



**Planning &
Infrastructure**

CBD & South-East Light Rail Project (SSI 6042)

Peer Review of Traffic & Transport Assessment

April 2014

SAMSA CONSULTING

TRANSPORT PLANNING & TRAFFIC ENGINEERING

Samsa Consulting Pty Ltd
Transport Planning & Traffic Engineering

ABN: 50 097 299 717

46 Riverside Drive, Sandringham, NSW 2219, AUSTRALIA

Telephone: (+61) 414 971 956 or (+612) 9583 2225

E-mail: alansamsa@telstra.com

Web: www.samsaconsulting.com

© Samsa Consulting Pty Ltd

This document is and shall remain the property of Samsa Consulting Pty Ltd. The document may only be used for the purposes for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

Contents

1. Introduction	1
1.1 Objectives & Scope of Work	1
1.2 Report Structure	2
2. Project Details	3
2.1 Background	3
2.2 Project Description	4
2.3 Preferred Infrastructure Project Amendments	6
3. Review of Traffic & Access Assessment	7
3.1 Key Assessment Issues	7
3.2 Project-Wide Issues.....	8
3.2.1 <i>General</i>	8
3.2.2 <i>Light Rail Operations</i>	8
3.2.3 <i>Traffic Operations</i>	9
3.2.4 <i>Bus Operations</i>	11
3.2.5 <i>Parking Issues</i>	11
3.3 City Centre Precinct.....	11
3.3.1 <i>Light Rail Operations</i>	11
3.3.2 <i>Traffic Operations</i>	12
3.3.3 <i>Bus Operations</i>	12
3.3.4 <i>Pedestrian Issues</i>	13
3.3.5 <i>Cyclist Issues</i>	13
3.4 Surry Hills Precinct	13
3.4.1 <i>Traffic Operations</i>	13
3.4.2 <i>Parking Issues</i>	14
3.5 Moore Park Precinct	14
3.5.1 <i>Traffic Operations</i>	14
3.6 Randwick Precinct	15
3.6.1 <i>Light Rail Operations</i>	15
3.6.2 <i>Traffic Operations</i>	15
3.6.3 <i>Parking Issues</i>	16
3.6.4 <i>Cyclist Issues</i>	16
3.7 Kensington & Kingsford Precinct	17
3.7.1 <i>Light Rail Operations</i>	17
3.7.2 <i>Traffic Operations</i>	17
3.7.3 <i>Parking Issues</i>	18
3.8 Project-Wide Construction Phase Issues.....	18
3.9 Summary of Submissions	19
4. Conclusions & Recommendations	21
4.1 Conclusions.....	21
4.2 Recommendations.....	22

1. Introduction

Transport for NSW (TfNSW) is the proponent for the CBD & South-East Light Rail (CSELR) Project, which consists of approximately 12 kilometres of new light rail track from Circular Quay to Central, Kingsford and Randwick via Surry Hills and Moore Park and includes a stabling facility at Randwick and a maintenance facility at Lilyfield.

This report details a review of the traffic and transport impact assessment for the proposed Project and has been prepared by *Samsa Consulting Pty Ltd*, Transport Planning & Traffic Engineering Consultants, for *NSW Department of Planning & Infrastructure (DP&I)* as part of its project assessment process.

1.1 Objectives & Scope of Work

The DP&I requires independent technical advice with respect to the Project's traffic and transport assessment. This review has been carried out to provide the independent technical advice including:

- Reviewing the Project proposal (as amended by the Preferred Infrastructure Report) and supporting traffic and transport assessment as well as the (Response to) Submissions Report.
- Site familiarisation visit of the Project area to observe and assess pertinent traffic and transport issues.
- Providing the DoPI with advice on the:
 - Adequacy of the assessment including identifying gaps in the assessment and methodology;
 - Adequacy and/or suitability of the conclusions and recommendations of the traffic and transport assessment including any amendments to the proposal;
 - Adequacy and suitability of any mitigation measures proposed; and
 - Any additional issues arising from consideration of the traffic and transport impacts of the proposal.
- Determine and report on the adequacy of the Proponent's Response to Submissions, in particular key agency and community group submissions.
- In conjunction with DP&I staff, develop recommended conditions of approval.
- Prepare a Summary Report summarising the above tasks.

In undertaking the review, the main document reviewed was Parsons Brinckerhoff "*CBD and South East Light Rail Project Environmental Impact Statement (EIS)*", November 2013, which incorporated the Booz & Co / AECOM "*Technical Paper 1: Transport Operations Report*", 6 November 2013, and Booz & Co / AECOM "*Technical Paper 2: Construction Traffic & Transport Management Strategy*", 7 November 2013. Other documents that were referenced / reviewed include the following:

- Submissions received from the general community, government agencies (Local Councils, Roads & Maritime Services), UNSW, assorted schools and other organisations.
- Director-General's Requirements, 5 August 2013

- Parsons Brinckerhoff "*CBD and South East Light Rail Project: Submissions Report*", March 2014

1.2 Report Structure

The remainder of this report is presented as follows:

Chapter 2 describes the proposed Project.

Chapter 3 provides a review of the traffic and transport assessment undertaken for the project.

Chapter 4 provides conclusions and recommendations.

2. Project Details

2.1 Background

Transport for NSW (TfNSW) is the proponent for the CSELR, and will deliver the planning and concept design phases of the proposal, and the early works. It is understood that the detailed design, construction, maintenance and operation of the proposal would most likely be delivered through a public private partnership (PPP) arrangement.

The CSELR proposal was declared a critical 'State Significant Infrastructure' project by the NSW Minister for Planning and Infrastructure on 20th May 2013. *Part 5.1* of the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act) establishes an assessment and approval regime for 'State Significant Infrastructure' (SSI). Under *Part 5.1* of the EP&A Act, the planning and approvals process includes the following key steps:

- Submission of an SSI application with an accompanying supporting document to seek Director General's requirements (DGRs) for the proposal – an SSI application was submitted to the Director-General of DP&I on 25th June 2013.
- Preparation and submission of an EIS, addressing the matters outlined in the DGRs – the Director-General of DP&I issued the DGRs for the CSELR proposal on 5th August 2013.
- Public exhibition of the EIS for a minimum of 30 days, whereby government agencies, interested groups and the community were invited to make submissions on the CSELR proposal.
- Preparation of a Submissions Report including a Preferred Infrastructure Report (PIR), to address community and stakeholder comments and document any changes to the original proposal. *Section 115Z(6)* of the EP&A Act enables the preparation of a PIR that outlines any proposed changes to minimise the Project's environmental impact or to deal with any other issue raised during the assessment of the application concerned.
- Assessment of the application by the DP&I and preparation of the Director-General's Environmental Assessment Report.
- Determination by the Minister for Planning and Infrastructure, including, any conditions of approval.
- Approval from the Minister for Planning and Infrastructure is required before Transport for NSW (proponent) can proceed with the CSELR proposal.

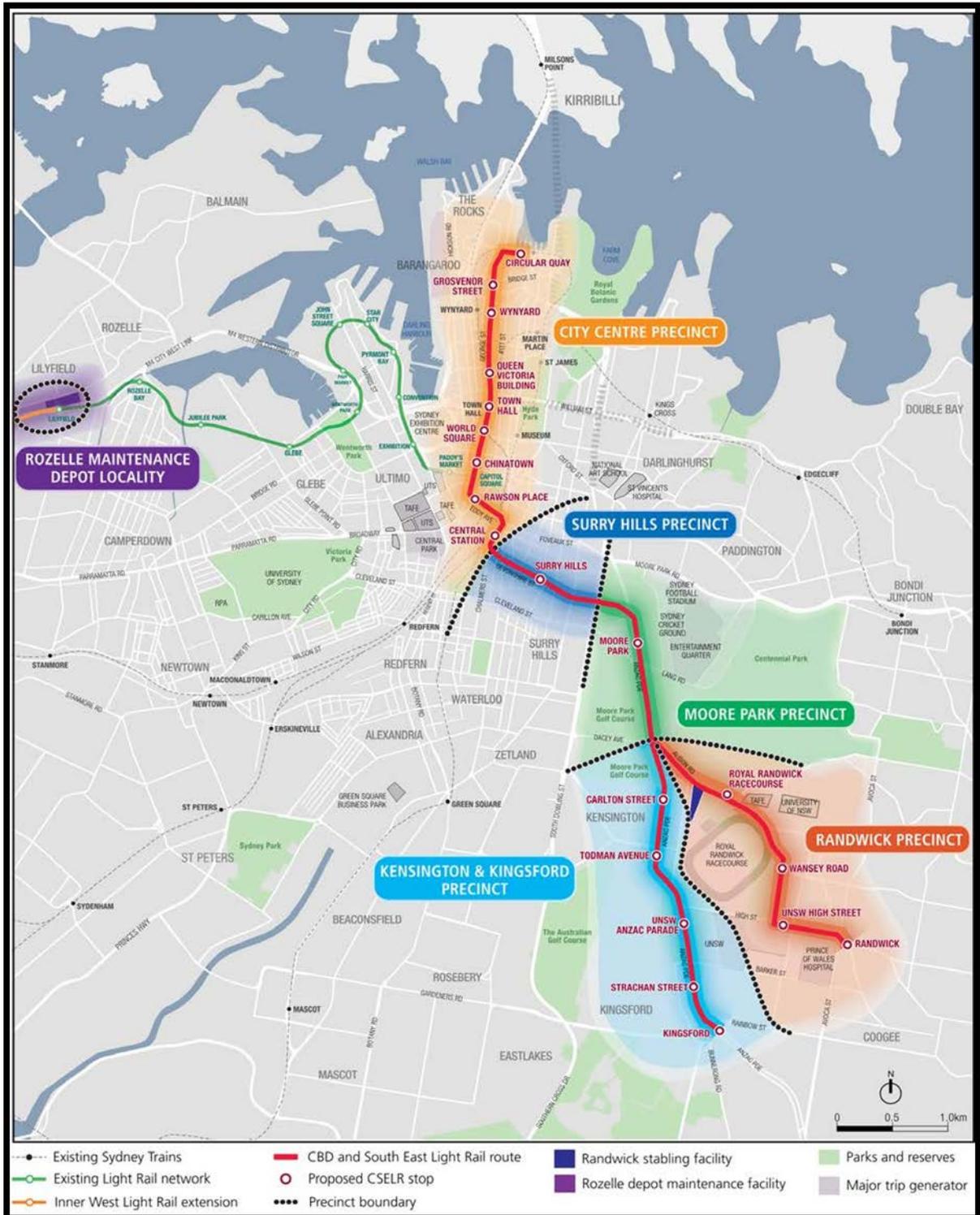
2.2 Project Description

The key features of the original CSELR proposal assessed in the EIS include the following:

- High frequency, 'turn up and go' services proposed to operate every two to three minutes during peak periods within the CBD and out to Moore Park, with services every five to six minutes between Moore Park and the Randwick and Kingsford branches.
- Pedestrian zone in George Street from Bathurst Street to Hunter Street, with light rail vehicles (LRVs) operating wire-free in this zone (except for overhead wires at stops used for charging LRVs).
- 20 light rail stops along the route, including interchange with heavy rail at major rail stations (Circular Quay, Wynyard, Town Hall and Central), ferry interchange at Circular Quay, and bus interchanges at the Town Hall, Queen Victoria Building, Rawson Place, Central Station, Randwick and Kingsford stops.
- Facilities in Randwick and at Rozelle for LRV stabling and maintenance (including wash down).
- Fleet of approximately 30 electric-powered LRVs (including spare LRVs), approximately 45 metres long, featuring air conditioning and accessible low-floor design.
- High frequency service with the capability to carry up to 9,000 passengers per hour in each direction.
- Capacity for approximately 80 seated and 220 standing passengers in each LRV.
- Public domain improvements including concepts for paving, street trees, lighting and furniture.
- Changes to property access and traffic management within the Project's direct corridor.
- The proposal is also integrated with, but does not include, a redesign of the Sydney bus network, which is proposed as part of a suite of projects under the (draft) *Sydney City Centre Access Strategy* (NSW Government 2013).

It is anticipated that the CSELR proposal would take approximately five to six years to build.

The proposed location of the CSELR and the project precincts is shown in *Figure 2.1* following.



Source: Parsons Brinckerhoff "CBD and South East Light Rail Project EIS"

Figure 2.1: Proposed Project Location Including Project Precincts

2.3 Preferred Infrastructure Project Amendments

The Preferred Infrastructure Project (PIR) was detailed as part of the proponent's Submissions Report. The PIR proposed a number of amendments to the original project assessed in the EIS. These amendments are as follows:

- Reduction in extent of wire-free zone within the CBD to between Wynyard and Town Hall stops.
- Chinatown stop arrangement – amendment from side platform to island platform with slight relocation to the north along George Street.
- Central Station stop and surrounds – amendments include the removal of the special event track and platform, the establishment of a low-speed shared traffic zone in Chalmers Street and the relocation of northbound bus stops out of Chalmers Street.
- Surry Hills stop arrangement – amendment from single island platform to dual side platforms.
- Replacement parking for the Langton Centre – potentially provide up to approximately 40 spaces to the north and south of the light rail alignment.
- Moore Park Precinct CSELR alignment and stop – relocation of Moore Park stop 250 m to the south and optimisation of the light rail track alignment (tunnel) under Moore Park and Anzac Parade.
- Pedestrian bridge over Anzac Parade, Moore Park – new pedestrian bridge across Anzac Parade adjacent to the Moore Park stop.
- Local access arrangements to Royal Randwick racecourse – reconfigured Alison Road / Darley Road intersection with new eastbound, bus-only slip lane for King Street / John Street access to Alison Road westbound.
- CSELR alignment and stops on Alison Road and Wansey Road – amendments include:
 - partial light rail realignment along Alison Road;
 - southbound only travel along the majority of Wansey Road and shared pedestrian / cyclist path to the east of the light rail alignment; and
 - relocation of the Wansey Road and UNSW High Street stops into Alison Road and High Street respectively.
- Randwick stop and interchange – relocation of light rail stop approximately one lane width into Belmore Road resulting in one southbound general traffic lane and two northbound bus lanes.
- UNSW Anzac Parade stop arrangement – amendment from side platform on eastern (UNSW) side of Anzac Parade to central island platform.
- Substation locations – revised location of substations at Parker Lane, Chalmers Street and Surry Hills.
- Construction compounds – proposed new compounds at Bond Street, Barrack Street and NIDA car park as well as relocation of compounds at Ward Park, Moore Park tunnel (east and west of Anzac Parade) and Moore Park site office.

3. Review of Traffic & Access Assessment

3.1 Key Assessment Issues

In undertaking the assessment of for the proposal, the proponent was required to address several key areas during both construction and operational phases, which were nominated by the DGRs. These key areas generally related to local and regional traffic, public transport, property access, parking, pedestrian facilities and bicycle network. The key assessment issues included the following:

- Preparation of a traffic impact assessment to include construction and operational traffic impacts to the local and regional road network, public transport operations, pedestrian and bicycle facilities.
- Daily and peak traffic generation for each phase of the proposal and potential cumulative impacts on the local and regional road network.
- Appropriate traffic network modelling ranging from regional road network to intersection analysis.
- Impacts of traffic on the overall efficiency, ease, comfort, reliability and convenience of the proposed light rail.
- Integration of light rail proposal with other public transport modes.
- Emergency vehicle and critical facility access to hospitals in the Randwick Health Campus.
- Impacts on on-street parking supplies and mitigation measures for retention / replacement of on-street parking.
- Specific construction-related impacts including staging of works.
- Intersection operations including modifications and impacts on travel time for all road network users.
- Bus network impacts and resultant traffic impacts from changes to routes, timetabling, network interaction, etc.
- Property and service access for all relevant transport modes.
- Impacts of vehicle breakdown and consequent contingency measures.
- Access strategies during construction and operational phases for pedestrian and bicycle networks, station / interchange accessibility, key destination accessibility, inter-modal transfer including way-finding and signage.
- Impacts of light rail stabling and maintenance facilities.
- Light rail demand including potential future extensions and impacts of future land use growth areas.
- Strategies and specific measures to mitigate / minimise identified impacts including and options assessment and effects of any measures proposed.

The above key assessment areas were considered in the peer review. Issues identified during the peer review are characterised in the following sections into project-wide (general) issues and Project precinct areas. Where the proponent has provided relevant interim responses, these have been included below each identified issue / comment.

3.2 Project-Wide Issues

3.2.1 General

- There appears to be significant work remaining during later detailed design development to enable a full understanding and meaningful assessment of the Project's environmental impacts to be undertaken. Further resolution and information is required to identify likely impacts and then to appropriately develop commensurate mitigation measures.
- There are numerous generalisations with non-specific / non-binding terms used within the assessment. This is coupled with the reliance on other strategies including the Sydney City Centre Access Strategy (SCCAS), CSELR Network Management Plan (NMP), etc. This results in minimal meaningful and detailed discussion on the Project implications if the proposed measures are not implemented or targets are not met, which leaves unknowns in the assessment that would need to be resolved at a later date. The measures proposed need to be definitive and able to be evaluated objectively.

TfNSW response: Implementation of the CSELR project will require whole of government collaboration to minimise impacts and maximise benefits. A comprehensive governance structure has been developed to plan, assess and manage impacts arising not only as a result of the CSELR but the cumulative effects of other initiatives, major projects, events and private development in the Sydney CBD.

- There do not appear to be any specific measures proposed to mitigate against cumulative impacts, both during construction (in regards to staging of works and other potential construction activities in the project area) and during operations.

TfNSW response: There are a wide range of strategic management measures signposted in the EIS which will need to be undertaken both prior to, during and post-construction. Where feasible, mitigation has been integrated into the design. A broader network management plan is proposed to further develop operational responses to critical incidents, demand management and network optimisation not only resulting from the CSELR but together with the cumulative effects of other initiatives, major projects, events and private development in the Sydney CBD.

- The chosen contractor would need to prepare a Construction Traffic Management Plan (CTMP) in consultation with, and to the satisfaction of relevant local councils and RMS.

TfNSW response: Noted in EIS.

3.2.2 Light Rail Operations

- The assessment of the light rail service assumes minimal delay through signalised junctions with respect to travel / service times, ie. optimal operating conditions. However, at major junctions in particular (eg. Anzac Parade / Alison Road / Dacey Avenue), wait times will be controlled by the coordinated traffic signal system (known as SCATS), which aims to maintain effective signal coordination on a network-wide basis with no significant priority to be given to light rail operations. These potential delays have not been quantified and may change during further design development, thus affecting stated service times / headways, etc.

TfNSW response: Operational modelling for the light rail has been prepared in consultation with RMS and the Transport Management Centre (TMC) and incorporates signal delays. The modelling is considered conservative in terms of the level of priority that the service would receive. Optimisation of light rail / traffic coordination is ongoing.

- In Figures 5.35 and 5.36 of *Traffic Operations* paper, the network performance statistics for the light rail option (2021) are compared with the 'do minimum' scenario (2021). While this provides a base for comparison of future conditions, it does not favourably compare the 'do minimum' scenario (2021) with the base scenario (existing 2012). Some of the conditions still deteriorate when the future light rail option is compared with the base case.

TfNSW response: The network performance statistics present a fair comparison of the network performance impact of the project at opening year vis a vis the network performance in that year without the project. It is not realistic to compare future year do-something case with current year base, since the broader network impacts of traffic growth, land development, etc. will not otherwise be captured in the base case.

3.2.3 Traffic Operations

- There is a general focus on the major road network and its operations with inadequate discussion / assessment of local road network operations resulting from major road congestion, for example. There has been minimal discussion on local road network traffic permeation, potential rat-runs, etc. Moreover, the road network operations seem to focus on the CBD area with a seemingly lower level of assessment undertaken on the south-east section of the project area, ie. east of Central Station. This is particularly the case for the assessment during construction, where intersection operations focus on the CBD area.

TfNSW response: There has been extensive consultation with local government over local area impacts. The forecast change in conditions is shown within the meso-scopic model. Councils have not raised any significant concerns regarding local traffic impacts.

TfNSW will continue to work with Councils in managing congestion in local traffic networks. Local roads that have significantly degraded performance as a result of the project will be mitigated as appropriate. Local government partners will address residual amenity impacts as part of their ongoing LATM programs.

Traffic analysis has covered the whole project corridor while reporting has focussed on areas of major impacts, which includes the CBD, arterial roads in the south-east and other local roads along the light rail alignment.

- The assessment states that the effects of potential changed traffic patterns will be resolved by TfNSW and RMS working together to identify appropriate upgrade measures. It is unclear when and how this would be resolved.

TfNSW response: The EIS outlines the expected impacts of TfNSW's reference scheme only with further design resolution at a later stage.

TfNSW will continue to assess the likely future conditions during construction and operation based on more detailed design, construction planning and interface with other projects. A comprehensive governance structure will be established to manage and approve the Construction Traffic Management Plans and grant road occupancy licenses to undertake the work.

- Key model assumptions (*Section 5.5.2.1*) states that the modelling was based on 2012 traffic volumes and that future traffic patterns likely to be affected by light rail should be assessed once wider area modelling by Transport for NSW is available. It is unclear when this would be made available and how it would be incorporated into the assessment.

TfNSW response: This relates specifically to the South Dowling Street at-grade crossing. Further modelling and assessment has since been undertaken by TfNSW as part of the Aimsun network model reported in the EIS.

- Intersection operations that are affected negatively rely on “revised traffic signal control plans and corridor strategies to ensure the movements with the heaviest demands are adequately catered for”. Also, that “further refinement of [intersection] design is underway in consultation with RMS to optimize operation”. Critical intersections have been identified however the assessment is silent or vague on potential solutions. Meaningful, clear mitigation measures are postponed to a later date to be resolved – via the CSELR Network Management Plan (NMP).

TfNSW response: Subsequent to the EIS, further detailed analysis of key intersections such as Kingsford Nineways, Alison Road / Anzac Parade and South Dowling St has been undertaken with RMS.

The CBD TT&ACC will be responsible for overseeing the coordination of CBD transport and traffic activities against the NMP. RMS and the TMC are further refining the CSELR Aimsun traffic model as a platform to refine their signal design and coordination. The Network Management Plan will also take account of other SCCAS projects that will affect the network, which is outside of the control of the CSELR project

- While there is some intersection assessment provided with levels of service at various intersections before and after operations begin, there are no meaningful mitigation measures proposed for intersections with lower levels of service. It appears that the performance of major intersections in particular will be left to RMS to resolve.

TfNSW response: Impacted intersections within the corridor have been mitigated to the extent possible through design and operational improvements. Ongoing assessment of the operational performance of the road network is being undertaken by TfNSW and RMS through the Network Management Plan to iteratively support detailed design and construction planning following contract award

- With the introduction of light rail there would only be a minor improvement in traffic demand between 2012 and 2021, from 7% increase without light rail to 6% increase with light rail.

TfNSW response: The project will remove 3,500 trips from the road network during the morning peak period and 4,000 trips during the afternoon peak period. This is equivalent to a 15% reduction in future growth in traffic volumes

- There seems to be minimal contingency proposed for single lane sections of road network (eg. George Street, Devonshire Street, etc.) where, if incidents occur (either light rail vehicle or public vehicle breakdowns or crashes), there is a higher risk of the road network becoming congested.

TfNSW response: The NMP would deal with contingency measures for incident management. The final track design is yet to be determined, however the design principle is that the design will allow motor vehicles to mount and travel along the track if required but discourage general use of the tracks. Emergency vehicles may use the light rail tracks under lights and sirens at any time.

- It is unclear how car-share locations would operate.

TfNSW response: These would be typical on-street car share bays, in the locations indicated in the EIS. TfNSW is working with Councils with respect to kerbside access and management

- Road Rules will need to be reviewed due to light rail operations within and across existing road corridors. This will need to be conditioned and undertaken prior to operations.

TfNSW response: The road environment will be designed in accordance to the NSW road rules. Regulations with respect to light rail operations within the road environment

are currently being reviewed. All signage and traffic control devices will draw from the Australian Road Rules and Austroads standards.

3.2.4 Bus Operations

- The EIS states that as a result of the CSELR, there would be 180 to 220 fewer peak hour buses (8 am to 9 am) entering the CBD from the south-east. Based on 60 passengers per bus, this equates to some 10,800 to 13,200 passengers that would need to transfer to light rail. The lower figure equates to some 36 light rail trips (based on a 300 passenger capacity per light rail vehicle), which would require a headway of 1 minute 40 secs (1.67 mins). However, maximum headways are proposed to be between 2.5 to 3 mins during peak periods, which equates to a maximum light rail capacity of approximately 7,200 passengers, equivalent to only some 120 buses.

TfNSW response: There are a couple of assumptions in this comment that are incorrect. Specifically, the average loading on these buses is less than 60, it includes bus savings in both directions and the 180-220 reduction includes other bus network enhancements identified in the SCCAS as a result of the CSELR such as through routing across the CBD and nearside termination at Central Station.

The demand shift from bus to light rail was forecast by the TfNSW Bureau of Transport Statistics using the Public Transport Project Model. Detailed demand and operational modelling has confirmed that the capacity of the CSELR is appropriate.

3.2.5 Parking Issues

- Mitigation measures for loss of parking generally include that they will be subject to implementation of parking management measures to balance supply and demand. Details of the measures are not provided although TfNSW would be working with relevant Councils / key stakeholders to manage kerbside activity.

TfNSW response: There is generally sufficient parking capacity in streets surrounding the light rail alignment to cater for observed demand. In some areas, parking management measures may be required to meet community expectations with respect to parking availability and proximity.

Councils are responsible for managing kerbside access. TfNSW is working with local councils to progress strategies for parking management in the corridor, with a particular focus on high priority uses such as loading zones, disability parking and bus/taxi zones. Additionally, further surveys were undertaken as part of the submission report to better understand the usage of these spaces.

- What evidence is there that there is latent parking supply in various areas? Anecdotal evidence at most locations indicates otherwise.

3.3 City Centre Precinct

3.3.1 Light Rail Operations

- The patronage table for the Central Station stop indicates loadings / unloading less than that for the UNSW stop, which seems to be incorrect given that a significant number of passengers would use the light rail between Central Station and UNSW.

TfNSW response: Passengers travelling to UNSW are expected to access the CSELR from a number of stops in the CBD, not just Central Station (which has the highest level of outbound boardings).

- Figure 9.7 in Volume 1A of the EIS indicates no rail transfers to light rail at any of the CityRail stations in the CBD area, which is unlikely.

TfNSW response: The figure is incorrect and has been corrected in the Submissions Report. Significant interchange is forecast from heavy rail to light rail at Town Hall and Central Station Stops. Patronage forecasting undertaken for the project was developed by TfNSW's Bureau of Transport Statistics using the Public Transport Project Model, which has been calibrated to existing demands using existing extensive surveys and future growth consistent with DP&I projections.

3.3.2 Traffic Operations

- While the major alternative route for north-south traffic through the CBD will focus on the Wentworth / College / Macquarie Street corridor with six travel lanes provided, traffic operations will depend more on intersection capacity at the ends, which hasn't been addressed in detail.

TfNSW response: Intersection capacity of all known changes and assumptions were assessed in the strategic and meso-scopic traffic modelling undertaken and reported in the EIS.

- A dual left-turn is proposed for Campbell Street into George Street southbound but there appears to be restricted swept path width for these movements.

TfNSW response: The proposed single lane turning manoeuvre has been assessed and meets relevant design standards.

- The new southbound configuration for Randle Lane results in relatively sharp left-turn movements off Elizabeth Street (northbound) and into Randle Street (northbound).

TfNSW response: This turning manoeuvre has been assessed and meets relevant design standards.

- The Wilmot Street intersection is proposed to be closed at George Street, yet Wilmot Street is one-way eastbound. It is unclear how vehicles would be able to access Wilmot Street.

TfNSW response: The CSELR project does not propose closing Wilmot Street at George Street. Wilmot Street and Central Street will reverse direction of operation.

- There are minimal details at this stage on how road safety would be maintained within the pedestrianised shared zone along George Street, which includes potential pedestrian interaction with vehicles such as taxis, service vehicles, local access, etc.

TfNSW response: The reference design is well advanced and details for pavement type and delineation are included in the urban design. This will be subject to further design development in association with the relevant approval authorities including the Centre for Road Safety and City of Sydney.

Road safety audits are required to be undertaken at each design stage and approved by the relevant authorities.

Local access will only be permitted in the George Street pedestrianised zone on the southbound track only and only for one block. This includes deliveries and access off street only with only limited space for vehicles to pull over to stop. Stopping on the light rail tracks is prohibited and speed for general traffic in shared spaces is up to 20 km/h. In this context TfNSW and CoS believes that it will be very unattractive for motorists to 'rat run' along George Street and unattractive for taxis to trawl for a fare.

City of Sydney and the operator will monitor the situation and consider what, if any measures for enforcement, is required.

3.3.3 Bus Operations

- During construction, a number of intersections along the proposed eastern CBD bus corridor and within the northern precinct of the CBD have been identified as having a

reduction in level of service. This will affect bus operations in the area yet minimal mitigation measures have been proposed.

TfNSW response: The implementation of the CBD Bus Plan prior to construction commencing on the CSELR is the major mitigation measure proposed. Further detailed planning of the CBD Bus Plan is underway to optimise travel times. This will be supported by a Network Management Plan as previously described.

3.3.4 Pedestrian Issues

- It is unclear whether mid-block pedestrian crossings would be retained in the CBD (along George Street) and how pedestrian movements would be controlled to cross at signalised junctions at ends of blocks.

TfNSW response: The principles for pedestrian crossings in the CBD are as set out below:

- *Mid-block pedestrian crossings would no longer be required within the pedestrianised zone;*
- *Outside of the pedestrianised zone, mid-block crossings would remain;*
- *Pedestrian movements will still be controlled by signals at the end of blocks in the CBD.*

Further design refinement will be undertaken in conjunction with the relevant approval authorities (RMS, Council) requiring typical safety review and approvals processes.

3.3.5 Cyclist Issues

- It is unclear whether a shared path will still be provided along Chalmers Street, adjacent to the Central Station stop, connecting Elizabeth Street to Prince Alfred Park.

TfNSW response: A key change to the CSELR proposal in the Submissions Report is the removal of through traffic from Chalmers Street between Randle Street and Elizabeth Street. This will allow the establishment of a shared space for cyclists, pedestrians and vehicles accessing properties. The footpath to the south of Devonshire Street is proposed to be widened to accommodate a shared path from Prince Alfred Park through to Devonshire Street where cyclists would cross to the east side of the Central Station Stop. Cyclists would travel through the shared space to a dedicated cycle path at the Elizabeth Street intersection leading around to a dedicated cycle crossing in Eddy Avenue.

3.4 Surry Hills Precinct

3.4.1 Traffic Operations

- Cleveland Street is likely to become the major diversion east-west in lieu of Devonshire Street restrictions. However, the assessment does not provide any meaningful mitigation measures and states that the corridor “would require a management plan to be developed to further improve operations”. It is unclear who would prepare this and what timeframe is proposed.

TfNSW response: Devonshire Street is a local distributor for Surry Hills. While some trips may divert to Cleveland Street, the majority of trips will find alternative routes through Surry Hills. Alternative westbound routes for local access in Surry Hills include Foveaux Street, Lansdowne / Belvoir Street and Kippax Street.

- The assessment states that existing right-turn movements for vehicles travelling eastbound along Devonshire Street would be consolidated to Elizabeth Street and Crown Street only – what about the major right-turn into Bourke Street, which runs southbound?

TfNSW response: The right-turn movement from Devonshire Street to Bourke Street remains under the proposed scheme.

- During construction, Devonshire Street is proposed to be closed but the figure on page 174 of CTTMS shows access to properties between Riley and Crown Streets.

TfNSW response: Access to properties is to be provided at all times during construction (through the worksite) along Devonshire Street, unless otherwise agreed by the property owner. In the section between Riley and Crown, access must be provided to Marlborough Lane (north) as there is no alternative access. The details of this access are to be resolved and could occur through the worksite or via a dedicated lane.

3.4.2 Parking Issues

- The significant loss of parking along Devonshire Street is proposed to be met by existing supply within the Surry Hills precinct. While parking may be available in the surrounding area, its proximity to residences and other land uses is likely to increase therefore reducing parking amenity, ie. being able to park near to a destination.

TfNSW response: There is generally sufficient parking capacity in streets surrounding the light rail alignment to cater for observed demand. In some areas, parking management measures may be required to meet community expectations with respect to parking availability and proximity. Councils are responsible for managing kerbside access. TfNSW is working with local councils to progress strategies for parking management in the corridor, with a particular focus on high priority uses such as loading zones, disability parking and bus/taxi zones.

Additionally, further surveys were undertaken as part of the submission report to better understand the usage of these spaces.

- The refined design (PIR) proposes to provide for replacement parking for the Langton Centre. However, this does not seem to be confirmed or committed to as the PIR states that there is "an opportunity to potentially provide up to approximately 30 spaces on the northern side of the alignment of the proposal (accessed via Nobbs Lane). Additionally, up to approximately 10 spaces could be provided to the south of the alignment (accessed via Parkham Lane) adjacent to the new Wimbo Park". It is unclear to what extent this parking will be provided if at all.

3.5 Moore Park Precinct

3.5.1 Traffic Operations

- During construction, the full closure of Lang Road at Anzac Parade for a two week period (night works) with a detour in place may be problematic considering the activity in the general area most nights, eg. The Entertainment Quarter. Staged partial closure should be considered at this location.

TfNSW response: Driver Avenue and Lang Road East are the proposed alternative routes during this period. TMC has agreed to night closures only of Lang Road, which has informed the tender requirements. Details agreed with TMC are as follows:

- Full closures of Lang Road can be undertaken during night works.
- Close Lang Road from Anzac Parade to Driver Avenue.
- Divert westbound traffic on Lang Road via Driver Avenue and Moore Park Road.
- Divert eastbound traffic on Cleveland Street via Anzac Parade, Moore Park Road and Driver Avenue.

No construction works at intersection to be undertaken that may affect Class 1 Events or Class 2 Events at Moore Park precinct.

3.6 Randwick Precinct

3.6.1 Light Rail Operations

- There is a relatively long distance (over 600 m) between the High Street stop (at Wansey Road) and the Belmore Road stop. This results in indirect access to Prince of Wales Hospital and associated facilities. While an additional stop would result in some delay to the route service, the delay would not be dissimilar to any delay due to stopping at the High Street / Avoca Street / Belmore Road signalised junction.

TfNSW response: Stop spacing on High Street is consistent with the stop spacing throughout suburban sections of CSELR and comparable to the Inner West extension. A 600 m spacing would mean even at the furthest point from a stop no-one would have to walk further than 3-4 minutes to a stop. The Prince of Wales Hospital main entrance is located approximately 200 m from the Randwick stop, a short walking distance.

An additional stop in High Street was considered but not taken forward due to the wider significant operational impacts on both general traffic and buses. Furthermore there are engineering constraints (gradient and width) to introducing a stop in High Street. As outlined in the submissions report, the UNSW upper campus stop has been relocated into High Street (from Wansey Road) reducing the distance to the terminus by approximately 100 m.

3.6.2 Traffic Operations

- There is a tight left-turn east into High Street from Wansey Road requiring vehicles to cross the light rail tracks. Similarly, the left-turn from Avoca Street into High Street westbound.

TfNSW response: Where encroachment occurs at intersections, traffic and light rail would be separated by separate phases of traffic signals. Measures developed through the detailed design phase together with enforcement will be applied to deter motorists travelling along the LRT tracks.

- During construction in the Randwick and Kingsford areas, works along Alison Road and Anzac Parade would benefit from being staggered in order to reduce the impact of construction activities. This is because the two routes are alternate routes for each other and by staging works along both at the same time may cause increased impact overall.

TfNSW response: TMC have stated that their preference is to reduce the impacts on the two roads during concurrent works. This however does not mean that works cannot occur concurrently. TMC has outlined a framework of when and how works can occur at the same time. The TMC requirement is as follows: "No long-term reduction in capacity to occur on Anzac Parade from intersection of Todman Avenue north (towards Alison Road) if works are being undertaken on Alison Road at the same time".

- Under the description of UNSW stop (page 5-44 of EIS Volume 1A), assessment states that "a plaza has been identified around the High Street stop with a narrowing of Wansey Road. This concept would require the reduction of the existing traffic along Wansey Road into a one-way configuration". However, Figures 5.31 and 5.32 show two-way flow on Wansey Road.

TfNSW response: The configuration of Wansey Road has been modified in the Submissions Report in response to community feedback. Wansey Road is proposed to be one-way between Alison Road and Arthur Street with a parking lane. The section of Wansey Road between High Street and Arthur Street (adjacent to the station) is retained as 2-way operation without parking.

- The PIR proposes to amend the innermost westbound lane of Alison Road at the John Street junction to operate as a shared through and right turn lane with right-turn available for buses only and an alternative general traffic route via Prince and King Streets to access John Street. The shared through and right turn lane is undesirable from a road safety viewpoint. Also the reduction in westbound Alison Road lane capacity caused by buses waiting to turn right (blocking a through lane) may be problematic. There is no commentary or analysis on this.
- The PIR proposes to amend Wansey Road to southbound travel only between Randwick Racecourse Gate 10 and Arthur Street. In assessing this change, the PIR states that *"the small volumes of traffic that would be diverted onto the surrounding road network as a result of the removal of the northbound traffic lane as presented in the EIS would be able to be accommodated with minimal adverse impact"*. However, there is no commentary on which alternative routes they may take, which are likely to be via the local road network, eg. Botany Street.

3.6.3 Parking Issues

- There are inadequate mitigation measures proposed to address the impact of the loss of significant numbers of parking spaces in the south-east section, eg. greater than 300 spaces removed in Randwick, 297 spaces in Kingsford, 173 spaces in UNSW precinct. For example, parking management measures have been proposed to balance supply and demand and resident parking schemes are proposed to be extended. However, this is likely to result in loss of parking amenity for significant numbers of people, ie. having to park further from residences, shops, etc. Moreover, these areas generally have a high utilisation of existing parking supply, especially around UNSW Campus.

TfNSW response: There is generally sufficient parking capacity in streets surrounding the light rail alignment to cater for observed demand. In some areas, parking management measures may be required to meet community expectations with respect to parking availability and proximity. Councils are responsible for managing kerbside access. TfNSW is working with local councils to progress strategies for parking management in the corridor, with a particular focus on high priority uses such as loading zones, disability parking and bus/taxi zones.

Additionally, further surveys were undertaken as part of the submission report to better understand the usage of these spaces.

- There do not appear to be any 'kiss'n'ride' facilities proposed at the Randwick stop, which is at the end of the line. This may capture residential areas to the south of the station in particular.

TfNSW response: Light rail is proposed as a walk-up service, with appropriate provision for high quality interchange between other access modes such as bus, rail and ferry. Key stops including termini will also include bike'n'ride facilities.

'Kiss'n'ride' provision is currently under consideration as a part of the kerb access planning being developed by RCC with TfNSW input.

3.6.4 Cyclist Issues

- The existing shared path along the western side of Wansey Road appears to be removed due to the two stops at either end of the street.

TfNSW response: A shared path will be provided along the length of Wansey Road to replace the existing facility.

3.7 Kensington & Kingsford Precinct

3.7.1 Light Rail Operations

- The light rail service is likely to provide only approximately 10 services per hour to the UNSW Campus (based on the highest service number of 20 per hour), which equates to some 3,000 passengers. This is likely to be inadequate for a campus with such a large population and will need to be complemented by existing express bus services, although these are proposed to be replaced entirely by the CSELR.

TfNSW response: The UNSW campus will be served by both branches of the CSELR. Therefore, they will receive 20 services per hour, per direction, at opening. This provides a capacity of 6,000 passengers per hour per direction, i.e. total 12,000 passengers. The existing level of peak hour demand from Central Station is approximately 2000 passengers.

The project is easily scalable for peaks in demand with the potential to increase service frequency to both lines. Longer term strategies are available to increase capacity by 100% over day one services. It is worth noting that the UNSW demand profile is less concentrated than for the typical weekday peak period travel. Also, that the direction of the demand for the UNSW is largely contra peak.

3.7.2 Traffic Operations

- There is proposed to be a significant restriction on right-turns off Anzac Parade northbound in the Kingsford / UNSW area – currently nine right-turns reduced to only three right-turns. However there has been minimal discussion on the affect of this on the local road network operations, redistribution of traffic, alternate routes, rat-runs and illegal manoeuvres, etc.

TfNSW response: The rationalisation of right-turns has been developed in close consultation with RMS and RCC. This has been modelled within the Aimsun network model and SIDRA intersection models, and has not shown any areas of significant concern.

RMS and the councils will continue to review potential wider network impacts as a result of the implementation of the CSELR and develop appropriate solutions through the NMP.

- There are potential road safety issues along Anzac Parade where the light rail line proposes to divert from its centre alignment to the eastern kerb at the UNSW stop and then back to the centre alignment (between High Street and UNSW Mall. This increases conflict points between light rail and road vehicles and creates potential road safety issues.

TfNSW response: The deviation of the CSELR from the centre of Anzac Parade no longer forms part of the project. This is outlined in the Submissions Report.

- The two-stage transition for the light rail from running along the eastern side of Anzac Parade across the Alison Road intersection to a central alignment seems to not yet be resolved and lacking in detail.

TfNSW response: Detailed micro-simulation of the two-stage transition has informed the reference scheme. TfNSW and RMS are satisfied with the performance of this intersection. The micro-simulation showed an improvement in intersection performance in the preferred design over the existing situation.

- The layout of the Nine-Ways intersection (Kingsford) from roundabout to signalisation is unclear, especially from the viewpoint of the right-turn restrictions across the light rail tracks.

TfNSW response: The Nine-Ways signalisation has been developed in partnership with RMS and RCC. This has been further refined in the reference design and Submissions Report. The following right-turn restrictions are proposed:

- Gardeners Road to Anzac Parade South
- Anzac Parade to Rainbow Street East

Detailed micro-simulation modelling of this arrangement together with the surrounding road network was undertaken. RMS and TfNSW are satisfied with the performance in the intersection. This scheme will be refined through detailed design following the appointment of the successful consortia.

- There is minimal discussion on alternate routes and impacts of the right-turn restriction from Gardeners Road to Anzac Parade (southbound) at Kingsford.

TfNSW response: The proposed route for this movement will be via Sturt Street, south of the interchange facility. This has been included in the micro-simulation modelling of the Nine-Ways intersection.

- During construction in the Randwick and Kingsford areas, works along Alison Road and Anzac Parade would benefit from being staggered in order to reduce the impact of construction activities. This is because the two routes are alternate routes for each other and by staging works along both at the same time may cause increased impact overall.

TfNSW response: TMC have stated that their preference is to reduce the impacts on the two roads during concurrent works. This however does not mean that works cannot occur concurrently. TMC has outlined a framework of when and how works can occur at the same time. The TMC requirement is as follows: "No long-term reduction in capacity to occur on Anzac Parade from intersection of Todman Avenue north (towards Alison Road) if works are being undertaken on Alison Road at the same time".

3.7.3 Parking Issues

- There are inadequate mitigation measures proposed to address the impact of the loss of significant numbers of parking spaces in the south-east section, eg. greater than 300 spaces removed in Randwick, 297 spaces in Kingsford, 173 spaces in UNSW precinct. For example, parking management measures have been proposed to balance supply and demand and resident parking schemes are proposed to be extended. However, this is likely to result in loss of parking amenity for significant numbers of people, ie. having to park further from residences, shops, etc. Moreover, these areas generally have a high utilisation of existing parking supply, especially around UNSW Campus.

TfNSW response: There is generally sufficient parking capacity in streets surrounding the light rail alignment to cater for observed demand. In some areas, parking management measures may be required to meet community expectations with respect to parking availability and proximity. Councils are responsible for managing kerbside access. TfNSW is working with local councils to progress strategies for parking management in the corridor, with a particular focus on high priority uses such as loading zones, disability parking and bus/taxi zones.

Additionally, further surveys were undertaken as part of the submission report to better understand the usage of these spaces.

3.8 Project-Wide Construction Phase Issues

- During construction, a worst case scenario has been identified of 210,000 tonnes of material to be exported off-site with a best case scenario of 142,000 tonnes to be exported based on 68,000 tonnes being able to be re-used. However, for the worst case scenario, it appears that only the export of material has been considered in haul

movements when an additional 68,000 tonnes of fill material would need to be imported also.

TfNSW response: The number of haul movements identified is the best estimate based on the information presented in Project Definition Design. The actual percentage split of exported and re-used material will be determined during the detailed design phase (this will include further geotechnical assessments). These volumes and number of trucks would be identified in the Construction Traffic Management Plan(s).

- During construction, heavy vehicle movements have been identified for each compound in isolation. Cumulative movements along particular routes have not been assessed even though it is likely that multiple work sites would operate simultaneously.

TfNSW response: Construction compounds will operate simultaneously during works. The number of compounds along the route is spread across the project and cumulative impacts on particular routes are unlikely to be significant in the context of total traffic volumes.

- During construction the proposal to provide employee parking in long-term leased parking spaces is undesirable and would lead to increased traffic generation into the CBD area.

TfNSW response: This is one option to provide employee parking in the CBD where workers need to bring equipment. No special dispensation in terms of site parking will be provided in the CBD.

3.9 Summary of Submissions

A total of 487 submissions were received from the general community, agencies and government authorities. This comprised some 13 submissions from government and agencies and 474 'community' submissions.

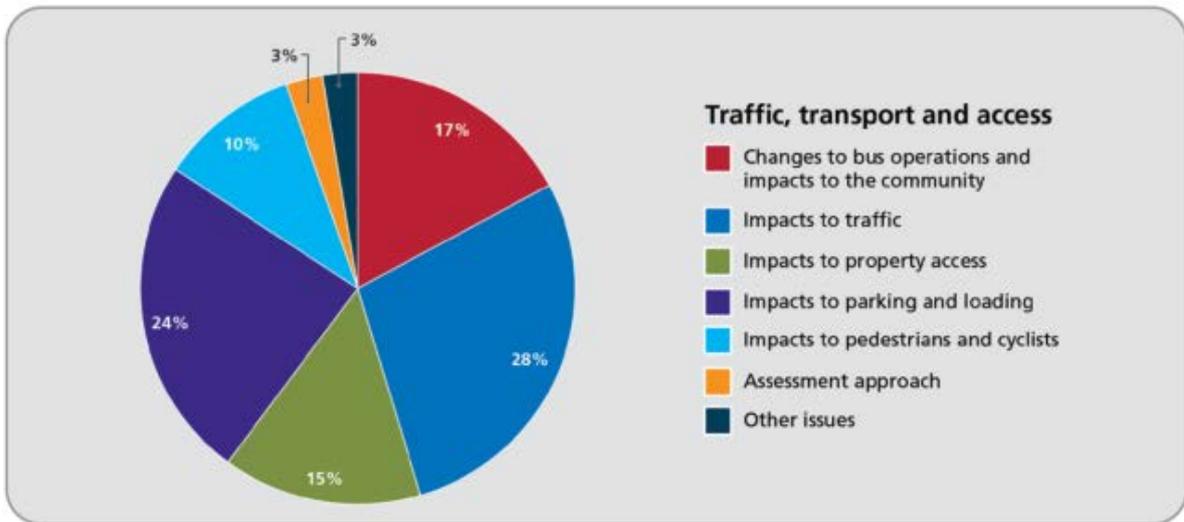
'Traffic, transport and access' was a key issue in 58% of the submissions received (274 submissions). This issue was broken down into the following sub-issues:

- Future changes and direct impacts to bus routes and services, particularly in the south-eastern suburbs
- Accessibility of the CSELR to other public transport services, particularly interchanging with bus services
- Impacts of CSELR use on special events
- Operational traffic impacts including general traffic network operations and access to properties.
- Road safety including light rail interaction with general vehicles, pedestrians, cyclists and other road users.
- Impacts to parking and kerbside activities, eg. loading, special uses.
- Vehicle access within the George Street pedestrian zone
- Pedestrian and cyclist impacts including accessibility to stations and CSELR services
- Light rail vehicle and/or general vehicle breakdowns and other emergencies / incidents along the CSELR network
- Disruptions to access for emergency services vehicles
- Construction impacts project-wide but also specifically within Sydney CBD area,

including general traffic impacts, property access, parking, unloading, pedestrian and cyclist impacts.

- Cumulative construction-related transport impacts

The proportion of sub-issues within the 'traffic, transport and access' key issue is shown in the following figure.



Source: Parsons Brinckerhoff "CBD and South East Light Rail Project Submissions Report"

4. Conclusions & Recommendations

4.1 Conclusions

The following conclusions are provided in the peer review of the proposed Project's traffic and transport assessment:

- While the assessment has generally addressed the most relevant traffic and transport issues, the level of detail provided in some aspects of the Project's planning and design development is considered to be inappropriate to enable a full understanding and meaningful assessment of the Project's impacts. The areas of greatest concern include:
 - Details of the comprehensive governance structure that is proposed to be established to manage and approve the Construction Traffic Management Plans and grant road occupancy licenses to undertake the work.
 - Finalisation of the CSELR Network Management Plan.
 - Finalisation of the CBD Bus Plan.
 - Ongoing micro and macro-simulation modelling and the effects of any changes on other parts of the road network including impacts of cumulative activities during construction and operations.
 - Details of parking strategies and kerbside access, especially in the Kingsford precinct and including 'kiss'n'ride' facilities and parking at the Langton Centre.
 - Details of monitoring and enforcement of the pedestrianised zones along George Street and Chalmers Street.
 - Council's development of LATM programs to address local road network traffic changes and impacts.
 - The significant level of control and/or risk transferred to Councils and RMS, including the CBD TT&ACC, TMC, etc.
- Significant Project areas are proposed to be resolved at a later stage during detailed design development, which in some cases is to be undertaken in conjunction with government authorities (eg. RMS and/or Councils) and in other cases left to others.
- The relatively high number and source of submissions related to 'traffic, transport and access' reflects the lack of detail in the planning and design of the Project and its partial reliance on downstream project development.

4.2 Recommendations

Due to the concept nature of some of the Project's design development and with further detailed design development to be undertaken at a later date, a number of Conditions of Consent and/or commitments would be required by the proponent to appropriately determine final impacts and provide suitable mitigation measures.

The following Draft Conditions of Consent or commitments from the proponent are recommended:

1. Prior to Project construction, the preparation of a Construction Traffic Management Plan (CTMP) would need to be undertaken by the chosen contractor in consultation with, and to the satisfaction of relevant local councils and RMS. The overall Project CTMP should be separated and prepared on a precinct-by-precinct or work zone basis as well as account for any cumulative activities / work zones operating simultaneously.

The CTMP would need to be either a Condition of Consent or included within the Statement of Commitments.

2. Prior to Project implementation, detailed impacts of potential changed traffic patterns and operations need to be determined and appropriate detailed upgrade measures identified to the satisfaction of RMS at, but not limited to, the following locations:

- Cleveland Street (diversion route in lieu of Devonshire Street restrictions).
- Alison Road / Anzac Parade / Dacey Avenue junction (due to the non-resolution of the two-stage crossing for the light rail).
- Alison Road (westbound combined through and right-turn lane) at John Street.
- Alison Road junction at Botany Street (mainly due to local traffic redistribution caused by the northern one-way section of Wansey Road).
- Belmore Road / Avoca Street junction (due to continuing design development).
- Nine-Ways signalisation (due to continuing design development).

Any further micro and macro-simulation modelling, as required to progress the design and development of the Project and its potential impacts at, but not limited to, the above locations, is to be undertaken to the satisfaction of RMS.

As part of the above design development and prior to Project implementation, the further resolution and finalisation of the CSELR Network Management Plan (NMP) and CBD Bus Plan is to be undertaken to satisfaction of RMS and Councils.

3. Prior to Project implementation, Road Rules will need to be reviewed with respect to light rail operations within and across existing road corridors.
4. Independent road safety audits are to be undertaken for all stages of further design development. Any issues identified by the audits will need to be closed out to the satisfaction of the relevant authorities including RMS and/or Councils.
5. Prior to Project implementation, detailed parking strategies including kerbside access need to be detailed by the proponent in conjunction with, and to the satisfaction of RMS (with respect to potentially increasing parking supply by assessing changes to clearways) and/or relevant Councils. Moreover, parking

strategies are required to follow policies proposed in *Table 6.1* and *Figure 6.1* of the Transport Operations Report.

6. The proponent is to provide for replacement parking at the Langton Centre consisting of 30 parking spaces on the northern side of the light rail alignment (to be accessed via Nobbs Lane) and 10 parking spaces to the south of the light rail alignment (to be accessed via Parkham Lane) adjacent to the new Wimbo Park.
7. Prior to Project implementation, the provision of 'kiss'n'ride' facilities at the Randwick and Kingsford (Nine-Ways) terminus stations needs to be determined and developed to the satisfaction of Randwick City Council.
8. Prior to Project implementation, monitoring and enforcement of local access within the George Street and Chalmers Street pedestrianised zones will need to be resolved by CoS and the operator.
9. The provision of a shared pedestrianised zone along Chalmers Street incorporating cyclist travel is inconsistent with the CoS development agreement, which stipulates a dedicated cycle-only path. This may need to be conditioned for the proponent to re-design or negotiated out of the development agreement to the satisfaction of CoS.