during exam periods. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.5 and Appendix B: Suggested Conditions of Approval no. B4 and B11.
44	4.4.1 Network Management Plan	UNSW notes that the Network Management Plan will have '... the high level objective of maintaining network journey times and congestion levels at acceptable levels'. Acceptable levels are not defined in the document.	Noted. The Network Management Plan (NMP) is at an early stage of development and at this stage it is not possible to define these targets. These goals would be developed by Roads and Maritime Services (RMS) in coordination with the Network Co-ordination Liaison Group following approval of the proposal.	The proposed mitigation measures that address the Network Management Plan are insufficient. It is unclear whether targets will be defined and who will be represented on the Network Coordination Liaison Group.

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				See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Sections 3.5 and 3.6 and Appendix B: Suggested Conditions of Approval no. B7.
53	3.9.2 Network Performance and Figure 3.10 Network performance statistics AM peak	Traffic outcomes for the south east corridors are worse than for the CBD cordon e.g. 11% increase in travel time in the CBD cordon versus 15% for the full model area.	Noted. The NMP would seek to mitigate these identified impacts in both the South East sector and the CBD.	Refer to responses on these issues above. In addition UNSW has major concerns with the relevance of the level of service calculations by TfNSW. This issue is addressed in more detail in the UNSW Submission to the CBD & South East Light Rail Project Submissions Report in Appendix F: Level of Service Calculations.
				See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Sections 3.1-3.3 and Appendix B: Suggested Conditions of Approval no. B9 and B10.
57	3.9.3.2 Intersection delays	UNSW notes that intersection delay diagrams are only shown for the CBD not for the south east.	Intersection modelling was not sufficiently advanced to allow an intersection level of service (LoS) assessment to be published outside of the CBD. Intersection operations would vary greatly depending on the construction methodology yet to be proposed by a contractor. Additional modelling would be undertaken for specific construction phases once a contractor is appointed and details are known.	Refer to responses on these issues above.
129	4.5.2.3 High Street	It is essential that the UNSW campus remains accessible during construction of the light rail for retail and other delivery vehicles, construction vehicles for sites on the campus, staff and student parking, cyclists and pedestrians. It is also essential that intersection works cease during exam study periods.	A traffic management plan would be prepared by the contractor prior to construction which would address the access issues noted.	Refer to responses on these issues above.
132	Table 4.5 Summary of proposed conditions for Anzac Parade intersection closures	UNSW notes only vehicles up to 12.5 metres long will be able to access High Street from Anzac Parade. It is essential that Eddy Avenue, Anzac Parade and High Street (and Alison Road during exam periods) remain operable for UNSW express bus services set	The contractor, on behalf of Transport for NSW, would not undertake any works that would prevent the operation of these services during construction. Detailed arrangements and management of pedestrian and bus stops would be developed as part	Refer to responses on these issues above.

			downs and pick ups during light rail construction.	of the site-specific traffic management plans produced by the contractor in consultation with stakeholders.	
	152	4.6.6.5 University express bus services 890, 891 and 892	It is essential that Eddy Avenue, Anzac Parade and High Street (and Alison Road during exam periods) remain operable for UNSW express bus services set downs and pick ups during light rail construction.	Eddy Avenue, Anzac Parade and High Street would remain operable for express bus services during construction.	Refer to responses on these issues above.
	176 & 177	Appendix B.2 Pitt Street/ Eddy Avenue indicative staging	It appears from the diagrams there will be limited access to Eddy Ave from Pitt St. UNSW express buses use Pitt St as a staging area to provide the number of services required. It is essential that Eddy Avenue remains operable for UNSW express bus services set downs and pick ups during light rail construction.	Eddy Avenue would remain operable for express bus services during construction.	Refer to responses on these issues above.
	195 & 196	Appendix B.8 High Street indicative staging plan	It is essential that the UNSW campus remains accessible during construction of the light rail for retail and other delivery vehicles, construction vehicles for sites on the campus, staff and student parking, cyclists and pedestrians. It is also essential that intersection works cease during exam study periods.	A traffic management plan would be prepared by the contractor prior to construction which would address the access issues noted.	Refer to responses on these issues above.
Technical Paper 5. Heritage Impact Assessment	(ii)	Executive Summary	The statement that the proposed CSELR route would have a major adverse impact on significant trees on the western Anzac Parade boundary of UNSW is supported.	The impact on these trees would be significantly reduced by the proposed relocation of the UNSW Anzac Parade stop to the centre of Anzac Parade. Refer to section 6.13 for further detail.	Refer to responses on these issues above.
	(iii)	Executive Summary	It is noted that no mitigation measures with regard to these trees is mentioned in the Executive Summary, but are stated on page 363 of the report.	Noted. The design of the UNSW Anzac Parade stop has been amended as discussed above and in section 6.13 in this report. This is expected to result in the saving of a number of these trees.	Refer to responses on these issues above.
	176	4.1.1 - Historical Archaeology – Methodology	It is noted that for the works on UNSW land there is a low-moderate potential for historical archaeological remains to be present and that some open area excavation and archival recording during site works and post-excavation analysis may be required.	Noted.	Noted
	322	5.6.3 - Kensington/ Kingsford Precinct - Detailed Heritage Impact	It is noted that the trees along the western Anzac Parade boundary of UNSW near the main entrance are listed on the Randwick City Council Register of	Refer to previous response in relation to these trees.	Refer to responses on these issues above

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		Assessment	Significant Trees. The proposed CSELR construction and the UNSW Anzac Parade stop will necessitate the removal of a number of these trees. The trees are identified as a significant group of plantings as well as being individual mature plantings with historic significance. The statement that removal of these trees and extensive pruning would have a major adverse impact on the group and result in the loss of individual elements that demonstrate the pre-UNSW racecourse phase of the site is supported. The side running track on UNSW land is not supported and it should be moved to a centre running track with an island platform for the reasons previously given above.		
	363	6.0 Mitigation Measures - 6.2.3 Built and Landscape Heritage	It is noted that the table identifies the impact on the significant trees on UNSW land as 'Major Adverse'. The proposed mitigation measures for detailed design of the CSELR and the UNSW stop to retain, if possible the two significant Moreton Bay fig trees and eight significant Port Jackson Figs along the Anzac Parade boundary of UNSW is supported and that where these significant trees must be removed then suitable replacements would be made. However, the side running track on UNSW land is not supported and it should be moved to a centre running track with an island platform for the reasons previously given above.	Following consultation with UNSW it is proposed to relocate the UNSW Anzac Parade stop to the centre of Anzac Parade. Details of this proposed design change are provided in section 6.13 of this report. This design change would significantly reduce the impact to these trees.	Refer to responses on these issues above
Technical Paper 6. Heritage Interpretation Strategy	45	4.2 Interpretive Concepts	The use of the UNSW Anzac Parade stop as a location for interpretive signage or evocative historical imagery is supported.	Noted.	Noted
Technical Paper 8. Greenhouse Gas Assessment	3	2.2 Australian Policy	This section is now out of date and requires revision.	Recent changes in policy do not affect the methodology for the greenhouse gas assessment undertaken.	Noted
Technical Paper 9. Preliminary Tree Assessment	C1	Appendix C	19 trees were assessed along the Anzac Parade fence line on UNSW property. All trees were given a SULE rating of 2a. UNSW agrees with this except for trees numbered 744 and 745 on the assessment	The SULE rating was used to characterise the condition of existing trees but was not a determinant in decisions relating to tree removal or impact. Further arborist advice would be obtained during detailed	Noted

			sheet. Both trees are Ficus macrophylla of significant size and are listed among a group of 10 trees under EIS Volume 5 - Technical Paper 5 - Heritage Impact Assessment, page 327, UNSW Significant Trees. Trees 744 and 745 should have a SULE rating of 1a.	design. Moving the UNSW Anzac Parade stop to the centre of Anzac Parade would significantly reduce impacts to trees in this area.	Refer to responses on these issues above.
Technical Paper 11. Noise and Vibration Assessment	All	All	It is unclear how existing noise and vibration adjacent to the UNSW campus at High Street has been measured and what the differences will be with the operation of the UNSW High Street stop. There is no reference to electro-magnetic impacts emanating from operation of the light rail tracks or from communications equipment at the UNSW High Street stop or on the light rail carriages. There are UNSW buildings on High Street containing equipment highly sensitive to vibration and electro-magnetic interference. Further discussion is required with UNSW on mitigation measures for noise, vibration and electro-magnetic impacts during both construction and operation.	Refer to responses above in relation to these issues. Discussion of electro-magnetic radiation is provided in section 10.10 of the EIS (Volume 1A). Equipment that is sensitive to electro-magnetic radiation would be further investigated during detail design to understand the specific nature of the sensitivity and inform the strategies and approach to minimise impacts on such equipment in consultation with UNSW. Transport for NSW would ensure there is no material adverse impact on existing sensitive equipment resulting from the proposal.	Refer to responses on these issues above.
	53 & 54	6.2.3 Vibration sensitive equipment criteria	UNSW notes that two precincts have been identified as critically sensitive to vibration, since they contain precision research and/or imaging facilities. These are the Lowy, Wallace Wurth and the Prince of Wales Hospital buildings at High Street; and the Tyree Energy Technology Building at Anzac Parade. UNSW confirms that both of these precincts will continue to be the focus of precision laboratories into the future so that their protection from excess vibration should be maintained. UNSW notes that the High Street precinct is identified in the Report as requiring the highest level of vibration protection, Treatment type S3. UNSW requests that the Anzac Parade section from NIDA past the Tyree building, which currently shows no vibration treatment, also be identified as requiring Treatment type S3.	Further investigation and consultation with UNSW would be required throughout the development of the detailed design at these locations. More detailed investigations would be conducted including measurement of existing ambient vibration levels at building facades and internally at the equipment locations, measurement of the vibration transmitting characteristics of the ground, and measurement of existing internal noise levels throughout NIDA to establish the sensitivity of different areas. The trackform design at each location would then be developed to meet the noise and vibration goals at each receiver. Transport for NSW would ensure there is no material adverse impact on existing sensitive equipment	Refer to responses on these issues above.

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resulting from the proposal.

Item	Summary of issues	Response	UNSW Response
1.0 UNSW support the project			
1.1	Notes that as a key partner in the Centre and the CSELR delivery process, UNSW strongly supports the project and the public benefits it will bring to the community, the Centre and to the University.	Noted.	Noted
3.4 Alternative designs for the UNSW stops			
3.4.1	Notes that UNSW has commissioned consultants to develop alternative stop designs, in line with the proposed Design Principles of the CSELR.	Noted.	
4.0 UNSW Anzac Parade Stop – proposed alternative design			
4.3	– The proposed alternative design, that 'provides a safer, more familiar and – easy to use stop typology in Anzac Parade' includes the following: - – centrally aligned tracks and platform – 103.4 metre long, 6.6 to 7.7 metre wide platform, double loaded from either end providing a ~730 square metres platform (refer Appendix A, Drawing 22) – double pedestrian crossing points (8 metre wide and 6 metre wide) leading directly into UNSW at University Mall and College Walk, respectively, and NIDA on western edge of Anzac Parade (refer Appendix A, Drawing 18) – canopy or shelter over 100% of the platform (refer Appendix A, Drawing 24 – CCTV, ticketing and information – retains and increases existing width of trafficable lanes on Anzac Parade at/to 3.2 metre for kerbside lanes and 3.5 metre for centre lanes (refer Appendix A, Drawing 23 – reduced traffic speeds to that of School Zones at 40 km/h to improve safety (refer Appendix C)	Following consultation with UNSW it is proposed to relocate the UNSW Anzac Parade stop to the centre of Anzac Parade. Details of this proposed design change are provided in section 6.13 of this report. Transport for NSW would consult with UNSW in relation to the design of this stop and the design features noted in the alternative design.	Refer to responses on these issues above.

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Item	Summary of issues	Response	UNSW Response
	– generous planting zones at each end of the platform – materials and finishes palette derived from the agreed palette with City of Sydney and commensurate with a significant interchange stop – removal or reduction in clutter through undergrounding of cables or use of joint-use poles (refer Appendix A, Drawing 19) – use of the 'Boulevard character' to reflect the nature of Anzac Parade, the significant mall entry and gateway to UNSW and the wider Education & Health Specialised Centre – adjacent improvements to cater for bus stops both south and north- bound and new taxi stands (refer Appendix A, Drawing 20).		
5.0 UNSW High Street Stop – proposed alternative design			
5.3	Transafe, commissioned by UNSW, recommended centre platform arrangement as the preferred platform arrangement mainly due to less potential conflict points compared with other options explored. The proposed alternative design includes the following: Centrally aligned tracks and platform: – 45 metre long, up to 8.4 metre wide platform providing a 360 square metre platform (refer Appendix A, Drawing 36); – a scramble crossing at High Street/Wansey Road intersection, with unique paving treatment to reflect nature of crossing (refer Appendix A, Drawing 32); – canopy or shelter over 100% of the platform (refer Appendix A, Drawing 38); – CCTV, ticketing and information; – removal or reduction in clutter through undergrounding of cables or use of joint-use poles (refer Appendix A, Drawing 33); – no right turn into Wansey from High Street in westerly direction. Left in and left out of Wansey Road, which is retained as a two-way carriageway of 3.4 metre wide southbound lane and 3.2 metre wide northbound lane (refer Appendix A, Drawing 37); – left in and left out traffic at Gate 9; – relocated bus stops to outside Gate 8 on High Street for both east and westbound routes arriving and departing UNSW (refer	Following consultation with Wansey Road residents it is proposed to relocate the UNSW High Street stop to the centre of High Street immediately east of the intersection with Wansey Road. Details of this proposed design change are provided in section 6.11 of this report. Transport for NSW would consult with UNSW in relation to the design of this stop and the design features noted in the alternative design.	Refer to responses on these issues above.

Item	Summary of issues	Response	UNSW Response
	Appendix A, Drawing 34); – 'park character' to reflect the nature of the Wansey Road area; – new street trees on eastern side of Wansey Road, between High and Arthur Streets (refer Appendix A, Drawing 35); – parking and taxi zone along eastern edge of Wansey Road at 2.5 metre wide with spaced street tree blister plantings; – a bus and taxi zone along the northern side of High Street (refer Appendix A, Drawing 34); – reduced traffic speeds to that of School Zones at 40 km/h to improve safety; – landscaped buffer between the light rail tracks and the bike path (refer Appendix A, Drawing 35); – enlarged footpath and protected bike path, arranged and spaced to allow for development opportunity on Randwick Racecourse site with frontage and access to Wansey Road; and – capacity of an Arthur Street extension into Randwick Racecourse site.		
6.0 Other relevant issues			
6.1 Construction impacts upon trees and landscape character			
6.1.2.1	**Tree removal** Notes that the construction and operation of the CSELR will have a high and moderate adverse impact on both Anzac Parade street trees and the UNSW Pool Lawn and University Mall. Requests the proposal is reviewed to minimise the adverse impact on immediate surrounds during construction and operation. Where the landscape and public domain character has been disturbed as a result of the CSELR and tree removal, mature trees should be installed in the immediate vicinity and species selected which are reflective of the surrounding character and to uplift the public domain.	The proposed relocation of the UNSW Anzac Parade stop to the centre of High Street would significantly reduce the impact to the Anzac Parade trees. Further detail is provided in section 6.13 of this report.	Refer to responses on these issues above.
6.1.2.2	Notes a lack of detail with regard to the stop character at UNSW	Comment noted. Landscaping in the vicinity of the stops would be	Refer to responses on these issues above.

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Item	Summary of issues	Response	UNSW Response
	High Street and UNSW Anzac Parade. For example, no trees have been proposed for the UNSW High Street stop, as the park typology planting palette consists only of grasses/tufted plants, sedges and groundcovers.	further considered during the detailed design phase.	
6.1.2.3	Requests that the use of a Palm for the Boulevard typology is considered as not an accurate reflection of the landscape in Anzac Parade, nor does it provide any amenity for pedestrians or cyclists. Supports the potential use of Figs and Brush Box on the street verges, as these species would be reflective of the existing landscape character and provide amenity for both pedestrians and cyclists.	Comment noted. Landscaping in the vicinity of the stops would be further considered during the detailed design phase	Refer to responses on these issues above.
6.1.2.4	Supports the recommendation to protect the existing Figs at the Australian Turf Club (Randwick Racecourse)	Comment noted. Proposed changes to the CSELR alignment along Alison Road would reduce the impact to Figs at Royal Randwick racecourse. Refer to section 6.11 of this report for further detail.	Noted
6.1.2.5	Notes the use of *Agathis robusta* would certainly create a distinct avenue for the CSELR, however its form and habit would not provide the amenity offered by the other species proposed in Randwick City Council's Street Tree Master Plan.	Comment noted. The selection of tree species would be determined as part of the detailed landscape design during the detailed design phase of the proposal.	Noted
6.2 Construction and post project noise, vibration and electro-magnetic interference			
6.2.1	**Sensitive uses at UNSW** Notes the potential of construction and operation to impact upon a range of sensitive uses at UNSW, including: – student accommodation on-site – Faculties and Schools that use sensitive equipment and carry out research – National Institute of Dramatic Art (NIDA) examination period.	Noted. Transport for NSW and the contractor would consult with UNSW to address these concerns.	Refer to responses on these issues above.
6.2.2	**Noise and vibration impacts** Notes that no technical assessment specifically related to the impact of construction and operation ground borne vibration on the operation of vibration-sensitive equipment was undertaken in relation to the various UNSW buildings located near or adjacent the CSELR alignment.	These assessments would be undertaken during the detailed design stage.	Refer to responses on these issues above.

Item	Summary of issues	Response	UNSW Response
6.2.3.1	**Electro-magnetic interference** Notes that no technical assessment on impact of construction and operation EMI on the operation of sensitive equipment was undertaken. Seeks assurance that the necessary mitigation measures required to avoid significant adverse impact on University operations be demonstrated.	Transport for NSW would ensure there is no material adverse impact on existing sensitive equipment resulting from the proposal.	Refer to responses on these issues above.
6.2.3.2	Comment: UNSW seeks input into the timetabling of intrusive works in the period leading up to and during examination periods at both the Randwick Racecourse site and the UNSW Kensington Campus to ensure adverse impacts by way of noise and vibration can be suitably managed and mitigated against.	Transport for NSW and the contractor would consult with UNSW in relation to these issues. As identified in the EIS (and in mitigation measure S.1 in Chapter 8 of this report), when working adjacent to educational facilities, there is a requirement for particularly noisy activities to be scheduled outside sensitive times such as exam periods where possible. Consultation and liaison with the University would be required throughout construction.	Refer to responses on these issues above.
6.3 Construction and post project impacts upon UNSW utilities and infrastructure			
6.3.0	Notes the EIS risk assessment does not identify that UNSW is the service utility provider, owner and maintainer for the UNSW Kensington Campus and as a result has not been consulted on these issues. In making this assessment without identification of the University as a service provider, the risk matrix details that several of the risks identified in the Utilities and Services category have a medium/low residual risk rating. UNSW does not agree with this assessment.	Transport for NSW would liaise with UNSW in its role as a service utility provider during detailed design. Protection and relocation of utilities would be addressed through a project agreement between the parties.	Refer to responses on these issues above.
6.3.1.1	**Groundwater, borewater, and stormwater** *Regarding groundwater and borewater:* Existing underground groundwater and borewater services affected include: – Location of two of the three large water production bores and	The proposed relocation of the UNSW Anzac Parade stop to the centre of Anzac Parade would prevent impact to the bore and associated infrastructure. Refer to section 6.13 of this report for further detail.	Refer to responses on these issues above.

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Item	Summary of issues	Response	UNSW Response
	associated services for the city of Kensington Campus which draws some 200 kL/day of groundwater for 'commercial' uses – UNSW main stormwater pipeline runs within part of this strip of land. – Bore water reticulation drain point lies immediately beneath the platform. – Irrigation pipelines that run the length of the proposed land acquisition. – Trade waste grease arrester and associated sewer drainage. Bore water mains exist across Anzac Parade to provide supply to – Western Campus and to L5 site. Notes that in the event that the UNSW Production Bores 3 and 4 require relocation to available sites within UNSW, full hydraulic/mechanical design is required for the bore, casing, pump, controls, power supply, new – 150 millimetre bore water connecting mains and a new system drain to stormwater, relocation of associated buried pipeline and valves away from the site to be acquired. All designs need approval from UNSW. Lead time for this work is at least six months with design and construction costs estimated at some $1m.		
6.3.1.2	*Regarding stormwater:* Notes that the existing local stormwater flooding along Anzac Parade from High Street to Day Street adjacent to UNSW is not addressed. The UNSW overland stormwater flood path drains onto Anzac Parade across the proposed construction compound and the UNSW Anzac Parade stop.	Comment noted. Further detailed consideration of flooding and stormwater drainage would be undertaken during detailed design.	Refer to responses on these issues above.
6.3.2	**Electricity** It is noted that the EIS assumes that AusGrid is the utility service owner and that any utilities relocation works associated with the light rail 'will require careful planning and programming with the	Noted. Transport for NSW would liaise with UNSW in its role as a service utility provider. Protection and relocation of utilities would be addressed through a project agreement between the parties. Liaison with Ausgrid has been undertaken in relation to electricity	Refer to responses on these issues above. Noted

Item	Summary of issues	Response	UNSW Response
	asset owner, AusGrid'. This is not the case for UNSW land where UNSW is the utility service owner. It is critically important that UNSW's share 11 kV supply from the AusGrid network is not in any way compromised by the additional supply capacity and maximum demand required by the CSELR Substations as UNSW operations and future development rely on this supply.	requirements for CSELR operation. The operation of CSELR would not affect supply of electricity to UNSW from the Ausgrid network.	
6.3.3	**Gas** The EIS assumes that Jemena is the utility service owner and that any utilities relocation works associated with the light rail 'will require careful planning and programming with the asset owner, Jemena'. This is not the case for UNSW land where UNSW is the utility service owner. Any relocation of services will require consultation with UNSW rather than Jemena.	Noted Transport for NSW would liaise with UNSW in its role as a service utility provider. Protection and relocation of utilities would be addressed through a project agreement between the parties.	Refer to responses on these issues above.
6.3.4	**Water supply and sewer** This section assumes that the local council and Sydney Water are the utility service owners and that any relocation works associated with the light rail will require careful planning and programming with them. As above, this is not the case for UNSW land where UNSW is the utility service owner. Any relocation of services will require consultation with UNSW rather than council or Sydney Water.	Noted. Transport for NSW would liaise with UNSW in its role as a service utility provider. Protection and relocation of utilities would be addressed through a project agreement between the parties.	Refer to responses on these issues above.
6.3.5	**Telecommunications** A range of communications carrier services enter UNSW on both Anzac Parade and High Street near the Wansey Road intersection. Carrier services installed along both Anzac Parade and Wansey Road are likely to be affected, however it is not clear if the entry point to the campus on Anzac Parade or High Street will also be within the extent of permanent work boundary. As part of the next stage of design, UNSW requests the provision of detailed information on the proposed treatment of each	The comments in relation to telecommunications services are noted. Transport for NSW would negotiate separate agreements with each of the services providers in relation to protection and relocation of their assets. Further consideration of this issue would be undertaken during detailed design.	Refer to responses on these issues above. Note: UNSW is its own telecommunications service provider and as such has services crossing Anzac parade to Western Campus and across High Street to Arthur Street and Botany Street. Additionally other telecommunications services providers provide services to campus. Therefore Transport for NSW is to liaise with UNSW in its role as a service utility provider. Protection and relocation of utilities would be addressed through a project agreement between the parties.

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Item	Summary of issues	Response	UNSW Response
	service by each carrier along both Anzac Parade and Wansey Road and High Street and the flow on implications for the interface with existing routes within UNSW. It is noted that an existing cable route running across High Street at 'Botany Street is not shown on the drawing. This conduit provides the route for voice and data cables to UNSW buildings in Botany Street and Arthur Streets. The route provides a single link to those premises. It is difficult to determine if another cable route running east along High Street providing fibre connection to various buildings within the POWH campus is included or not on the drawing. UNSW requests that detailed information on all communications cable routes included in considerations and the proposed treatment of each service along those routes is provided to UNSW Communications Services and Facilities Management during the next stage of design. One of the key assumptions in the EIS indicates that 'local connections and relocations outside the corridor have not yet been considered in the program'. This is a critical consideration. Notes that a range of communications carrier services enter UNSW via Anzac Parade. As part of the next stage of design, it is requested that detailed information is provided to UNSW on the proposed treatment of each route, cable and service for each carrier and the flow on implications for the interface with existing routes within UNSW.		See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Sections 3.5 and 3.6 and Appendix B: Suggested Conditions of Approval no. B44.
6.3.6	**Future proofing/future expansion and servicing needs** Notes that UNSW plans to develop the Western side of Anzac	Noted. Transport for NSW would consult with UNSW in relation to the proposed development on the western side of Anzac Parade and the need for the design of CSELR to accommodate future	The proposed mitigation measures for utilities, services and infrastructure impacts are insufficient. Note: Future proofing is also applicable to High Street.

Item	Summary of issues	Response	UNSW Response
	Parade opposite UNSW Anzac Parade Station. UNSW Infrastructure and Utility services will be extended across Anzac Parade to further service that site. Notes there is no mention of the potential Risk of services interruptions to UNSW's infrastructure during construction or the impact on UNSW operations of the service interruption if this occurs.	infrastructure and utilities in this location.	UNSW has prepared an alternative Concept Design for the UNSW Anzac Parade stop. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report and Appendix D: Concept Designs for UNSW Stops. A strategy for the provision and maintenance of future utilities, services and infrastructure to the Kensington campus either side of Anzac Parade is required in consultation with UNSW. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.6 and Appendix B: Suggested Conditions of Approval no. B44.
6.4 Construction and post project impacts upon UNSW operations			
6.4.0	Comment: It is essential that UNSW be able to operate as normally as possible during the CSELR construction works period.	Noted. A consultation process would be established with the contractor to address issues associated with UNSW operations during the construction phase.	The proposed mitigation measures for stakeholder engagement are insufficient. A Stakeholder Involvement Plan and/or a Business Landowner and Engagement Management Plan is required specifically for UNSW. The Plan should detail by whom, when and how UNSW will be informed on progress, activities and impacts of the project, the management of complaints and other protocols. A Place Manager is required for the Kensington campus to provide a single point of contact during construction See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.6 and Appendix B: Suggested Conditions B49 and B50
6.4.1	**Traffic and access** **– Student and staff access** In addition to public transport, UNSW has approximately 8,000 staff and students arriving by private vehicle, 7,000 walking and more than 1,000 cycling to campus each day. Any changes to arrangements need to	The issues raised are noted and would be addressed during detailed construction planning for the proposal.	Refer to responses on these issues above.

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Item	Summary of issues	Response	UNSW Response
	be coordinated and communicated in advance to avoid confusion and disruption to operations.		
	Operations and delivery access Ongoing access for deliveries is essential for normal operations to continue. Access to the University is limited to a number of entry/exit points. Should any one Gate be affected for an extended duration (including the route to that Gate) severe impacts to supplies of materials and other important deliveries is likely to result.		
	- **UNSW construction program** At present there are four major projects underway on the Kensington Campus. To assist in resolving routine and construction access issues and likely impacts. UNSW seeks to work proactively with Transport for NSW to formulate a construction program that is mutually acceptable to both parties and considers the economic and business impacts of each project or entity.		
	- **Traffic operations and management** Despite the MoU, recognised operational impacts and the role of UNSW's staff and students in the viability of the CSELR proposal, this key role has often not been reflected in the language or focus in the EIS including the Construction Traffic and Transport Management Plan (CTTMP). For example UNSW is identified under 'Other Stakeholders' and is excluded from membership of the Network Coordination Liaison Group. UNSW intends to continue to be actively involved as a key partner at both high and detailed levels to ensure shared objectives and public benefits can		

Item	Summary of issues	Response	UNSW Response
	be achieved. - **Journey time and signal priority** UNSW does not support any changes that would increase travel times between Central Station and the UNSW Kensington Campus e.g. additional stop(s) or pedestrian priority areas.		
6.4.2	**Bus services** During construction, University does not accept that there are no mitigation measures to offset the disruption and maintain or improve the experience for its staff and students particularly those travelling on the Express Bus services from Central Station.	Express bus services currently play a critical role in providing transport to and from the UNSW. This important task would be provided by the CSELR once construction is complete. Detailed mitigation measures to retain express bus operations during each phase of construction would be developed as part of the site specific traffic management plans produced by the contractor in consultation with stakeholders.	Refer to responses on these issues above.
6.4.2.1	Arrangements at Central Station/Express Services UNSW requests the following changes and inclusions: – Run express buses in the morning peak along Alison Road and Botany Street onto High Street. – Provide shelter at Eddy Avenue. – Investigate loading express buses on Chalmers street south of – Devonshire Street per the major events. – Guarantee Sydney buses staff are on site to load buses from rear doors and ensure ticket machines are operational. – Allow the larger articulated buses to continue to provide express bus services. – Dispense with tickets for the duration of construction. – Provide supplementary services from Green Square, Redfern and/or Bondi Junction.	During the construction of the CSELR, all options to maintain the highest level of reliability for UNSW bus services would be considered. This as well as any other potential options to mitigate construction impacts would be considered further by the contractor in consultation with key stakeholders to mitigate construction impacts. At the Central Station end of the bus routes, no changes are proposed to express bus services in relation to the CSELR proposal – i.e. express buses would continue to use Eddy Avenue, avoiding the major construction site within Chalmers Street, and customers would continue to use the existing facilities and services provided by NSW State Transit. The suggestion to enhance cross-regional bus services is noted and would be considered by Transport for NSW.	Refer to responses on these issues above. Noted Noted
6.4.2.2	*Regarding the Long Term Transport Master Plan* Notes that the Central Station East-West link is required to provide an integrated solution and seamless transfer between heavy rail	Noted. This proposal is not part of the CSELR proposal and would be subject to a separate planning approval process. The CSELR proposal makes provision for this link, should it be developed.	Noted

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Item	Summary of issues	Response	UNSW Response
	and light rail for University staff and students as well as people attending special events. UNSW notes that this is an agreed action of the NSW Long Term Transport Master Plan and recommends that it is delivered in time for 2019 when light rail services start.		
6.4.2.3	*Regarding arrangements at Randwick Racecourse (exam periods)* Requests that construction works be timetabled to coincide with the major Christmas break between December and February. This includes consideration of works in Alison Road as these will impact UNSW exams held at the Randwick Racecourse.	It would not be possible to restrict construction works to the major Christmas break as requested. Transport for NSW and the contractor would work closely with UNSW to minimise the impact of construction during exam periods.	Noted
6.4.2.4	*Other bus and operations comments* It is noted that UNSW supports: ▪ the Anzac Parade Services (routes 391, 392, 394 and 399) continuing to Todman Avenue providing direction connections to UNSW; ▪ the continuation of cross regional bus services via High Street including routes 348, 370, 375, 400 and 410; and ▪ the Kingsford mitigations strategies of Tidal flow operation on Anzac Parade and staged construction activities in the Anzac Parade and Alison Road corridors. It is also noted that the University Express bus services and Metrobus routes M10 and M50 will not operate as they will be replaced by CSELR.	Changes to bus services in the South East are subject to separate consideration by Transport for NSW. The comments are noted and would be considered. Transport for NSW would undertake the South East bus network redesign in 2016–2017 and would consult with UNSW regarding the final preferred network. Please refer to section 5.8.1 of this report for further details.	Noted Noted
6.4.2.5	*Future routes/services*	Please refer to response above.	Refer to responses on these issues above

Item	Summary of issues	Response	UNSW Response
	UNSW strongly recommends that decisions regarding all future bus routes and the operation of the Light Rail Services are made on merit		
6.4.5	**Economic impacts** Notes the recommendation to implement a Business and Landowner Engagement and Management Plan as well as a Business Management and Assistance Strategy to proactively work with businesses. As the largest organisation (turnover $1.5bn, annual capital spend circa $200m, 6,000 staff) impacted by the light rail construction UNSW requests that it is defined as a business for the purposes of these plans and strategies.	UNSW would be defined as a business for the purposes of these plans and strategies.	The proposed mitigation measures for stakeholder engagement are insufficient. A Stakeholder Involvement Plan and/or a Business Landowner and Engagement Management Plan is required specifically for UNSW. The Plan should detail by whom, when and how UNSW will be informed on progress, activities and impacts of the project, the management of complaints and other protocols. A Place Manager is required for the Kensington campus to provide a single point of contact during construction. See the UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.6 and Appendix B: Suggested Conditions B49 and B50.
6.5	**Construction compound location** The location of the construction compound on the campus is not supported due to the range of likely impacts upon the campus and nearby sensitive uses within the campus. These impacts include loss of amenity and intrusion of noise, vibration, and light spill at night; loss of significant trees; potential damage and loss of access to infrastructure and services; impaired pedestrian accessibility, reduced safety, diversion of existing stormwater flow, noting that the proposed site of the compound is an area largely subject to inundation. As a result of UNSW's recommended revised location for the UNSW Anzac Parade stop, the compound is no longer directly contiguous with where the works are proposed to be undertaken. There may be an opportunity for the compound to be located within the road reserve.	A construction compound is no longer required at the UNSW Anzac Parade stop, as explained in sections 6.13 and 6.15 of this report. The compound site is proposed to be relocated to the existing university car park adjacent to the NIDA building. Transport for NSW would work closely with UNSW to address the issues raised. Environmental issues would be addressed through the CEMP.	Refer to responses on these issues above
6.6	**Stabling options**	Noted.	Noted

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Item	Summary of issues	Response	UNSW Response
	The University supports the stabling option that best serves and supports the operation of the CSELR network.		
7.0	**Ongoing consultation with Transport for NSW** To achieve suitable and meaningful input into the detailed design phase, UNSW seeks the preparation and implementation of a stakeholder liaison protocol and sign-off mechanism to address early works and main construction works to assist in input, feedback (and critically) notification of when certain works may be carried out.	Agreed. Transport for NSW would continue to consult with UNSW during the detailed design and construction phases of the proposal.	The proposed mitigation measures for stakeholder engagement are insufficient. A Stakeholder Involvement Plan and/or a Business Landowner and Engagement Management Plan is required specifically for UNSW. The Plan should detail by whom, when and how UNSW will be informed on progress, activities and impacts of the project, the management of complaints and other protocols. A Place Manager is required for the Kensington campus to provide a single point of contact during construction. See UNSW Submission to the CBD & South East Light Rail Project Submissions Report Section 3.6 and Appendix B: Suggested Conditions B49 and B50.

UNSW Suggested Conditions

PART B ENVIRONMENTAL PERFORMANCE

UNSW STOPS DESIGN REVIEW PANEL

B1. A Design Review Panel shall be constituted for both UNSW stops for this project. The composition/membership of the Design Review Panel shall be subject to approval by the Director-General (or his delegate), and shall be at least three members, one from or nominated by UNSW, and one being an independent traffic and transport design expert not part of the detailed design process of the project, and another from or nominated by Randwick City Council, plus any other relevant party. The Design Review Panel shall consider the revised designs required under this approval (see Conditions B9 and B10), Stops Urban Design and Landscape Reports, Stops Access Plans, and recommendations or conclusions arising from the Network Coordination Liaison Group, including Construction Traffic Management Plan(s).

UNSW STOPS URBAN DESIGN AND LANDSCAPE REPORTS

B2. The Proponent shall prepare a UNSW Stops Urban Design and Landscape Report(s) in relation to all aspects of the project as it affects UNSW, including the UNSW Stops, compound, and the Kensington Campus environs. The Stops Urban Design and Landscape Report(s) shall be prepared / developed within 12 months of commissioning of the project and in consultation with (and the agreement of) UNSW. The Report(s) shall be consistent with the design objectives, design standards, and requirements as set out in Conditions B4-B10 and B14-B19 in relation to the Stops Access Plans, Revised Design, the Network Coordination Liaison Group, and Trees and Landscaping.

B3. The Urban Design and Landscape Report(s) required under Condition B2 shall be reviewed by the Design Review Panel, as constituted for the UNSW Stops.

The Proponent shall update and finalise the Urban Design and Landscape Report(s), having regard to and addressing any comments made by the Design Review Panel. A copy of the final Report(s) shall be submitted to the Director-General as soon as practicable following finalisation of the Report(s), accompanied by a justification if any of the comments made by the Design Review Panel have not been incorporated into the final design, or otherwise addressed.

STOPS ACCESS PLANS

B4. The Proponent shall develop Stops Access Plans for both UNSW stops to inform the final design of the stops. These shall include such matters as platform size and dimensions and other required passenger facilities, design and location of footpaths, pedestrian crossings, cycleways, integration of proposed and existing landscaping and public domain, and any traffic and road changes and other transport initiatives at and in the environs of each stop.

The Plans shall consider, but not be limited to, the following:

(a) Integration with UNSW's security and safety infrastructure including CCTV and help points and permit a dual contiguous visibility between both systems;
(b) Access and patrolling structure;
(c) Safe and convenient access to and use of the stops (including platforms and ramps);

(d) Anticipated levels of access and service to the UNSW Kensington Campus at the stops, including provided demand survey material from UNSW (as updated from time to time);
(e) The identification of opportunities and constraints presented by existing and proposed transport and access infrastructure and services;
(f) Patronage changes resulting from land use, population, employment, transport infrastructure and service changes;
(g) Integration with existing and proposed transport infrastructure and services, including maintenance of existing timetabled bus services and their ability to operate in accordance with published timetables and maintain a required level of service during construction;
(h) Pedestrian, cycle, bus, taxi, vehicle and emergency vehicle access and parking, and infrastructure and servicing requirements;
(i) The proposed Network Management Plan;
(j) Legislative requirements and applicable guidelines (such as the VRIOGS);
(k) Final design, infrastructure, management and service measures, and the level of access and service to be achieved for all users;
(l) Operational management provisions for future operational requirements, including maintenance, security and management responsibilities;
(m) The designs arising from the Design Review Panel's consideration of the Urban Design and Landscape Report(s) and their finalisation, as required under Conditions B1-B3;
(n) The results of any safety audits as may be required or prepared under this approval; and
(o) The findings, recommendations and requirements of a detailed noise, vibration, EMI and RFI impact assessment as required by Conditions B22 and B23 of this approval.

The Plan(s) shall be prepared in consultation with the Network Coordination Liaison Group required under Condition B7-B8 and with UNSW consultation and agreement and shall be supported by a meseoscopic and a micro-simulation traffic and transport analysis. The Plan(s) shall detail a delivery and implementation program and shall be provided to the Director-General and made publicly available prior to construction, unless otherwise agreed by the Director-General.

B5. In developing the Plan(s), the Proponent shall consider requirements of other conditions of this approval, including:

(a) Traffic and accessibility design;
(b) Parking management strategy;
(c) Pedestrian and cyclist network strategy;
(d) Urban design and landscaping;
(e) Security and safety infrastructure integration; and
(f) Other UNSW-related requirements including those set out in Conditions B1-B4, B9-B10, and B20-B37, including noise, vibration, EMI and RFI.

B6. The Stop Access Plan(s) required under Condition B4 shall be reviewed by a qualified traffic and transport professional(s), independent of the detailed design process for the project. The independent, qualified professional(s) shall be approved by the Director-General prior to the commencement of the review process.

NETWORK COORDINATION LIAISON GROUP

B7. A Network Coordination Liaison Group shall be established to inform the detailed design of temporary construction and permanent operational traffic and transport measures and to inform ongoing management measures prior to and during construction of the project. The Group shall be chaired by the Proponent and shall

comprise representatives of Planning & Infrastructure, relevant road authorities (including RMS and Councils), transport operators (including bus and taxi operators), and emergency services, UNSW and other key project partners.

The recommendations of the Group shall be referred to the Director-General for approval prior to their adoption and implementation.

The Group shall be consulted on, and inform the preparation of, a Construction Traffic Management Plan (as required under Condition C2) and Stops Access Plans.

B8. The Proponent shall undertake supplementary analyses as required by the Network Coordination Liaison Group and detailed modelling of traffic changes and impacts that have the potential to have a significant detrimental impact on traffic flow efficiency with the objective of informing and improving road network changes and traffic management measures. The requirement for, and details of, the modelling shall be undertaken in consultation with the Group. The revised traffic management measures, including changes to the pedestrian, bicycle and public transport networks, shall be incorporated into the Construction Traffic Management Plan and Stop Access Plan(s).

UNSW ANZAC PARADE STOP – REVISED DESIGN

B9. The project shall be revised to incorporate the following amendments (and in recognition of the results of the stop's road safety audit). The new design of the stop shall be provided to the Director-General for approval prior to the commencement of pre-construction and construction activities at, and in the environs of, the Anzac Parade Stop and shall incorporate:

(a) An alignment adjustment to allow for a wider a platform ;

(b) Platform dimensions to increase to at least 90 metres in length to accommodate 2 car sets and made wider (up to between 7.0 and 7.7 metres at its maximum) to accommodate passenger peak period boarding demand with Level of Service of 'C' calculated with UNSW survey figures adjusted for growth and using VRIOGS and without the need for marshalling.
[*Note: should marshalling be adopted this will be at the cost of the proponent and appropriate indemnities will be required for UNSW against associated risks*];

(c) A shelter that covers the entire platform and ramps and that extends beyond the platform width to meet a 1:2 cut off angle to provide weather protection;

(d) Location and design of ticketing system and passenger information to reduce congestion and delay and improve safety;

(e) Confirmation of the northern staggered pedestrian crossing, with traffic signals;

(f) Use of at source mitigation measures to address noise, vibration, EMI and RFI impacts to UNSW sensitive environments;

(g) Coordination of intersection light operations to prevent the "see through" effect;

(h) Public domain repairs, including new pavements equal in quality to the University Mall, landscaping: to compensate for the lost trees; repair and reworking of hard and soft landscape in front of the Tyree Energy Technologies building in order to provide access paths to the Mall, ground cover and a new tree; to adjust to the new footpath locations, reconstruction of boundary walls and associated landscaping at NIDA and shared use poles for lighting, traffic signals, traffic signs, communication cables etc.; and

(i) A new Anzac Parade western side bus shelter to match the stop architecture and for the full length of the bus stop.
[Note no shelter is required on the eastern side of Anzac Parade]

In the event that further design amendments are required as a consequence of

compliance with conditions B1-B8, any such revised designs shall be approved by the Director-General, following consultation and agreement with UNSW.

UNSW HIGH STREET STOP – REVISED DESIGN

B10. The project shall be revised to incorporate the following amendments (and in recognition of the results of the stop's road safety audit). The new design of the stop shall be provided to the Director-General for approval prior to the commencement of pre-construction and construction activities at, and in the environs of, the High Street Stop and shall incorporate:

(a) Moving the alignment of the track as far north as possible to minimise the noise, vibration, EMI and RFI effects. This entails the use of side platforms and the removal of other vehicle traffic from High Street between Wansey Road and Botany Street
[Note 1: emergency vehicles and public buses may continue to use High Street sharing the light rail alignment]
[Note 2: this realignment assumes the use of some additional UNSW land on the north east corner of High Street and Wansey Road and access to existing developments where required via UNSW land accessed from Arthur Street];

(b) Use of at source mitigation measures to address noise, vibration, EMI and RFI impacts to UNSW sensitive environments,

(c) Side platforms 45m long and 3.5m in width with 3.0m additional footpath space behind the two platforms to accommodate queuing and alighting space at peak times, and contiguous level with the paved plaza surrounding them eliminating any steps;

(d) T Shelter for the full length of the southern inbound platform ;

(e) Location and design of ticketing system and passenger information to reduce congestion and delay and improve safety;

(f) Relocation of the shared pedestrian and bicycle path in Wansey Road reservation west of the light rail alignment;

(g) Provision of bus stops with shelters on both sides of High Street immediately west of Wansey Road, with a combined taxi zone on the southern side;

(h) New pavements equal in quality to the University Mall, landscaping, and lighting as required for the pedestrian plaza including shared use poles;

(i) Crossing points in High Street at each of the platforms and in line with the footpaths and shared bicycle paths within the Wansey Road reservation and the footpath on Botany Street; and, in line with the northern footpath of High Street on Wansey Road; and

(j) Bollards to mark the light rail track alignment and rough stone paving sets within the alignment, except at crossing points to discourage pedestrian movement outside the crossing points.

In the event that further design amendments are required as a consequence of compliance with conditions B1-B8, any such revised designs shall be approved by the Director-General, following consultation with and agreement of UNSW.

CENTRAL STATION STOP

B11. The design resolution of the Central Station Stop shall be undertaken in consultation with UNSW. The key issues shall be addressed to UNSW's satisfaction and agreement, particularly access, safety, and passenger management.

HIGH STREET PEDESTRIAN PLAZA

B12. TfNSW and UNSW shall work jointly in obtaining the necessary approvals by providing support to close High Street and create the High Street Pedestrian Plaza between Wansey Road and Botany Street. The road shall be closed to all vehicles except for the following: Light Rail Vehicles, emergency vehicles and buses. TfNSW

shall provide access to information, technical assistance and assistance in negotiation with approving authorities.

UNSW ANZAC PARADE CONSTRUCTION COMPOUND

B13. The Proponent shall prepare a Construction and Environmental Management Plan (CEMP) as required under Condition C1. Where as a result of the UNSW construction compound UNSW (and NIDA) facilities are impacted during construction works through temporary or permanent land acquisition, reduced amenity, reduced access, reduced functionality or other impact, the Proponent shall, in consultation with (and the approval of) UNSW and NIDA address construction impacts and agree on mitigation, management and rehabilitation measures. Where appropriate, the Proponent shall determine viable alternative options for UNSW (and NIDA) facilities during the construction phase. Mitigation and management measures shall be implemented, prior to impacts occurring.

Note: refer to application of Condition C1 in relation to a UNSW-specific Construction and Environmental Management Plan (CEMP)

TREES AND LANDSCAPING

B14. Prior to any UNSW-related works commencing (whether early, enabling or main project construction works), the Proponent shall engage a suitably qualified arborist to prepare a pre-construction tree audit detailing the current condition of all trees within construction zone at the UNSW Kensington Campus, including tree canopies, roots etc. The tree audit shall prepared in consultation with (and the agreement of) UNSW and be submitted to the Director-General for information prior to the commencement of any works.

B15. A Tree Management Strategy shall be prepared following the tree audit's sign-off and shall be prepared in consultation with (and the agreement of) UNSW and be submitted to the Director-General for information prior to the commencement of any works. The Tree Management Strategy shall address, but not be limited to:

(a) Key outcomes of the Tree Audit in relation to health, significance, size of trees;
(b) Tree protection measures and maintain tree health;
(c) Relevant legislative frameworks;
(d) Processes and mitigation measures in relation to tree removal and replacement;
(e) Replanting strategy;
(f) Reduction of risk to public safety, both short and long term;
(g) Reduction of potential damage to property, both short and long term; and
(h) Providing clearances around services and utilities.

B16. The Proponent shall minimise disturbance of and impact on existing trees on UNSW land at UNSW Kensington Campus. Tree protection zones shall be established and maintained during the construction period. Any trees that require removal shall be confirmed with and agreed by UNSW.

B17. Construction of walls/footpaths around existing trees on UNSW land at UNSW Kensington Campus shall be confirmed via root mapping in consultation with (and agreement by) UNSW to determine construction methods required.

B18. Replacement trees on UNSW land at UNSW shall be provided as agreed with / to the satisfaction of UNSW. Consultation with (and agreement by) UNSW shall establish an appropriate new tree planting and tree offset strategy (including locations, species, sizes and soil requirements).

B19. Replacement understory planting on UNSW land shall be provided as agreed with and to the satisfaction of UNSW. Consultation with UNSW will establish appropriate types of planting, locations, species, pot sizes and soil requirements.

ELECTROMAGNETIC INTERFERENCE, RADIO FREQUENCY INTERFERENCE, NOISE AND VIBRATION AT SENSITIVE UNSW ENVIRONMENTS

Note: These conditions only relate to sensitive environments within or associated with UNSW. They are intended to operate in parallel with standard whole of Project noise and vibration conditions, which will continue to apply where the following conditions do not apply. It is expected that the Project Approval will include conditions relevant to the whole Project that specify:

- *a) Construction hours.*
- *b) Noise and vibration limits during construction works for various land uses (including commercial, educational and residential land uses).*
- *c) A construction noise and vibration management plan.*
- *d) A construction noise and vibration compliance report.*
- *e) Noise and vibration limits during operations.*
- *f) Operational noise and vibration review and compliance assessment.*

Sensitive Environments at UNSW Kensington Campus

B20. Prior to the commencement of construction the Proponent shall prepare a Key Sensitive Environments Location Plan for the UNSW Campus (which includes NIDA). The Key Sensitive Environments Location Plan shall be based on UNSW's Key Sensitive Environments and Research Areas Plan, Drawing 11A, and shall identify all buildings and sites that contain, or will contain, sensitive uses at the UNSW Campus as well the location of construction works zones and/or light rail operational infrastructure and activities that are relevant to the specified key sensitive environments. Sensitive environments include, but are not limited to, performance spaces, teaching spaces, residential areas and/or research facilities. The Key Sensitive Environments Location Plan shall be prepared in consultation with and to the satisfaction of UNSW.

Construction Hours

B21. In addition to other conditions relating to construction hours, construction activities associated with the Project shall only be undertaken with the agreement of UNSW during the following periods:

a) UNSW Exam Periods, where the construction works are likely to be audible within UNSW Exam locations at UNSW Kensington Campus and Randwick Racecourse; and

b) at any time in relation to construction works specified in the Key Sensitive Environments Location Plan (see Condition B20).

Technical Assessment of Noise and Vibration

B22. Prior to the completion of detailed design the Proponent shall carry out a technical assessment of EMI, RFI, noise and vibration impacts for sensitive environments identified in the Key Sensitive Environments Location Plan. The technical assessment shall be undertaken by a suitably qualified and experienced specialist (or specialists) who is approved by the Director-General, in consultation with UNSW, and shall include the following:

a) Background EMI, RFI, noise and vibration measurements, undertaken in consultation with UNSW;

b) Calculations to predict to a reasonable level of certainty the levels of EMI, RFI, noise and vibration that will be generated by the Project, using reasonable worst case construction and operational scenarios;
c) Construction – If, after applying all feasible and commercially available mitigation measures and alternative construction methodologies, predictions of construction noise or vibration are unable to comply with the Vibration and Noise Performance Standards at all times then the Proponent shall prepare a Research Mitigation Plan for Construction EMI, RFI, Vibration and Noise (RMPCERVN) in consultation with UNSW. The RMPCERVN will include, but shall not be limited to, a combination of scheduling remedies, changes to construction methods and timing, ongoing monitoring, and site based mitigation measures, including the use of vibration isolation tables and other isolation strategies;
d) Operations – If the levels of EMI, RFI, noise and vibration are predicted to be unable to comply with the EMI, RFI, Vibration and Noise Performance Standards at all times during the operation of the Project then the impact assessment report shall assess feasible and commercially available mitigation measures to ameliorate the impact such that the Performance Standards are complied with at all times. Performance Standards are defined in Conditions B24, B27, and B30-B32. In its consideration of mitigation measures the Proponent shall consider the certainty and scientific validation of the mitigation measure in being able to ensure the Project will comply with the Performance Standards, and shall consider the feasibility of relocating the alignment of light rail tracks to the northern edge of High Street;
e) Document the details of consultation with UNSW and explain how the issues raised by UNSW have been addressed; and
f) The establishment of a separate fund to pay for future mitigation works in the event that the Performance Standards are exceeded. The fund shall be used by UNSW for future mitigation works with the approval of the Director-General, in consultation with UNSW.

The technical assessment of EMI, RFI, noise and vibration shall be submitted to the Director-General for approval, and shall be approved by the Director-General before the commencement of any construction works specified in the Key Sensitive Environments Location Plan (see Condition B20).

B23. The technical assessment of EMI, RFI, noise and vibration impacts shall consider the following parameters:

a) Proposed construction methodology and specific construction equipment and activities to assess ground borne construction vibration impacts. Vibration, noise and EMI/RFI spectra shall be provided for the proposed construction methods, activities and specific light rail construction equipment;
b) Characteristics of the proposed rolling stock and track form proposed for the light rail system to ascertain the parameters of source vibration, noise and EMI/RFI levels likely from the light rail. Source vibration, noise and EMI/RFI levels of rolling stock operating on track systems similar to that proposed for the Project shall be obtained to ensure that appropriate levels of source vibration, noise and EMI/RFI are used for impact predictions;
c) Geology / lithology details to determine the amount of vibration attenuation likely between the alignment and UNSW buildings;
d) Structural details of the UNSW buildings to ascertain the likely decoupling loss between the ground and various UNSW buildings;
e) Structural details of the buildings specified in the Key Sensitive Environments Location Plan to ascertain vibration attenuation / amplification; and
f) Performance Standards as defined for Sensitive Equipment and Research Areas in Conditions B24, B27 and B30-B32.

If it is not possible to collect all the site specific information above, specific assumptions shall be made to carry out a meaningful review of impacts. Such

assumptions shall be based on international design experience on other light rail systems, noise, vibration and electromagnetic/radio frequency interference measurements of existing light rail systems, and established empirical modelling methodologies to assess impacts on the internal environment within the key current and planned research facilities.

Vibration Performance Standards

B24. Vibration caused by the Project shall not exceed the Vibration Performance Standards for Key Sensitive Environments identified in the Key Sensitive Environments Location Plan. The Vibration Performance Standards for Key Sensitive Environments shall be as follows:

a) Vibrations caused by the Project shall not exceed:
   (i) A vibration criterion of VC-E based on a standardised generic classification of equipment associated with the Vibration Criteria (VC) curves set out in Gordon SPIE99 "Generic Vibration Criteria for Vibration-Sensitive Equipment";
   (ii) Long-term background tri-axial vibration levels of the floor vibration (x, y, and z) to be represented by the L_{90} statistical parameter over each of three time periods (day, evening, night) spanning an entire continuous 24-hour period; and
   (iii) Equipment specifications as defined by manufacturers or documented research need.

b) Vibration shall be measured over a minimum 24 hour period at each location specified on the Key Sensitive Environments Location Plan;

c) The vibration from the operation of the Project and a passby of a light rail vehicle shall not exceed the existing ambient vibration condition (L_{90}) vibration level in any of the 1/3-octave bands from 4 Hz to 200 Hz during the applicable time period. The vibration level is the level in any axis; and

d) Vibration generated by the Project shall also comply with the requirements of both the EPA under the *Protection of the Environment Operations Act 1997 (POEO Act)* and the EPA *Rail infrastructure noise guideline (2013)*.

Unless determined by the Vibration Criteria (VC) curves set out in Gordon SPIE99 "Generic Vibration Criteria for Vibration-Sensitive Equipment" or equipment specifications, the vibration generated by a Project light rail vehicle is defined as the root-mean-square ("RMS") energy average (L_{eq}) of the building floor vibration attributable to a Project light rail vehicle during a passby. The RMS vibration attributable to a Project light rail vehicle is that obtained by measurement over the duration of a train passby. The "passby time" of a train over which the RMS is obtained is defined as the time between the "3 dB down points" of the recorded vibration level. In the case where equipment has specified criteria the measurement methodology shall be modified to address the specific equipment.

B25. The Vibration Performance Standards incorporate the variability that naturally exists between trains under typical operations. Acceptable variation, for compliance with the Vibration Performance Standards shall be defined as follows:

a) The Vibration Performance Standards in Condition 24(a)(ii) shall be met by 95 per cent of the Project light rail vehicle passby events;

b) In no passby event shall the vibration from any Project light rail vehicle be in excess of 3 decibels above the Vibration Performance Standards in Condition 24(a)(ii) in any single one-third octave band; and

c) In the case where equipment specifications are defined as an absolute maximum then the Vibration Performance Standards shall be met by 100 per cent of the Project light rail vehicle passby events and measured in accordance with specific criteria requirements.

B26. Unless otherwise defined by equipment criteria, vibration measurements shall be undertaken in accordance with measurement methodology guidelines contained within both Australian Standard AS2670.2:1990 *Evaluation of human exposure to whole-body vibration. Part 2: Continuous and shock-induced vibration in buildings (1 to 80 Hz)* and the EPA *Assessing Vibration: a technical guideline (2006)*.

Noise Performance Standards

B27. Noise caused by the Project (including both airborne and re-radiated structure-borne noise) shall not exceed the Noise Performance Standards for Key Sensitive Environments identified in the Key Sensitive Environments Location Plan. The Noise Performance Standards for Key Sensitive Environments shall be as follows:

a) Noise caused by the Project shall not exceed:
   (i) Operational noise caused by the Project shall not exceed the recommended "Satisfactory" design sound levels for different areas of occupancy inside rooms of different types within Educational Buildings and Public Buildings as presented in Table 1 of AS2107:2000 Acoustics – Recommended design sound levels and reverberation times for building interiors.
   (ii) Equipment Specific Criteria as defined by manufacturers or documented research need.

b) Where equipment has specific measurement requirements these shall apply, otherwise noise generated by a Project light rail vehicle is defined as the L_{ASmax} measured (using the "slow" time weighting) of the noise attributable to a Project light rail vehicle during a passby.

c) Operational noise generated by the Project shall also comply with the requirements of both the EPA under the *Protection of the Environment Operations Act 1997 (POEO Act)* and the EPA *Rail infrastructure noise guideline (2013)*.

d) Construction noise impacts shall be established in accordance with the guidance within *Australian Standard AS 2436-2010, Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites* and the EPA *Interim Construction Noise Guideline*.

B28. The Noise Performance Standards incorporate the variability that naturally exists between trains under typical operations. Acceptable variation, for compliance with the Noise Performance Standards shall be defined as follows:

a) The Noise Performance Standards in Condition 27(a)(i) shall be met by 95 per cent of the Project light rail vehicle passby events.

b) In no passby event shall the noise from any Project light rail vehicle be in excess of the recommended "Maximum" design sound levels for different areas of occupancy inside rooms of different types within Educational Buildings and Public Buildings as presented in Table 1 of AS2107:2000 *Acoustics – Recommended design sound levels and reverberation times for building interiors*.

c) In the case where equipment specifications are defined as an absolute maximum then the Noise Performance Standards shall be met by 100 per cent of the Project light rail vehicle passby events and measured in accordance with specific criteria requirements

B29. Unless otherwise defined by equipment criteria, noise measurements shall be undertaken in accordance with measurement methodology guidelines contained within AS2107:2000 *Acoustics – Recommended design sound levels and reverberation times for building interiors* and AS2659 *Guide to the use of portable sound measuring equipment*.

Electromagnetic and Radio Frequency Interference Performance Standards

B30. EMI for the Project shall not exceed the EMI Performance Standard for Key Sensitive Environments as identified on the Key Sensitive Environments Location Plan. Unless otherwise agreed with UNSW, the EMI Performance Standard shall be 10nT p-p (the p-p level is the peak-to-peak level in the time domain) in areas that have been designed to house high performance imaging equipment or research animals, as identified on the Key Sensitive Environments Location Plan. EMI shall be measured in the nominal 1 Hz to 10 kHz frequency range.

B31. The Direct Current (DC) magnetic field EMI Performance Standard shall be set as the existing limit for the most sensitive piece of equipment located within a Key Sensitive Environment, and determined through survey of existing equipment. DC EMI levels shall be measured in the 0 to 1 Hz frequency range. Where equipment has specific measurement requirements these shall apply.

B32. RFI for the Project shall not exceed the RFI Performance Standard in areas that have been designed to house high performance imaging equipment, as identified on the Key Sensitive Environments Location Plan. The RFI Performance Standard is 1 V/m. Where equipment has specific measurement requirements these shall apply.

Pre-Construction Noise, Vibration and EMI/RFI Testing and Validation

B33. At the commencement of Early Works / Enabling Stage construction, the Proponent shall conduct noise, vibration and EMI/RFI tests at relevant sensitive environment to be identified and agreed with UNSW. The tests shall determine if the Project will comply with the EMI/RFI vibration, and noise Performance Standards and verify assumptions made during the technical assessment of noise, vibration and EMI/RFI are accurate (including measured verification of ground vibration attenuation design parameters).

If the tests indicate that the EMI/RFI vibration, and noise Performance Standards are unable to be complied at all times during construction then the Proponent shall prepare a RMPCERVN, in accordance with the process set out in B22(c).

Pre-Operational Testing

B34. Prior to commencement of commissioning of the Project, a testing regime shall be implemented to verify that the Project complies with the EMI, RFI, noise and vibration Performance Standards. The testing shall follow a Commissioning Plan to be developed with and agreed to by UNSW. The plan shall provide a mechanism and allow sufficient time for UNSW to review the results to confirm the accuracy of the commissioning prior to commencement of operation of the project witnessing of and receipt of all testing results shall be made available to UNSW.

Operations Testing and Monitoring

B35. Prior to the commencement of operations the Proponent shall prepare and implement a detailed EMI, RFI, Noise and Vibration Monitoring and Management Plan. The Plan shall be approved by the Director General, in consultation with UNSW, prior to the commencement of operations, and shall include the following:

a) A description of ongoing maintenance and improvement programs and schedules to assure compliance with the EMI, RFI, noise and vibration Performance Standards throughout the lifetime of the Project.
b) Include a monitoring program as agreed to by UNSW to verify the effectiveness of the mitigation and ensure that the EMI, RFI, noise and vibration Performance Standards are not exceeded; and
c) Provide for compliance auditing, with compliance reports to be submitted to UNSW.

If the monitoring program demonstrates that the EMI, RFI, Noise and Vibration Performance Standards are complied with at all times during the first 2 years operation of the Project then the monitoring program may be revised with the approval of the Director-General, in consultation with UNSW.

B36. If a monitoring system or other indicators such as UNSW research equipment results indicate that a Project light rail vehicle causes noise or vibration to exceed a Vibration or Noise Performance Standard and UNSW reasonably determines that such exceedance will result or has resulted in harm, the Project shall immediately make temporary operational adjustments, such as slowing the vehicles or imposing other operational constraints, to avoid further exceedances. The Project shall continue to operate under such constraints while the Proponent investigates the potential exceedance in further detail and provides an alternative solution and resolution to the remove such exceedances, to the satisfaction of the Director-General, in consultation with UNSW.

Document Review by UNSW

B37. Documentation Review Points shall be scheduled at the following stages of the Project and supporting noise, vibration, EMI and RFI design documentation and measurements shall be submitted to UNSW to demonstrate compliance with the EMI and RFI, noise and vibration Performance Standards. The Project shall make a minimum allowance of 60 days in programming for UNSW to review and approve the following documentation:

a) The Project Return Design Brief;
b) Detailed Design Completion technical assessment prior to Tender for Construction;
c) Design parameters verification at commencement of Early Works / Enabling Stage Construction to ensure assumptions made during the design stages are accurate (including measured verification of ground vibration attenuation design parameters);
d) Construction phase compliance
   (iv) Pre-assessment of construction phase impact and development of the Research Mitigation Plan for Construction Vibration, Noise and EMI/RFI (RMPCERVN);
   (v) At the start of each significant new phase of construction with potential for different noise, vibration and EMI/RFI impacts to UNSW, the anticipated construction activities for the phase shall be validated and checked on site to meet the specified vibration and noise limits as agreed in the RMPCERVN; and
e) Commissioning.

AIR QUALITY

B38. The project shall be constructed and operated with the objective of meeting air quality goals for PM10, CO, NO2 and ambient SO2 as prescribed in the *National Environment Protection Measure (NEPM) for Ambient Air Quality.*

Dust Management

B39. The Proponent shall carry out all reasonable and feasible measures to minimise dust generated by the Project.

B40. During construction, the Proponent shall ensure that:

a) All vehicles do not exceed a speed limit of 10 kilometres per hour on UNSW land;

b) all loaded vehicles entering or leaving UNSW land have their loads covered; and

c) all loaded vehicles are cleaned of dirt, sand and other materials before they leave any site area on roads within UNSW land, to avoid tracking these materials on UNSW and public roads.

OPERATIONAL ENVIROMENTAL MANAGEMENT SYSTEM

B41. Prior to the commencement of operation, the Proponent shall incorporate the project into existing environmental management systems applying to the light rail network and which have been prepared in accordance with the AS/NZS ISO 14000 Environmental Management System services.

OPERATIONAL PERFORMANCE

Maintenance

B42. The ongoing maintenance and operational costs of urban design and landscaping items and works implemented as part of this Approval shall remain the Proponent's responsibility until satisfactory arrangements have been put in place for the transfer of the asset to the relevant authority. Prior to the transfer of assets, the Proponent shall maintain items and works to design standards established in the Urban Design and Stop Access Plan(s), including the engagement of a landscape specialist and the removal of graffiti, posters, stickers, and dirt within performance standards specified in the Urban Design and Stop Access Plan(s).

Operational Performance Audit

B43. Within twelve months of the completion of construction of the project, the Proponent shall commission an independent, qualified person or team to undertake an Operational Performance Audit of the project. An Operational Performance Audit Report shall be submitted to the Director-General within one month of the completion of the Audit, otherwise agreed by the Director-General. The Audit shall:

(a) Assess compliance with the requirements of this approval, and other licences and approvals that apply to the project;
(b) Assess the operational performance of the project against the aims and objectives for the project specified in the documents referred to under condition A1 of this approval;
(c) Assess the environmental performance of the project against the predictions made and conclusions drawn in the documents referred to under the project against the predictions made and conclusions drawn in documents referred to under condition A1 of this approval; and
(d) Review the effectiveness of the environmental management of the project, including any environmental impact mitigation works.

UTILITIES AND SERVICES

B44. Existing and likely or planned future UNSW-owned utilities and infrastructure, such as power, gas, groundwater / bore water supply, stormwater systems, water supply and sewer or telecommunications and their infrastructure shall not be interrupted or adversely affected by the project.

Consistent with any communications protocols established under this Approval, UNSW shall be provided with sufficient notice of any works – no less than 30 calendar days and for power supply no less than 90 calendar days – that would interrupt or potentially affect normal services and operations.

UNSW-owned utilities, services and other infrastructure potentially affected by construction and operation shall be identified prior to construction to determine

requirements for access to, diversion, protection, replacement and/or support. Consultation with UNSW shall be undertaken to make suitable arrangements for access to, diversion, protection, replacement and/or support of the affected infrastructure as required. The cost of any such arrangements shall be borne by the Proponent.

Where UNSW utilities, services and other infrastructure connect below Anzac Parade or High Street to other sites, coordination with UNSW is required to enable provision for future utilities, services and other infrastructure connections below the light rail tracks. The cost of such additional conduits shall be borne by UNSW.

Note see also Dilapidation and Reinstatement at Condition B48.

CONSTRUCTION TRANSPORT AND ACCESS

B45. The project shall be designed with the objective of minimising adverse changes to existing access arrangements and services for other transport modes (including published timetabled bus services to UNSW) and, where feasible, and reasonable facilitate an improved level of access and service to other transport modes comparable to the existing situation.

A Traffic Management Plan and/or Access Management Plan for UNSW is to be prepared in consultation with (and agreed by) UNSW and shall have regard to maintaining access to the UNSW Kensington Campus for both its normal operations and any UNSW construction-related access. In particular, the Plan shall provide for UNSW to seek to review the traffic signal and intersection operations of the following intersections:

(a) Anzac Parade / Barker Street;
(b) Anzac Parade / University Mall;
(c) Anzac Parade / High Street;
(d) High Street / Botany Street;
(e) Wansey Road/High Street;
(f) Arthur Street/Botany Street; and
(g) Wansey Road/Arthur Street

B46. Access to private property / UNSW land shall be maintained during construction unless otherwise agreed with the property owner in advance. A landowner's access that is physically affected by the project shall be reinstated to at least an equivalent standard, in consultation with the property owner.

B47. In relation to new or modified road, parking, pedestrian and cycle infrastructure, the project shall be designed:

(a) In consultation with the relevant road authority;
(b) In consideration of existing and future demand, road safety and traffic network impacts;
(c) To meet relevant design, engineering and safety guidelines, including *Austroads Guide to Traffic Engineering Practice*; and
(d) And certified by an appropriately qualified person that has considered the above matters.

DILAPIDATION AND REINSTATEMENT

B48. The Proponent shall engage an independent and qualified person(s) to prepare Dilapidation Report(s) in relation to UNSW buildings, land, services and infrastructure affected by the project as a direct result of works and the construction compound area (to be agreed with UNSW), prior to construction.

The report shall assess the current condition of buildings, land, services and infrastructure (both above and under ground level) and describe mechanisms to restore any damage that may result due to the construction of the project. The Report(s) shall be submitted to UNSW for review (and agreement) prior to use of UNSW land for construction purposes and the commencement of construction of both UNSW stops.

Following completion of construction, a subsequent report shall be prepared to assess any damage caused by the construction of the project.

The Proponent shall ensure that any measures to restore or reinstate buildings, land and infrastructure affected by the construction of the project are undertaken in a timely manner, in accordance with the requirements, and to the satisfaction, of UNSW and the relevant authority(ies), and at the full expense of the Proponent. Any pavement failures arising from construction traffic that result in safety concerns for other road users, shall be repaired in accordance with the relevant road authority's specifications no later than 48 hours following notification by the relevant road authority.

Note: Replacement of services and infrastructure shall be in accordance with the University's standards.

COMMUNITY AND STAKEHOLDER INVOLVEMENT PLAN

B49. A Community and Stakeholder Involvement Plan shall be prepared by the Proponent for Director-General approval prior to the commencement of any works (early, enabling or main project works) at or around the UNSW Kensington Campus and its co-related sites (including Randwick Racecourse). The Plan shall be prepared in consultation with (and agreed by) UNSW and shall include, but not be limited to, the following:

(a) Notification and information on project progress, activities and impacts of the project;
(b) Who will inform UNSW of the above, and when and how this is to occur (including required lead-in times for UNSW to adjust its services and utilities to cater for works – this is typically 30 calendar days and 90 days for power); and
(c) Management of complaints and other relevant protocols.

A Place Manager shall be allocated to the UNSW Kensington Campus to ensure an appropriate single point of contact is available during construction of the project, where it affects UNSW.

BUSINESS LANDOWNER AND ENGAGEMENT MANAGEMENT PLAN

B50. A Business Landowner and Engagement Management Plan shall be prepared by the Proponent for Director-General approval prior to the commencement of any works (early, enabling or main project works) at or around the UNSW Kensington Campus and its co-related sites (including Randwick Racecourse). The Plan shall be prepared in consultation with (and agreed by) UNSW and shall include, but not be limited to, the following:

(a) Notification and information on project progress, activities and impacts of the project;
(b) Who will inform UNSW of the above, and when and how this is to occur (including required lead-in times for UNSW to adjust its services and utilities to cater for works – this is typically 30 calendar days and 90 days for power); and

(c) Management of complaints and other relevant protocols.

A Place Manager shall be allocated to the UNSW Kensington Campus to ensure an appropriate single point of contact is available during construction of the project, where it affects UNSW.

PART C ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING

ENVIRONMENTAL MANAGEMENT

Construction and Environmental Management Plans / Environmental Control Maps

C1. The Proponent shall prepare and implement a Construction Environmental Management Plan for the project in accordance with the *Guideline for the Preparation of Environmental Management Plans* (Department of Planning and Infrastructure 201x). No construction associated with the project shall commence until written approval of this plan has been received from the Director-General or his nominee. The Plan shall:

a) Be submitted to the Director-General for Consent no later than two weeks prior to the commencement of construction or demolition or within such period otherwise agreed by the Director-General;
b) Outline all environmental management practices and procedures to be followed during construction and demolition works associated with the project;
c) Describe all activities to be undertaken on the site during construction of the project, including a clear indication of construction stages;
d) Detail how the environmental performance of the construction works will be monitored, and what actions will be taken to address identified adverse environmental impacts;
e) Describe of the roles and responsibilities for all relevant employees involved in construction and demolition works associated with the project; and
f) Include, but not limited to, addressing the following matters:
   (i) construction traffic;
   (ii) community consultation and complaints handling;
   (iii) construction soil and water management; and
   (iv) Noise, vibration, EMI and RFI management.

C2. In support of the preparation of a Construction and Environmental Management Plan (CEMP) for the project, discrete Environmental Control Maps shall be prepared both UNSW stops and the UNSW construction compound. The Environmental Control Plans shall be prepared in consultation with (and agreed by) UNSW and other relevant parties and shall include, but not be limited to, addressing the following matters:

(a) Impacts of noise, vibration, electromagnetic and radio frequency interference;
(b) Light spill;
(c) Dust and air quality;
(d) Traffic, transport and access arrangements, including existing public transport services;
(e) Stormwater, run-off, and sediment control;
(f) Impacts upon critical utilities, services and other infrastructure and maintenance of current and projected supply and operation of these;
(g) Flora and fauna;
(h) Groundwater impacts;
(i) Stormwater impacts; and
(j) Sewer impacts

The CEMP shall be submitted to the Director-General for review and approval prior to the commencement of any works, including early, enabling or main construction works.

C3. As part of the CEMP for the project, the Proponent shall prepare and implement the following plan(s):

(a) A Construction Traffic Management Plan for both UNSW Stops and the UNSW construction compound, prepared in accordance with the Roads and Maritime Service's *QA Specification GI0 - Control of Traffic and Traffic Control at Work Sites Manual (2003)* to manage disruptions to traffic movements as a result of construction traffic associated with the project. The Plan shall be developed in consultation with (and agreed by) UNSW and Randwick City Council and shall include, but not necessarily be limited to:

(i) Identification of construction traffic routes and quantification of construction traffic volumes (including heavy vehicle/ spoil haulage) on these routes;

(ii) Details of vehicle movements for construction sites and site compounds including parking, dedicated vehicle turning areas, and ingress and egress points;

(iii) Details of potential impacts to traffic on the existing road network, including, intersection level of service and potential disruptions to pedestrians, public transport (including during and outside of exam periods), parking, cyclists and property access;

(iv) Details of temporary and interim traffic arrangements to address potential impacts, including any use of traffic controllers at key UNSW Kensington Campus pedestrian intersections and refined traffic signal operations at key intersections around the UNSW Kensington Campus;

(v) A response procedure for dealing with traffic incidents; and

(vi) Mechanism for the monitoring, review and amendment of this Plan.

Environmental Management Strategy

C4. The Proponent shall prepare and implement an Environmental Management Strategy for the development to the satisfaction of the Director-General. This strategy shall:

a) Be submitted to the Director-General for approval prior to the commencement of any construction works;
b) Be prepared by a suitably qualified and experienced expert;
c) Provide the strategic framework for environmental management of the project;
d) Identify the statutory approvals that apply to the project;
e) Describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the project;
f) Describe the procedures that would be implemented to:
   (i) Keep the local community and relevant agencies informed about the operation and environmental performance of the project;
   (ii) Receive, handle, respond to, and record complaints;
   (iii) Resolve any disputes that may arise;
   (iv) Respond to any non-compliance;
   (v) Respond to emergencies; and
g) Include, but not be limited to, the following environmental management plans:
   (i) Traffic, access and public transport services, including for existing bus services;
   (ii) Flora and fauna management;
   (iii) Tree Protection, replacement and management;
   (iv) Soil and stormwater management;

(v) Air quality and dust control;
(vi) Light spill;
(vii) Impacts upon critical utilities and services and ensuring maintenance of current and projected supply and operation of these;
(viii) Noise, vibration, electromagnetic and radio frequency interference management; and
(ix) Groundwater.

Management Plan Requirements

C5. The Proponent shall ensure that the environmental management plans required under this Approval are prepared in accordance with the *Guideline for the Preparation of Environmental Management Plans* (Department of Planning and Infrastructure 201x) and include:

a) Detailed baseline data;
b) A description of:
   (i) The relevant statutory requirements (including any relevant approval, licence or lease conditions);
   (ii) Any relevant limits or performance measures/criteria;
   (iii) The specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;
c) A description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;
d) A program to monitor and report on the:
   (i) Impacts and environmental performance of the project;
   (ii) Effectiveness of any management measures (see 'c' above);
e) A contingency plan to manage any unpredicted impacts and their consequences;
f) A program to investigate and implement ways to improve the environmental performance of the project over time;
g) A protocol for managing and reporting any:
   (i) Incidents;
   (ii) Complaints;
   (iii) Non-compliances with statutory requirements; and
   (iv) Exceedances of the impact assessment criteria and/or performance criteria; and
h) A protocol for periodic review of the plan.

Accredited Environmental Management System

C6. Where the Proponent operates an ISO accredited Environmental Management System (EMS) and can demonstrate in writing to the satisfaction of the Director General that the requirements of Conditions C1- C3, and any other condition in this part, will be addressed through the operation of the EMS, the Director General may, in writing, direct that the EMS can operate in lieu of those conditions.

C7. In accrediting the operation of an EMS in accordance with Condition C6, The Director-General may specify that particular environmental management documentation and reporting (e.g. audit reports), be submitted to Planning & Infrastructure for its consideration, and that the Proponent comply with any directive of the Director-General with regard to any required management or mitigation measures arising from the environmental management of the project.

Annual Review

C8. By the end of March each year, or other timing as may be agreed by the Director-General, the Proponent shall review the environmental performance of the project to the satisfaction of the Director-General. This review shall:

a) Describe the project work that was carried out in the previous calendar year, and the project work that is proposed to be carried out over the next year;

b) Include a comprehensive review of the monitoring results and complaints records of the project over the previous calendar year, which includes a comparison of these results against the following:
   (i) The relevant statutory requirements, limits or performance measures/criteria;
   (ii) Requirements of any plan or program required under this Approval;
   (iii) The monitoring results of previous years; and
   (iv) The relevant predictions in the EIS;
c) Identify any non-compliance or incidents over the last year, and describe what actions were (or are being) taken to ensure compliance or mitigation;
d) Identify any trends in the monitoring data over the life of the project;
e) Identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and
f) Describe what measures will be implemented over the next year to improve the environmental performance of the project.

Revision of Strategies, Plans and Programs

C9. Within 3 months of the submission of either:
a) An annual review under condition C8 above;
b) An incident report under condition C8 above;
c) An audit under condition C10 below; or
d) Any modification to the conditions of this Approval,

The Proponent shall review, and if necessary revise, the strategies, plans, and programs required under this consent to the satisfaction of the Director-General.

Note: This is to ensure the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the development.

AUDITING

Independent Environmental Audit

C10. Within 2 years of the date of this Approval, and every 3 years thereafter, unless the Director-General directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project. This audit shall:
a) Be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Director-General;
b) Include consultation with the relevant agencies;
c) Assess the environmental performance of the project and assess whether it is complying with the requirements in this consent, and any other relevant approvals and relevant EPL/s (including any assessment, plan or program required under these approvals);
d) Review the adequacy of any approved strategy, plan or program required under the abovementioned approvals; and
e) Recommend measures or actions to improve the environmental performance of the project, and/or any strategy, plan or program required under these approvals.

Note: This audit team shall be led by a suitably qualified auditor, and include experts in:

(k) impacts of noise, vibration, electromagnetic and radio frequency interference
(l) traffic, transport and access arrangements, including existing public transport services
(m) impacts upon critical utilities, services and other infrastructure and maintenance of current and projected supply and operation of these
(n) fauna, trees and landscape
(o) groundwater impacts
(p) stormwater impacts
(q) sewer impacts

and any other fields specified by the Director-General.

C11. Within 3 months of commissioning this audit, or as otherwise agreed by the Director-General, the Proponent shall submit a copy of the audit report to the Director-General, together with its response to any recommendations contained in the audit report.

SCHEDULE OF ACRONYMS AND ABBREVIATIONS

CEMP	Construction and Environmental Management Plan
dB	Decibels
EMI	Electromagnetic interference
EMS	Environmental Management System
EPA	NSW Environment Protection Authority
Hz	Hertz
NIDA	National Institute of Dramatic Arts
nT	Nano Tesla
PM10	Particulate Matter less than 10 microns
RFI	Radio frequency interference
RMPCERVN	Research Mitigation Plan for Construction EMI, RFI, Vibration and Noise
RMS	Roads & Maritime Service
TfNSW	Transport for New South Wales
UNSW	University of New South Wales
VC	Vibration Criteria
VC-E	Vibration Criteria – Grade 'E'
VRIOGS	Victorian Rail Industry Operators Group Standards

Suggested Conditions of Approval

UNSW and its consultant team

Appendix B

UNSW Suggested Conditions

PART B ENVIRONMENTAL PERFORMANCE

UNSW STOPS DESIGN REVIEW PANEL

B1. A Design Review Panel shall be constituted for both UNSW stops for this project. The composition/membership of the Design Review Panel shall be subject to approval by the Director-General (or his delegate), and shall be at least three members, one from or nominated by UNSW, and one being an independent traffic and transport design expert not part of the detailed design process of the project, and another from or nominated by Randwick City Council, plus any other relevant party. The Design Review Panel shall consider the revised designs required under this approval (see Conditions B9 and B10), Stops Urban Design and Landscape Reports, Stops Access Plans, and recommendations or conclusions arising from the Network Coordination Liaison Group, including Construction Traffic Management Plan(s).

UNSW STOPS URBAN DESIGN AND LANDSCAPE REPORTS

B2. The Proponent shall prepare a UNSW Stops Urban Design and Landscape Report(s) in relation to all aspects of the project as it affects UNSW, including the UNSW Stops, compound, and the Kensington Campus environs. The Stops Urban Design and Landscape Report(s) shall be prepared / developed within 12 months of commissioning of the project and in consultation with (and the agreement of) UNSW. The Report(s) shall be consistent with the design objectives, design standards, and requirements as set out in Conditions B4-B10 and B14-B19 in relation to the Stops Access Plans, Revised Design, the Network Coordination Liaison Group, and Trees and Landscaping.

B3. The Urban Design and Landscape Report(s) required under Condition B2 shall be reviewed by the Design Review Panel, as constituted for the UNSW Stops.

The Proponent shall update and finalise the Urban Design and Landscape Report(s), having regard to and addressing any comments made by the Design Review Panel. A copy of the final Report(s) shall be submitted to the Director-General as soon as practicable following finalisation of the Report(s), accompanied by a justification if any of the comments made by the Design Review Panel have not been incorporated into the final design, or otherwise addressed.

STOPS ACCESS PLANS

B4. The Proponent shall develop Stops Access Plans for both UNSW stops to inform the final design of the stops. These shall include such matters as platform size and dimensions and other required passenger facilities, design and location of footpaths, pedestrian crossings, cycleways, integration of proposed and existing landscaping and public domain, and any traffic and road changes and other transport initiatives at and in the environs of each stop.

The Plans shall consider, but not be limited to, the following:

(a) Integration with UNSW's security and safety infrastructure including CCTV and help points and permit a dual contiguous visibility between both systems;
(b) Access and patrolling structure;
(c) Safe and convenient access to and use of the stops (including platforms and ramps);

(d) Anticipated levels of access and service to the UNSW Kensington Campus at the stops, including provided demand survey material from UNSW (as updated from time to time);
(e) The identification of opportunities and constraints presented by existing and proposed transport and access infrastructure and services;
(f) Patronage changes resulting from land use, population, employment, transport infrastructure and service changes;
(g) Integration with existing and proposed transport infrastructure and services, including maintenance of existing timetabled bus services and their ability to operate in accordance with published timetables and maintain a required level of service during construction;
(h) Pedestrian, cycle, bus, taxi, vehicle and emergency vehicle access and parking, and infrastructure and servicing requirements;
(i) The proposed Network Management Plan;
(j) Legislative requirements and applicable guidelines (such as the VRIOGS);
(k) Final design, infrastructure, management and service measures, and the level of access and service to be achieved for all users;
(l) Operational management provisions for future operational requirements, including maintenance, security and management responsibilities;
(m) The designs arising from the Design Review Panel's consideration of the Urban Design and Landscape Report(s) and their finalisation, as required under Conditions B1-B3;
(n) The results of any safety audits as may be required or prepared under this approval; and
(o) The findings, recommendations and requirements of a detailed noise, vibration, EMI and RFI impact assessment as required by Conditions B22 and B23 of this approval.

The Plan(s) shall be prepared in consultation with the Network Coordination Liaison Group required under Condition B7-B8 and with UNSW consultation and agreement and shall be supported by a meseoscopic and a micro-simulation traffic and transport analysis. The Plan(s) shall detail a delivery and implementation program and shall be provided to the Director-General and made publicly available prior to construction, unless otherwise agreed by the Director-General.

B5. In developing the Plan(s), the Proponent shall consider requirements of other conditions of this approval, including:

(a) Traffic and accessibility design;
(b) Parking management strategy;
(c) Pedestrian and cyclist network strategy;
(d) Urban design and landscaping;
(e) Security and safety infrastructure integration; and
(f) Other UNSW-related requirements including those set out in Conditions B1-B4, B9-B10, and B20-B37, including noise, vibration, EMI and RFI.

B6. The Stop Access Plan(s) required under Condition B4 shall be reviewed by a qualified traffic and transport professional(s), independent of the detailed design process for the project. The independent, qualified professional(s) shall be approved by the Director-General prior to the commencement of the review process.

NETWORK COORDINATION LIAISON GROUP

B7. A Network Coordination Liaison Group shall be established to inform the detailed design of temporary construction and permanent operational traffic and transport measures and to inform ongoing management measures prior to and during construction of the project. The Group shall be chaired by the Proponent and shall

comprise representatives of Planning & Infrastructure, relevant road authorities (including RMS and Councils), transport operators (including bus and taxi operators), and emergency services, UNSW and other key project partners.

The recommendations of the Group shall be referred to the Director-General for approval prior to their adoption and implementation.

The Group shall be consulted on, and inform the preparation of, a Construction Traffic Management Plan (as required under Condition C2) and Stops Access Plans.

B8. The Proponent shall undertake supplementary analyses as required by the Network Coordination Liaison Group and detailed modelling of traffic changes and impacts that have the potential to have a significant detrimental impact on traffic flow efficiency with the objective of informing and improving road network changes and traffic management measures. The requirement for, and details of, the modelling shall be undertaken in consultation with the Group. The revised traffic management measures, including changes to the pedestrian, bicycle and public transport networks, shall be incorporated into the Construction Traffic Management Plan and Stop Access Plan(s).

UNSW ANZAC PARADE STOP – REVISED DESIGN

B9. The project shall be revised to incorporate the following amendments (and in recognition of the results of the stop's road safety audit). The new design of the stop shall be provided to the Director-General for approval prior to the commencement of pre-construction and construction activities at, and in the environs of, the Anzac Parade Stop and shall incorporate:

(a) An alignment adjustment to allow for a wider a platform ;

(b) Platform dimensions to increase to at least 90 metres in length to accommodate 2 car sets and made wider (up to between 7.0 and 7.7 metres at its maximum) to accommodate passenger peak period boarding demand with Level of Service of 'C' calculated with UNSW survey figures adjusted for growth and using VRIOGS and without the need for marshalling.
[*Note: should marshalling be adopted this will be at the cost of the proponent and appropriate indemnities will be required for UNSW against associated risks*];

(c) A shelter that covers the entire platform and ramps and that extends beyond the platform width to meet a 1:2 cut off angle to provide weather protection;

(d) Location and design of ticketing system and passenger information to reduce congestion and delay and improve safety;

(e) Confirmation of the northern staggered pedestrian crossing, with traffic signals;

(f) Use of at source mitigation measures to address noise, vibration, EMI and RFI impacts to UNSW sensitive environments;

(g) Coordination of intersection light operations to prevent the "see through" effect;

(h) Public domain repairs, including new pavements equal in quality to the University Mall, landscaping: to compensate for the lost trees; repair and reworking of hard and soft landscape in front of the Tyree Energy Technologies building in order to provide access paths to the Mall, ground cover and a new tree; to adjust to the new footpath locations, reconstruction of boundary walls and associated landscaping at NIDA and shared use poles for lighting, traffic signals, traffic signs, communication cables etc.; and

(i) A new Anzac Parade western side bus shelter to match the stop architecture and for the full length of the bus stop.
[Note no shelter is required on the eastern side of Anzac Parade]

In the event that further design amendments are required as a consequence of

compliance with conditions B1-B8, any such revised designs shall be approved by the Director-General, following consultation and agreement with UNSW.

UNSW HIGH STREET STOP – REVISED DESIGN

B10. The project shall be revised to incorporate the following amendments (and in recognition of the results of the stop's road safety audit). The new design of the stop shall be provided to the Director-General for approval prior to the commencement of pre-construction and construction activities at, and in the environs of, the High Street Stop and shall incorporate:

(a) Moving the alignment of the track as far north as possible to minimise the noise, vibration, EMI and RFI effects. This entails the use of side platforms and the removal of other vehicle traffic from High Street between Wansey Road and Botany Street
[Note 1: emergency vehicles and public buses may continue to use High Street sharing the light rail alignment]
[Note 2: this realignment assumes the use of some additional UNSW land on the north east corner of High Street and Wansey Road and access to existing developments where required via UNSW land accessed from Arthur Street];

(b) Use of at source mitigation measures to address noise, vibration, EMI and RFI impacts to UNSW sensitive environments,

(c) Side platforms 45m long and 3.5m in width with 3.0m additional footpath space behind the two platforms to accommodate queuing and alighting space at peak times, and contiguous level with the paved plaza surrounding them eliminating any steps;

(d) T Shelter for the full length of the southern inbound platform ;

(e) Location and design of ticketing system and passenger information to reduce congestion and delay and improve safety;

(f) Relocation of the shared pedestrian and bicycle path in Wansey Road reservation west of the light rail alignment;

(g) Provision of bus stops with shelters on both sides of High Street immediately west of Wansey Road, with a combined taxi zone on the southern side;

(h) New pavements equal in quality to the University Mall, landscaping, and lighting as required for the pedestrian plaza including shared use poles;

(i) Crossing points in High Street at each of the platforms and in line with the footpaths and shared bicycle paths within the Wansey Road reservation and the footpath on Botany Street; and, in line with the northern footpath of High Street on Wansey Road; and

(j) Bollards to mark the light rail track alignment and rough stone paving sets within the alignment, except at crossing points to discourage pedestrian movement outside the crossing points.

In the event that further design amendments are required as a consequence of compliance with conditions B1-B8, any such revised designs shall be approved by the Director-General, following consultation with and agreement of UNSW.

CENTRAL STATION STOP

B11. The design resolution of the Central Station Stop shall be undertaken in consultation with UNSW. The key issues shall be addressed to UNSW's satisfaction and agreement, particularly access, safety, and passenger management.

HIGH STREET PEDESTRIAN PLAZA

B12. TfNSW and UNSW shall work jointly in obtaining the necessary approvals by providing support to close High Street and create the High Street Pedestrian Plaza between Wansey Road and Botany Street. The road shall be closed to all vehicles except for the following: Light Rail Vehicles, emergency vehicles and buses. TfNSW

shall provide access to information, technical assistance and assistance in negotiation with approving authorities.

UNSW ANZAC PARADE CONSTRUCTION COMPOUND

B13. The Proponent shall prepare a Construction and Environmental Management Plan (CEMP) as required under Condition C1. Where as a result of the UNSW construction compound UNSW (and NIDA) facilities are impacted during construction works through temporary or permanent land acquisition, reduced amenity, reduced access, reduced functionality or other impact, the Proponent shall, in consultation with (and the approval of) UNSW and NIDA address construction impacts and agree on mitigation, management and rehabilitation measures. Where appropriate, the Proponent shall determine viable alternative options for UNSW (and NIDA) facilities during the construction phase. Mitigation and management measures shall be implemented, prior to impacts occurring.

Note: refer to application of Condition C1 in relation to a UNSW-specific Construction and Environmental Management Plan (CEMP)

TREES AND LANDSCAPING

B14. Prior to any UNSW-related works commencing (whether early, enabling or main project construction works), the Proponent shall engage a suitably qualified arborist to prepare a pre-construction tree audit detailing the current condition of all trees within construction zone at the UNSW Kensington Campus, including tree canopies, roots etc. The tree audit shall prepared in consultation with (and the agreement of) UNSW and be submitted to the Director-General for information prior to the commencement of any works.

B15. A Tree Management Strategy shall be prepared following the tree audit's sign-off and shall be prepared in consultation with (and the agreement of) UNSW and be submitted to the Director-General for information prior to the commencement of any works. The Tree Management Strategy shall address, but not be limited to:

(a) Key outcomes of the Tree Audit in relation to health, significance, size of trees;
(b) Tree protection measures and maintain tree health;
(c) Relevant legislative frameworks;
(d) Processes and mitigation measures in relation to tree removal and replacement;
(e) Replanting strategy;
(f) Reduction of risk to public safety, both short and long term;
(g) Reduction of potential damage to property, both short and long term; and
(h) Providing clearances around services and utilities.

B16. The Proponent shall minimise disturbance of and impact on existing trees on UNSW land at UNSW Kensington Campus. Tree protection zones shall be established and maintained during the construction period. Any trees that require removal shall be confirmed with and agreed by UNSW.

B17. Construction of walls/footpaths around existing trees on UNSW land at UNSW Kensington Campus shall be confirmed via root mapping in consultation with (and agreement by) UNSW to determine construction methods required.

B18. Replacement trees on UNSW land at UNSW shall be provided as agreed with / to the satisfaction of UNSW. Consultation with (and agreement by) UNSW shall establish an appropriate new tree planting and tree offset strategy (including locations, species, sizes and soil requirements).

B19. Replacement understory planting on UNSW land shall be provided as agreed with and to the satisfaction of UNSW. Consultation with UNSW will establish appropriate types of planting, locations, species, pot sizes and soil requirements.

ELECTROMAGNETIC INTERFERENCE, RADIO FREQUENCY INTERFERENCE, NOISE AND VIBRATION AT SENSITIVE UNSW ENVIRONMENTS

Note: These conditions only relate to sensitive environments within or associated with UNSW. They are intended to operate in parallel with standard whole of Project noise and vibration conditions, which will continue to apply where the following conditions do not apply. It is expected that the Project Approval will include conditions relevant to the whole Project that specify:

- *a) Construction hours.*
- *b) Noise and vibration limits during construction works for various land uses (including commercial, educational and residential land uses).*
- *c) A construction noise and vibration management plan.*
- *d) A construction noise and vibration compliance report.*
- *e) Noise and vibration limits during operations.*
- *f) Operational noise and vibration review and compliance assessment.*

Sensitive Environments at UNSW Kensington Campus

B20. Prior to the commencement of construction the Proponent shall prepare a Key Sensitive Environments Location Plan for the UNSW Campus (which includes NIDA). The Key Sensitive Environments Location Plan shall be based on UNSW's Key Sensitive Environments and Research Areas Plan, Drawing 11A, and shall identify all buildings and sites that contain, or will contain, sensitive uses at the UNSW Campus as well the location of construction works zones and/or light rail operational infrastructure and activities that are relevant to the specified key sensitive environments. Sensitive environments include, but are not limited to, performance spaces, teaching spaces, residential areas and/or research facilities. The Key Sensitive Environments Location Plan shall be prepared in consultation with and to the satisfaction of UNSW.

Construction Hours

B21. In addition to other conditions relating to construction hours, construction activities associated with the Project shall only be undertaken with the agreement of UNSW during the following periods:

a) UNSW Exam Periods, where the construction works are likely to be audible within UNSW Exam locations at UNSW Kensington Campus and Randwick Racecourse; and

b) at any time in relation to construction works specified in the Key Sensitive Environments Location Plan (see Condition B20).

Technical Assessment of Noise and Vibration

B22. Prior to the completion of detailed design the Proponent shall carry out a technical assessment of EMI, RFI, noise and vibration impacts for sensitive environments identified in the Key Sensitive Environments Location Plan. The technical assessment shall be undertaken by a suitably qualified and experienced specialist (or specialists) who is approved by the Director-General, in consultation with UNSW, and shall include the following:

a) Background EMI, RFI, noise and vibration measurements, undertaken in consultation with UNSW;

b) Calculations to predict to a reasonable level of certainty the levels of EMI, RFI, noise and vibration that will be generated by the Project, using reasonable worst case construction and operational scenarios;
c) Construction – If, after applying all feasible and commercially available mitigation measures and alternative construction methodologies, predictions of construction noise or vibration are unable to comply with the Vibration and Noise Performance Standards at all times then the Proponent shall prepare a Research Mitigation Plan for Construction EMI, RFI, Vibration and Noise (RMPCERVN) in consultation with UNSW. The RMPCERVN will include, but shall not be limited to, a combination of scheduling remedies, changes to construction methods and timing, ongoing monitoring, and site based mitigation measures, including the use of vibration isolation tables and other isolation strategies;
d) Operations – If the levels of EMI, RFI, noise and vibration are predicted to be unable to comply with the EMI, RFI, Vibration and Noise Performance Standards at all times during the operation of the Project then the impact assessment report shall assess feasible and commercially available mitigation measures to ameliorate the impact such that the Performance Standards are complied with at all times. Performance Standards are defined in Conditions B24, B27, and B30-B32. In its consideration of mitigation measures the Proponent shall consider the certainty and scientific validation of the mitigation measure in being able to ensure the Project will comply with the Performance Standards, and shall consider the feasibility of relocating the alignment of light rail tracks to the northern edge of High Street;
e) Document the details of consultation with UNSW and explain how the issues raised by UNSW have been addressed; and
f) The establishment of a separate fund to pay for future mitigation works in the event that the Performance Standards are exceeded. The fund shall be used by UNSW for future mitigation works with the approval of the Director-General, in consultation with UNSW.

The technical assessment of EMI, RFI, noise and vibration shall be submitted to the Director-General for approval, and shall be approved by the Director-General before the commencement of any construction works specified in the Key Sensitive Environments Location Plan (see Condition B20).

B23. The technical assessment of EMI, RFI, noise and vibration impacts shall consider the following parameters:

a) Proposed construction methodology and specific construction equipment and activities to assess ground borne construction vibration impacts. Vibration, noise and EMI/RFI spectra shall be provided for the proposed construction methods, activities and specific light rail construction equipment;
b) Characteristics of the proposed rolling stock and track form proposed for the light rail system to ascertain the parameters of source vibration, noise and EMI/RFI levels likely from the light rail. Source vibration, noise and EMI/RFI levels of rolling stock operating on track systems similar to that proposed for the Project shall be obtained to ensure that appropriate levels of source vibration, noise and EMI/RFI are used for impact predictions;
c) Geology / lithology details to determine the amount of vibration attenuation likely between the alignment and UNSW buildings;
d) Structural details of the UNSW buildings to ascertain the likely decoupling loss between the ground and various UNSW buildings;
e) Structural details of the buildings specified in the Key Sensitive Environments Location Plan to ascertain vibration attenuation / amplification; and
f) Performance Standards as defined for Sensitive Equipment and Research Areas in Conditions B24, B27 and B30-B32.

If it is not possible to collect all the site specific information above, specific assumptions shall be made to carry out a meaningful review of impacts. Such

assumptions shall be based on international design experience on other light rail systems, noise, vibration and electromagnetic/radio frequency interference measurements of existing light rail systems, and established empirical modelling methodologies to assess impacts on the internal environment within the key current and planned research facilities.

Vibration Performance Standards

B24. Vibration caused by the Project shall not exceed the Vibration Performance Standards for Key Sensitive Environments identified in the Key Sensitive Environments Location Plan. The Vibration Performance Standards for Key Sensitive Environments shall be as follows:

a) Vibrations caused by the Project shall not exceed:
   (i) A vibration criterion of VC-E based on a standardised generic classification of equipment associated with the Vibration Criteria (VC) curves set out in Gordon SPIE99 "Generic Vibration Criteria for Vibration-Sensitive Equipment";
   (ii) Long-term background tri-axial vibration levels of the floor vibration (x, y, and z) to be represented by the L_{90} statistical parameter over each of three time periods (day, evening, night) spanning an entire continuous 24-hour period; and
   (iii) Equipment specifications as defined by manufacturers or documented research need.

b) Vibration shall be measured over a minimum 24 hour period at each location specified on the Key Sensitive Environments Location Plan;

c) The vibration from the operation of the Project and a passby of a light rail vehicle shall not exceed the existing ambient vibration condition (L_{90}) vibration level in any of the 1/3-octave bands from 4 Hz to 200 Hz during the applicable time period. The vibration level is the level in any axis; and

d) Vibration generated by the Project shall also comply with the requirements of both the EPA under the *Protection of the Environment Operations Act 1997 (POEO Act)* and the EPA *Rail infrastructure noise guideline (2013)*.

Unless determined by the Vibration Criteria (VC) curves set out in Gordon SPIE99 "Generic Vibration Criteria for Vibration-Sensitive Equipment" or equipment specifications, the vibration generated by a Project light rail vehicle is defined as the root-mean-square ("RMS") energy average (L_{eq}) of the building floor vibration attributable to a Project light rail vehicle during a passby. The RMS vibration attributable to a Project light rail vehicle is that obtained by measurement over the duration of a train passby. The "passby time" of a train over which the RMS is obtained is defined as the time between the "3 dB down points" of the recorded vibration level. In the case where equipment has specified criteria the measurement methodology shall be modified to address the specific equipment.

B25. The Vibration Performance Standards incorporate the variability that naturally exists between trains under typical operations. Acceptable variation, for compliance with the Vibration Performance Standards shall be defined as follows:

a) The Vibration Performance Standards in Condition 24(a)(ii) shall be met by 95 per cent of the Project light rail vehicle passby events;

b) In no passby event shall the vibration from any Project light rail vehicle be in excess of 3 decibels above the Vibration Performance Standards in Condition 24(a)(ii) in any single one-third octave band; and

c) In the case where equipment specifications are defined as an absolute maximum then the Vibration Performance Standards shall be met by 100 per cent of the Project light rail vehicle passby events and measured in accordance with specific criteria requirements.

B26. Unless otherwise defined by equipment criteria, vibration measurements shall be undertaken in accordance with measurement methodology guidelines contained within both Australian Standard AS2670.2:1990 *Evaluation of human exposure to whole-body vibration. Part 2: Continuous and shock-induced vibration in buildings (1 to 80 Hz)* and the EPA *Assessing Vibration: a technical guideline (2006).*

Noise Performance Standards

B27. Noise caused by the Project (including both airborne and re-radiated structure-borne noise) shall not exceed the Noise Performance Standards for Key Sensitive Environments identified in the Key Sensitive Environments Location Plan. The Noise Performance Standards for Key Sensitive Environments shall be as follows:

a) Noise caused by the Project shall not exceed:
   (i) Operational noise caused by the Project shall not exceed the recommended "Satisfactory" design sound levels for different areas of occupancy inside rooms of different types within Educational Buildings and Public Buildings as presented in Table 1 of AS2107:2000 Acoustics – Recommended design sound levels and reverberation times for building interiors.
   (ii) Equipment Specific Criteria as defined by manufacturers or documented research need.

b) Where equipment has specific measurement requirements these shall apply, otherwise noise generated by a Project light rail vehicle is defined as the L_{ASmax} measured (using the "slow" time weighting) of the noise attributable to a Project light rail vehicle during a passby.

c) Operational noise generated by the Project shall also comply with the requirements of both the EPA under the *Protection of the Environment Operations Act 1997 (POEO Act)* and the EPA *Rail infrastructure noise guideline (2013).*

d) Construction noise impacts shall be established in accordance with the guidance within *Australian Standard AS 2436-2010, Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites* and the EPA *Interim Construction Noise Guideline.*

B28. The Noise Performance Standards incorporate the variability that naturally exists between trains under typical operations. Acceptable variation, for compliance with the Noise Performance Standards shall be defined as follows:

a) The Noise Performance Standards in Condition 27(a)(i) shall be met by 95 per cent of the Project light rail vehicle passby events.

b) In no passby event shall the noise from any Project light rail vehicle be in excess of the recommended "Maximum" design sound levels for different areas of occupancy inside rooms of different types within Educational Buildings and Public Buildings as presented in Table 1 of AS2107:2000 *Acoustics – Recommended design sound levels and reverberation times for building interiors.*

c) In the case where equipment specifications are defined as an absolute maximum then the Noise Performance Standards shall be met by 100 per cent of the Project light rail vehicle passby events and measured in accordance with specific criteria requirements

B29. Unless otherwise defined by equipment criteria, noise measurements shall be undertaken in accordance with measurement methodology guidelines contained within AS2107:2000 *Acoustics – Recommended design sound levels and reverberation times for building interiors* and AS2659 *Guide to the use of portable sound measuring equipment.*

Electromagnetic and Radio Frequency Interference Performance Standards

B30. EMI for the Project shall not exceed the EMI Performance Standard for Key Sensitive Environments as identified on the Key Sensitive Environments Location Plan. Unless otherwise agreed with UNSW, the EMI Performance Standard shall be 10nT p-p (the p-p level is the peak-to-peak level in the time domain) in areas that have been designed to house high performance imaging equipment or research animals, as identified on the Key Sensitive Environments Location Plan. EMI shall be measured in the nominal 1 Hz to 10 kHz frequency range.

B31. The Direct Current (DC) magnetic field EMI Performance Standard shall be set as the existing limit for the most sensitive piece of equipment located within a Key Sensitive Environment, and determined through survey of existing equipment. DC EMI levels shall be measured in the 0 to 1 Hz frequency range. Where equipment has specific measurement requirements these shall apply.

B32. RFI for the Project shall not exceed the RFI Performance Standard in areas that have been designed to house high performance imaging equipment, as identified on the Key Sensitive Environments Location Plan. The RFI Performance Standard is 1 V/m. Where equipment has specific measurement requirements these shall apply.

Pre-Construction Noise, Vibration and EMI/RFI Testing and Validation

B33. At the commencement of Early Works / Enabling Stage construction, the Proponent shall conduct noise, vibration and EMI/RFI tests at relevant sensitive environment to be identified and agreed with UNSW. The tests shall determine if the Project will comply with the EMI/RFI vibration, and noise Performance Standards and verify assumptions made during the technical assessment of noise, vibration and EMI/RFI are accurate (including measured verification of ground vibration attenuation design parameters).

If the tests indicate that the EMI/RFI vibration, and noise Performance Standards are unable to be complied at all times during construction then the Proponent shall prepare a RMPCERVN, in accordance with the process set out in B22(c).

Pre-Operational Testing

B34. Prior to commencement of commissioning of the Project, a testing regime shall be implemented to verify that the Project complies with the EMI, RFI, noise and vibration Performance Standards. The testing shall follow a Commissioning Plan to be developed with and agreed to by UNSW. The plan shall provide a mechanism and allow sufficient time for UNSW to review the results to confirm the accuracy of the commissioning prior to commencement of operation of the project witnessing of and receipt of all testing results shall be made available to UNSW.

Operations Testing and Monitoring

B35. Prior to the commencement of operations the Proponent shall prepare and implement a detailed EMI, RFI, Noise and Vibration Monitoring and Management Plan. The Plan shall be approved by the Director General, in consultation with UNSW, prior to the commencement of operations, and shall include the following:

a) A description of ongoing maintenance and improvement programs and schedules to assure compliance with the EMI, RFI, noise and vibration Performance Standards throughout the lifetime of the Project.
b) Include a monitoring program as agreed to by UNSW to verify the effectiveness of the mitigation and ensure that the EMI, RFI, noise and vibration Performance Standards are not exceeded; and
c) Provide for compliance auditing, with compliance reports to be submitted to UNSW.

If the monitoring program demonstrates that the EMI, RFI, Noise and Vibration Performance Standards are complied with at all times during the first 2 years operation of the Project then the monitoring program may be revised with the approval of the Director-General, in consultation with UNSW.

B36. If a monitoring system or other indicators such as UNSW research equipment results indicate that a Project light rail vehicle causes noise or vibration to exceed a Vibration or Noise Performance Standard and UNSW reasonably determines that such exceedance will result or has resulted in harm, the Project shall immediately make temporary operational adjustments, such as slowing the vehicles or imposing other operational constraints, to avoid further exceedances. The Project shall continue to operate under such constraints while the Proponent investigates the potential exceedance in further detail and provides an alternative solution and resolution to the remove such exceedances, to the satisfaction of the Director-General, in consultation with UNSW.

Document Review by UNSW

B37. Documentation Review Points shall be scheduled at the following stages of the Project and supporting noise, vibration, EMI and RFI design documentation and measurements shall be submitted to UNSW to demonstrate compliance with the EMI and RFI, noise and vibration Performance Standards. The Project shall make a minimum allowance of 60 days in programming for UNSW to review and approve the following documentation:

a) The Project Return Design Brief;
b) Detailed Design Completion technical assessment prior to Tender for Construction;
c) Design parameters verification at commencement of Early Works / Enabling Stage Construction to ensure assumptions made during the design stages are accurate (including measured verification of ground vibration attenuation design parameters);
d) Construction phase compliance
   (iv) Pre-assessment of construction phase impact and development of the Research Mitigation Plan for Construction Vibration, Noise and EMI/RFI (RMPCERVN);
   (v) At the start of each significant new phase of construction with potential for different noise, vibration and EMI/RFI impacts to UNSW, the anticipated construction activities for the phase shall be validated and checked on site to meet the specified vibration and noise limits as agreed in the RMPCERVN; and
e) Commissioning.

AIR QUALITY

B38. The project shall be constructed and operated with the objective of meeting air quality goals for PM10, CO, NO2 and ambient SO2 as prescribed in the *National Environment Protection Measure (NEPM) for Ambient Air Quality.*

Dust Management

B39. The Proponent shall carry out all reasonable and feasible measures to minimise dust generated by the Project.

B40. During construction, the Proponent shall ensure that:

a) All vehicles do not exceed a speed limit of 10 kilometres per hour on UNSW land;

b) all loaded vehicles entering or leaving UNSW land have their loads covered; and

c) all loaded vehicles are cleaned of dirt, sand and other materials before they leave any site area on roads within UNSW land, to avoid tracking these materials on UNSW and public roads.

OPERATIONAL ENVIROMENTAL MANAGEMENT SYSTEM

B41. Prior to the commencement of operation, the Proponent shall incorporate the project into existing environmental management systems applying to the light rail network and which have been prepared in accordance with the AS/NZS ISO 14000 Environmental Management System services.

OPERATIONAL PERFORMANCE

Maintenance

B42. The ongoing maintenance and operational costs of urban design and landscaping items and works implemented as part of this Approval shall remain the Proponent's responsibility until satisfactory arrangements have been put in place for the transfer of the asset to the relevant authority. Prior to the transfer of assets, the Proponent shall maintain items and works to design standards established in the Urban Design and Stop Access Plan(s), including the engagement of a landscape specialist and the removal of graffiti, posters, stickers, and dirt within performance standards specified in the Urban Design and Stop Access Plan(s).

Operational Performance Audit

B43. Within twelve months of the completion of construction of the project, the Proponent shall commission an independent, qualified person or team to undertake an Operational Performance Audit of the project. An Operational Performance Audit Report shall be submitted to the Director-General within one month of the completion of the Audit, otherwise agreed by the Director-General. The Audit shall:

(a) Assess compliance with the requirements of this approval, and other licences and approvals that apply to the project;
(b) Assess the operational performance of the project against the aims and objectives for the project specified in the documents referred to under condition A1 of this approval;
(c) Assess the environmental performance of the project against the predictions made and conclusions drawn in the documents referred to under the project against the predictions made and conclusions drawn in documents referred to under condition A1 of this approval; and
(d) Review the effectiveness of the environmental management of the project, including any environmental impact mitigation works.

UTILITIES AND SERVICES

B44. Existing and likely or planned future UNSW-owned utilities and infrastructure, such as power, gas, groundwater / bore water supply, stormwater systems, water supply and sewer or telecommunications and their infrastructure shall not be interrupted or adversely affected by the project.

Consistent with any communications protocols established under this Approval, UNSW shall be provided with sufficient notice of any works – no less than 30 calendar days and for power supply no less than 90 calendar days – that would interrupt or potentially affect normal services and operations.

UNSW-owned utilities, services and other infrastructure potentially affected by construction and operation shall be identified prior to construction to determine

requirements for access to, diversion, protection, replacement and/or support. Consultation with UNSW shall be undertaken to make suitable arrangements for access to, diversion, protection, replacement and/or support of the affected infrastructure as required. The cost of any such arrangements shall be borne by the Proponent.

Where UNSW utilities, services and other infrastructure connect below Anzac Parade or High Street to other sites, coordination with UNSW is required to enable provision for future utilities, services and other infrastructure connections below the light rail tracks. The cost of such additional conduits shall be borne by UNSW.

Note see also Dilapidation and Reinstatement at Condition B48.

CONSTRUCTION TRANSPORT AND ACCESS

B45. The project shall be designed with the objective of minimising adverse changes to existing access arrangements and services for other transport modes (including published timetabled bus services to UNSW) and, where feasible, and reasonable facilitate an improved level of access and service to other transport modes comparable to the existing situation.

A Traffic Management Plan and/or Access Management Plan for UNSW is to be prepared in consultation with (and agreed by) UNSW and shall have regard to maintaining access to the UNSW Kensington Campus for both its normal operations and any UNSW construction-related access. In particular, the Plan shall provide for UNSW to seek to review the traffic signal and intersection operations of the following intersections:

(a) Anzac Parade / Barker Street;
(b) Anzac Parade / University Mall;
(c) Anzac Parade / High Street;
(d) High Street / Botany Street;
(e) Wansey Road/High Street;
(f) Arthur Street/Botany Street; and
(g) Wansey Road/Arthur Street

B46. Access to private property / UNSW land shall be maintained during construction unless otherwise agreed with the property owner in advance. A landowner's access that is physically affected by the project shall be reinstated to at least an equivalent standard, in consultation with the property owner.

B47. In relation to new or modified road, parking, pedestrian and cycle infrastructure, the project shall be designed:

(a) In consultation with the relevant road authority;
(b) In consideration of existing and future demand, road safety and traffic network impacts;
(c) To meet relevant design, engineering and safety guidelines, including *Austroads Guide to Traffic Engineering Practice*; and
(d) And certified by an appropriately qualified person that has considered the above matters.

DILAPIDATION AND REINSTATEMENT

B48. The Proponent shall engage an independent and qualified person(s) to prepare Dilapidation Report(s) in relation to UNSW buildings, land, services and infrastructure affected by the project as a direct result of works and the construction compound area (to be agreed with UNSW), prior to construction.

The report shall assess the current condition of buildings, land, services and infrastructure (both above and under ground level) and describe mechanisms to restore any damage that may result due to the construction of the project. The Report(s) shall be submitted to UNSW for review (and agreement) prior to use of UNSW land for construction purposes and the commencement of construction of both UNSW stops.

Following completion of construction, a subsequent report shall be prepared to assess any damage caused by the construction of the project.

The Proponent shall ensure that any measures to restore or reinstate buildings, land and infrastructure affected by the construction of the project are undertaken in a timely manner, in accordance with the requirements, and to the satisfaction, of UNSW and the relevant authority(ies), and at the full expense of the Proponent. Any pavement failures arising from construction traffic that result in safety concerns for other road users, shall be repaired in accordance with the relevant road authority's specifications no later than 48 hours following notification by the relevant road authority.

Note: Replacement of services and infrastructure shall be in accordance with the University's standards.

COMMUNITY AND STAKEHOLDER INVOLVEMENT PLAN

B49. A Community and Stakeholder Involvement Plan shall be prepared by the Proponent for Director-General approval prior to the commencement of any works (early, enabling or main project works) at or around the UNSW Kensington Campus and its co-related sites (including Randwick Racecourse). The Plan shall be prepared in consultation with (and agreed by) UNSW and shall include, but not be limited to, the following:

(a) Notification and information on project progress, activities and impacts of the project;
(b) Who will inform UNSW of the above, and when and how this is to occur (including required lead-in times for UNSW to adjust its services and utilities to cater for works – this is typically 30 calendar days and 90 days for power); and
(c) Management of complaints and other relevant protocols.

A Place Manager shall be allocated to the UNSW Kensington Campus to ensure an appropriate single point of contact is available during construction of the project, where it affects UNSW.

BUSINESS LANDOWNER AND ENGAGEMENT MANAGEMENT PLAN

B50. A Business Landowner and Engagement Management Plan shall be prepared by the Proponent for Director-General approval prior to the commencement of any works (early, enabling or main project works) at or around the UNSW Kensington Campus and its co-related sites (including Randwick Racecourse). The Plan shall be prepared in consultation with (and agreed by) UNSW and shall include, but not be limited to, the following:

(a) Notification and information on project progress, activities and impacts of the project;
(b) Who will inform UNSW of the above, and when and how this is to occur (including required lead-in times for UNSW to adjust its services and utilities to cater for works – this is typically 30 calendar days and 90 days for power); and

(c) Management of complaints and other relevant protocols.

A Place Manager shall be allocated to the UNSW Kensington Campus to ensure an appropriate single point of contact is available during construction of the project, where it affects UNSW.

PART C ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING

ENVIRONMENTAL MANAGEMENT

Construction and Environmental Management Plans / Environmental Control Maps

C1. The Proponent shall prepare and implement a Construction Environmental Management Plan for the project in accordance with the *Guideline for the Preparation of Environmental Management Plans* (Department of Planning and Infrastructure 201x). No construction associated with the project shall commence until written approval of this plan has been received from the Director-General or his nominee. The Plan shall:

a) Be submitted to the Director-General for Consent no later than two weeks prior to the commencement of construction or demolition or within such period otherwise agreed by the Director-General;
b) Outline all environmental management practices and procedures to be followed during construction and demolition works associated with the project;
c) Describe all activities to be undertaken on the site during construction of the project, including a clear indication of construction stages;
d) Detail how the environmental performance of the construction works will be monitored, and what actions will be taken to address identified adverse environmental impacts;
e) Describe of the roles and responsibilities for all relevant employees involved in construction and demolition works associated with the project; and
f) Include, but not limited to, addressing the following matters:
   (i) construction traffic;
   (ii) community consultation and complaints handling;
   (iii) construction soil and water management; and
   (iv) Noise, vibration, EMI and RFI management.

C2. In support of the preparation of a Construction and Environmental Management Plan (CEMP) for the project, discrete Environmental Control Maps shall be prepared both UNSW stops and the UNSW construction compound. The Environmental Control Plans shall be prepared in consultation with (and agreed by) UNSW and other relevant parties and shall include, but not be limited to, addressing the following matters:

(a) Impacts of noise, vibration, electromagnetic and radio frequency interference;
(b) Light spill;
(c) Dust and air quality;
(d) Traffic, transport and access arrangements, including existing public transport services;
(e) Stormwater, run-off, and sediment control;
(f) Impacts upon critical utilities, services and other infrastructure and maintenance of current and projected supply and operation of these;
(g) Flora and fauna;
(h) Groundwater impacts;
(i) Stormwater impacts; and
(j) Sewer impacts

The CEMP shall be submitted to the Director-General for review and approval prior to the commencement of any works, including early, enabling or main construction works.

C3. As part of the CEMP for the project, the Proponent shall prepare and implement the following plan(s):

(a) A Construction Traffic Management Plan for both UNSW Stops and the UNSW construction compound, prepared in accordance with the Roads and Maritime Service's *QA Specification GI0 - Control of Traffic and Traffic Control at Work Sites Manual (2003)* to manage disruptions to traffic movements as a result of construction traffic associated with the project. The Plan shall be developed in consultation with (and agreed by) UNSW and Randwick City Council and shall include, but not necessarily be limited to:

(i) Identification of construction traffic routes and quantification of construction traffic volumes (including heavy vehicle/ spoil haulage) on these routes;

(ii) Details of vehicle movements for construction sites and site compounds including parking, dedicated vehicle turning areas, and ingress and egress points;

(iii) Details of potential impacts to traffic on the existing road network, including, intersection level of service and potential disruptions to pedestrians, public transport (including during and outside of exam periods), parking, cyclists and property access;

(iv) Details of temporary and interim traffic arrangements to address potential impacts, including any use of traffic controllers at key UNSW Kensington Campus pedestrian intersections and refined traffic signal operations at key intersections around the UNSW Kensington Campus;

(v) A response procedure for dealing with traffic incidents; and

(vi) Mechanism for the monitoring, review and amendment of this Plan.

Environmental Management Strategy

C4. The Proponent shall prepare and implement an Environmental Management Strategy for the development to the satisfaction of the Director-General. This strategy shall:

a) Be submitted to the Director-General for approval prior to the commencement of any construction works;
b) Be prepared by a suitably qualified and experienced expert;
c) Provide the strategic framework for environmental management of the project;
d) Identify the statutory approvals that apply to the project;
e) Describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the project;
f) Describe the procedures that would be implemented to:
   (i) Keep the local community and relevant agencies informed about the operation and environmental performance of the project;
   (ii) Receive, handle, respond to, and record complaints;
   (iii) Resolve any disputes that may arise;
   (iv) Respond to any non-compliance;
   (v) Respond to emergencies; and
g) Include, but not be limited to, the following environmental management plans:
   (i) Traffic, access and public transport services, including for existing bus services;
   (ii) Flora and fauna management;
   (iii) Tree Protection, replacement and management;
   (iv) Soil and stormwater management;

(v) Air quality and dust control;
(vi) Light spill;
(vii) Impacts upon critical utilities and services and ensuring maintenance of current and projected supply and operation of these;
(viii) Noise, vibration, electromagnetic and radio frequency interference management; and
(ix) Groundwater.

Management Plan Requirements

C5. The Proponent shall ensure that the environmental management plans required under this Approval are prepared in accordance with the *Guideline for the Preparation of Environmental Management Plans* (Department of Planning and Infrastructure 201x) and include:

a) Detailed baseline data;
b) A description of:
   (i) The relevant statutory requirements (including any relevant approval, licence or lease conditions);
   (ii) Any relevant limits or performance measures/criteria;
   (iii) The specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;
c) A description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;
d) A program to monitor and report on the:
   (i) Impacts and environmental performance of the project;
   (ii) Effectiveness of any management measures (see 'c' above);
e) A contingency plan to manage any unpredicted impacts and their consequences;
f) A program to investigate and implement ways to improve the environmental performance of the project over time;
g) A protocol for managing and reporting any:
   (i) Incidents;
   (ii) Complaints;
   (iii) Non-compliances with statutory requirements; and
   (iv) Exceedances of the impact assessment criteria and/or performance criteria; and
h) A protocol for periodic review of the plan.

Accredited Environmental Management System

C6. Where the Proponent operates an ISO accredited Environmental Management System (EMS) and can demonstrate in writing to the satisfaction of the Director General that the requirements of Conditions C1- C3, and any other condition in this part, will be addressed through the operation of the EMS, the Director General may, in writing, direct that the EMS can operate in lieu of those conditions.

C7. In accrediting the operation of an EMS in accordance with Condition C6, The Director-General may specify that particular environmental management documentation and reporting (e.g. audit reports), be submitted to Planning & Infrastructure for its consideration, and that the Proponent comply with any directive of the Director-General with regard to any required management or mitigation measures arising from the environmental management of the project.

Annual Review

C8. By the end of March each year, or other timing as may be agreed by the Director-General, the Proponent shall review the environmental performance of the project to the satisfaction of the Director-General. This review shall:

a) Describe the project work that was carried out in the previous calendar year, and the project work that is proposed to be carried out over the next year;

b) Include a comprehensive review of the monitoring results and complaints records of the project over the previous calendar year, which includes a comparison of these results against the following:
   (i) The relevant statutory requirements, limits or performance measures/criteria;
   (ii) Requirements of any plan or program required under this Approval;
   (iii) The monitoring results of previous years; and
   (iv) The relevant predictions in the EIS;
c) Identify any non-compliance or incidents over the last year, and describe what actions were (or are being) taken to ensure compliance or mitigation;
d) Identify any trends in the monitoring data over the life of the project;
e) Identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and
f) Describe what measures will be implemented over the next year to improve the environmental performance of the project.

Revision of Strategies, Plans and Programs

C9. Within 3 months of the submission of either:
a) An annual review under condition C8 above;
b) An incident report under condition C8 above;
c) An audit under condition C10 below; or
d) Any modification to the conditions of this Approval,

The Proponent shall review, and if necessary revise, the strategies, plans, and programs required under this consent to the satisfaction of the Director-General.

Note: This is to ensure the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the development.

AUDITING

Independent Environmental Audit

C10. Within 2 years of the date of this Approval, and every 3 years thereafter, unless the Director-General directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project. This audit shall:
a) Be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Director-General;
b) Include consultation with the relevant agencies;
c) Assess the environmental performance of the project and assess whether it is complying with the requirements in this consent, and any other relevant approvals and relevant EPL/s (including any assessment, plan or program required under these approvals);
d) Review the adequacy of any approved strategy, plan or program required under the abovementioned approvals; and
e) Recommend measures or actions to improve the environmental performance of the project, and/or any strategy, plan or program required under these approvals.

Note: This audit team shall be led by a suitably qualified auditor, and include experts in:

(k) impacts of noise, vibration, electromagnetic and radio frequency interference
(l) traffic, transport and access arrangements, including existing public transport services
(m) impacts upon critical utilities, services and other infrastructure and maintenance of current and projected supply and operation of these
(n) fauna, trees and landscape
(o) groundwater impacts
(p) stormwater impacts
(q) sewer impacts

and any other fields specified by the Director-General.

C11. Within 3 months of commissioning this audit, or as otherwise agreed by the Director-General, the Proponent shall submit a copy of the audit report to the Director-General, together with its response to any recommendations contained in the audit report.

SCHEDULE OF ACRONYMS AND ABBREVIATIONS

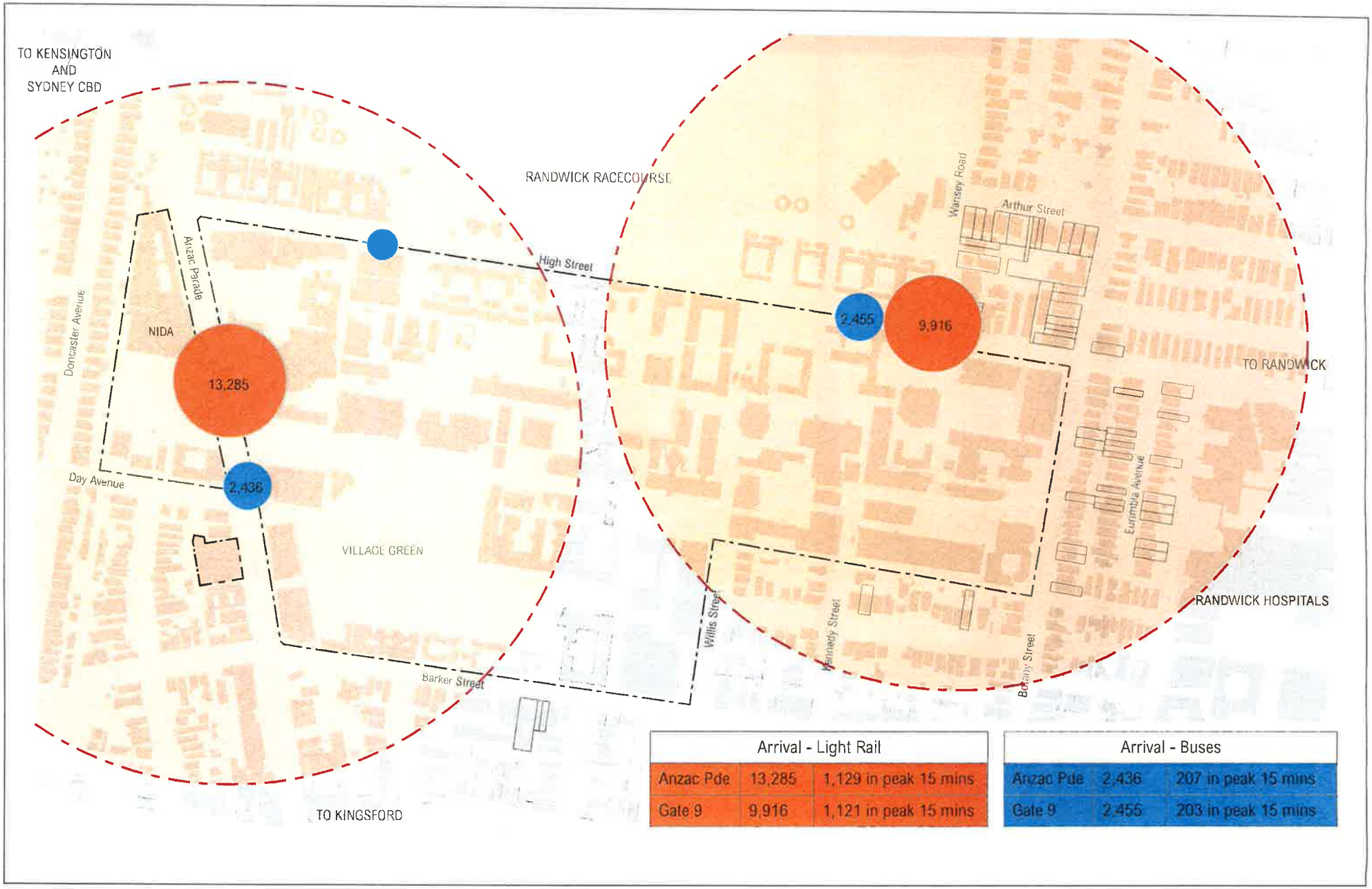
CEMP	Construction and Environmental Management Plan
dB	Decibels
EMI	Electromagnetic interference
EMS	Environmental Management System
EPA	NSW Environment Protection Authority
Hz	Hertz
NIDA	National Institute of Dramatic Arts
nT	Nano Tesla
PM10	Particulate Matter less than 10 microns
RFI	Radio frequency interference
RMPCERVN	Research Mitigation Plan for Construction EMI, RFI, Vibration and Noise
RMS	Roads & Maritime Service
TfNSW	Transport for New South Wales
UNSW	University of New South Wales
VC	Vibration Criteria
VC-E	Vibration Criteria – Grade 'E'
VRIOGS	Victorian Rail Industry Operators Group Standards

UNSW Patronage Assessment for the Upper Campus and Lower Campus (2013)

UNSW

Appendix C

JBA | 13533



Arrival - Light Rail		
Anzac Pde	13,285	1,129 in peak 15 mins
Gate 9	9,916	1,121 in peak 15 mins

Arrival - Buses		
Anzac Pde	2,436	207 in peak 15 mins
Gate 9	2,455	203 in peak 15 mins

LEGEND

- Light rail
- Buses

0 25 50 100m

UNSW

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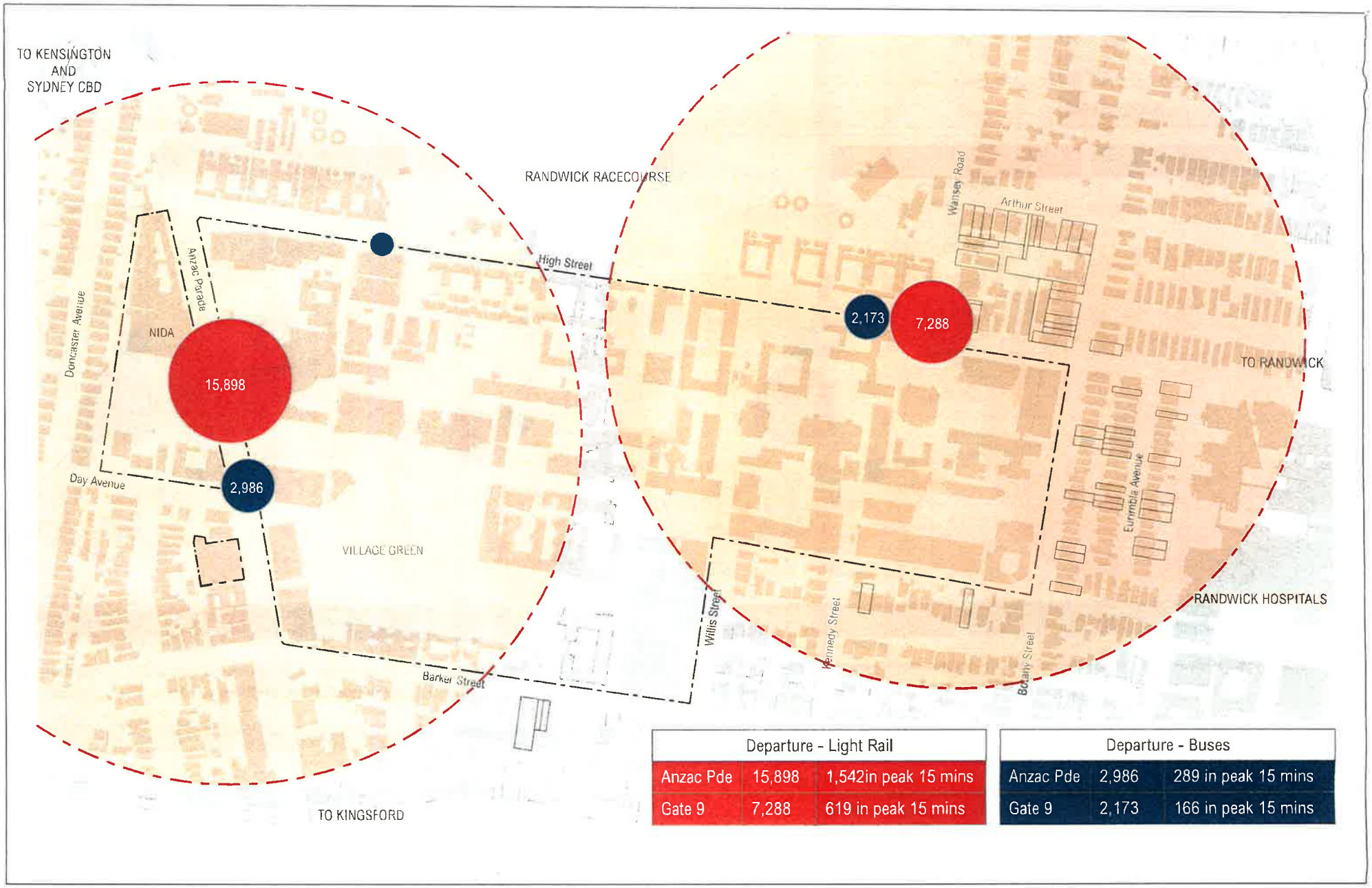
Tzannes Associates ARCHITECTURE URBAN DESIGN

CBD & South East Light Rail Project
EIS Response for UNSW

2020
Projected Daily Staff and Student Arrivals

SCALE	DRAWN	CHECKED	DATE	PROJECT	DRAWING	REVISION
1:4000 @A3	KG	AW	06/12/13	13040	5	A



Departure - Light Rail		
Anzac Pde	15,898	1,542in peak 15 mins
Gate 9	7,288	619 in peak 15 mins

Departure - Buses		
Anzac Pde	2,986	289 in peak 15 mins
Gate 9	2,173	166 in peak 15 mins

LEGEND

- Light rail
- Buses

UNSW

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CBD & South East Light Rail Project
EIS Response for UNSW

2020
Projected Daily Staff and Student Departures

SCALE	DRAWN	CHECKED	DATE	PROJECT	DRAWING	REVISION
1:4000 @A3	KG	AW	06/12/13	13040	6	A

The two scenarios below borrow information from the annual UNSW Travel Survey (2007 to 2013), the 2013 Campus Counts and the SELRP Technical Paper 1: Transport Operations Report, 6 November 201 3 to extrapolate UNSW ridership numbers in for the light rail on a typical semesters day as well as arrival and departure patterns of users at the proposed stations locations. The light rail will significantly impact pedestrian movements at the University Mall entrance, Anzac Parade and at Gate 9, High Street. Similar to current patterns, it is expected that more people will depart from the lower campus to avoid walking uphill to Gate 9.

Assumptions Scenario 1

1. Scenario 1 assumes that the campus population and public transport ridership percentage remain the same as 2013
2. Buses 891,895,892, M10 & M50 have been detained. Buses 391,392,393,394,397,399 service the campus southbound only. 395 and 396 have been cancelled and replaced with an extended service 343. No changes are made to the other buses (370,346,400 and 303, Source: SELRP Technical Paper 1: Transport Operations Report, 6 November 201 3)
3. All passengers using 891,895,892, M10, M50, 391, 392, 393, 394, 397 and 399 (north bound only) are using light rail
4. The current proportion of total staff and students attending the Kensington campus on a typical semesters day remains at 80%

Assumptions Scenario 2

1. Scenario 2 assumes a steady 2% annual growth in the campus population (14% increase in population from 2013) and a continued trend towards the use of public transport (projected to be 65% in 2020, Source: 2013 Travel Survey Results).
2. Same as assumptions 2,3,4 above (Scenario 1)

Note: The scenarios do not take into account a projected annual increase in patronage of 2.7% in the use of light rail due to change in travel times, increasing cost of petrol, parking, and other lifestyle factors. (Source: Honours Thesis, Ridership Analysis of the CBD and South East Light Rail Project, Author: Richard Banzon, November 2013)

Arrival and departure projections for all modes of transport (Source: 2013 Campus Counts)

Anzac Parade:
Peak arrival assumed at 8.5% of total, between 9-9.15am
Average arrival assumed at 1.4% throughout the day (7am-9pm)
Peak departure assumed at 9.7% of total, between 6.30-6.45pm
Average departure assumed at 1.8% throughout the day (7am-9pm)

Gate 9:
Peak arrival assumed at 11.3% of total, between 9.15-9.30am
Average arrival assumed at 1.8% throughout the day (7am-9pm)
Peak departure assumed at 8.5% of total, between 6.30-6.45pm
Average departure assumed at 1.7% throughout the day (7am-9pm)

Scenario 1: No change in campus population or shift in transportation modes

Approximately 39,000 trips made on Light Rail by the UNSW staff and students (arrival + departure)

Anzac Parade - Light Rail		
Arrival	11,117	944 in peak 15 mins
Departure	13,304	1,290 in peak 15 mins

Anzac Parade - Buses		
Arrival	2,636	175 in peak 15 mins
Departure	2,499	242 in peak 15 mins

Gate 9 - Light Rail		
Arrival	8,298	937 in peak 15 mins
Departure	6,099	518 in peak 15 mins

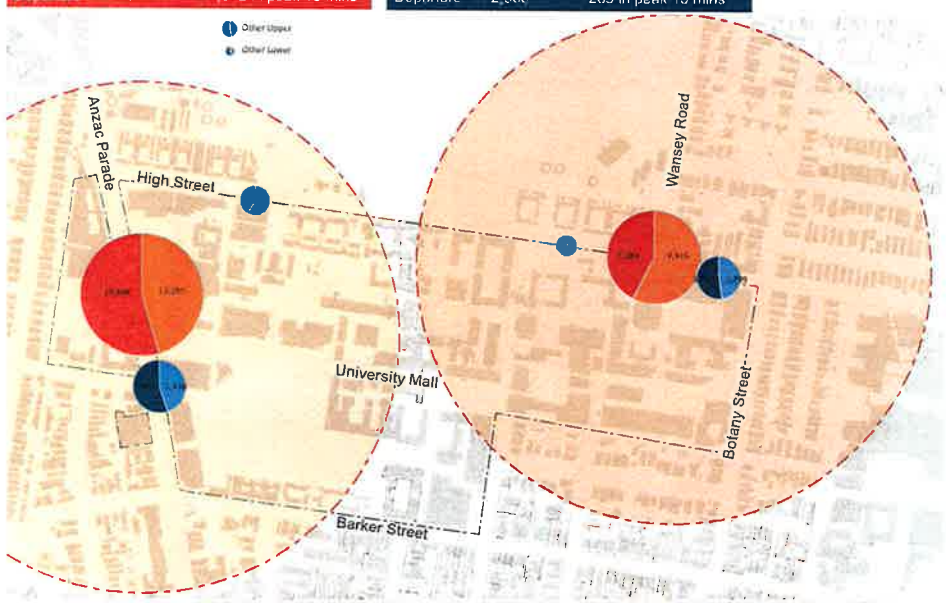
Gate 9 - Buses		
Arrival	1,506	170 in peak 15 mins
Departure	1,634	139 in peak 15 mins

Scenario 2: Steady growth in population and shift to public transport

Approximately 46,000 trips made on Light Rail (18% increase) by the UNSW staff and students (arrival + departure)

Anzac Parade - Light Rail		
Arrival	13,285	1,129 in peak 15 mins
Departure	15,898	1,542 in peak 15 mins

Anzac Parade - Buses		
Arrival	2,430	207 in peak 15 mins
Departure	2,986	289 in peak 15 mins



Gate 9 - Light Rail		
Arrival	9,916	1121 in peak 15 mins
Departure	7,288	619 in peak 15 mins

Gate 9 - Buses		
Arrival	1,799	203 in peak 15 mins
Departure	1,953	166 in peak 15 mins

LEGEND

- Arrival - light rail
- Departure - light rail
- Arrival - buses
- Departure - buses

Not to Scale

UNSW

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Tzannes Associates ARCHITECTURE URBAN DESIGN

CBD & South East Light Rail Project
EIS Response for UNSW

Data sheet -
Ridership Projections 2020

SCALE	DRAWN	CHECKED	DATE	PROJECT	DRAWING	REVISION
1:4000 @A3	KG	AW	06/12/13	13040	7	A