WESTCONNEX M4-M5 LINK EIS

PEER REVIEW OF TRAFFIC AND TRANSPORT ASSESSMENT AND ACTIVE TRANSPORT ASSESSMENT

FOR

DEPARTMENT OF PLANNING AND ENVIRONMENT

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EXECUTIVE SUMMARY

Context

The WestConnex M4-M5 Link is being proposed by New South Wales Roads and Maritime Services (the 'Proponent') under Part 5 of the *Environmental Planning and Assessment Act 1979* and has prepared an Environmental Impact Statement (EIS) for the project. Bitzios Consulting has been commissioned by the Department of Planning and Environment to undertake a Peer Review of the Traffic and Transport assessment (including the Active Transport assessment) within the EIS. This review has considered the operational period and construction period impact assessments in view of the Secretary's Environmental Assessment Requirements (SEARS) dated 3rd May 2017.

Methodologies

The EIS makes use of the WestConnex Regional Traffic Model (WRTM) Version 2.3 and microsimulation traffic models for the Wattle Street interchange area, Rozelle interchange area and the St Peters interchange area. These models are considered appropriate for the mix of broader network assessment and localised impact assessments near interchanges however it is noted that:

- the WRTM is a demand-based model and its forecast future year traffic demands are well in excess of the network's practical capacity; and
- the base year calibration and validation performance of the microsimulation models has not been documented in the EIS in order to understand their strengths and weaknesses when interpreting the project case modelling outputs from these models. RMS has subsequently provided the model calibration and validation reports to the reviewer for consideration in this review report.

The benefits assessment for the project has been based on the WRTM which may tend to overstate the congestion levels in the future base case and hence overstate the congestion-reduction benefits of the project. Notwithstanding these limitations, the WRTM is the most appropriate available modelling tool for the benefits assessment. Augmenting its outputs with the microsimulation modelling outputs would better represent the performance differences between the base and project cases.

Operational Period Impacts

The operational period modelling considered 'link-based' Levels of Service (LoS) on the M4 East, the New M5 and on the M4-M5 Link as well as the intersection performance LoS within the three interchange areas using outputs from the microsimulation models. Whilst the process is appropriate, the level of detail provided from the microsimulation model is insufficient to completely understand pinch point effects and queuing patterns and how they influence the results.

The key unresolved questions from the review of the operational period modelling and assessment include:

- How the intersection of Frederick Street/Parramatta Road/Wattle Street performs with the project and how impacts at this location can be managed?
- The extent of effects of queuing back from the Sydney CBD into Anzac Bridge and into the proposed Rozelle interchange and what are the consequential impacts on non-CBD movements, and how could they be mitigated?
- How to reasonably assess the potential impacts and benefits in the St Peters area without implementing other upgrade projects as part of the base case, or further reducing assumed traffic growth.

Cumulative impacts have been appropriately assessed as have staged opening considerations.

Construction Period Impacts

The assessment of construction period impacts is generally 'high level' with a general deferral of management strategies and plans to more detailed construction traffic management plans which would follow in the design and construction phases. Some more detailed assessments of potential 'hot spots' have been included in the Proponent's responses to submissions. There would have benefits in also providing typical or standard treatments to manage the interfaces between active transport and construction traffic at crossing points or where lane narrowing is likely.

For example, specific 'hot spots' which would have been worthy of more detailed consideration and specific mitigation measures in the EIS include:

- the congestion and delay effects of heavy vehicles at the Wattle Street/Parramatta Road/Frederick Street intersection;
- the delays and queuing for general traffic on City West Link south of and through the Rozelle interchange works area; and
- the very long route diversion for pedestrians and cyclists south of Victoria Road at the Iron Cove Link construction site.

Conclusions

The M4-M5 Link EIS has generally covered the SEARs related to Traffic and Transport, including Active Transport. Further detail could have been provided regarding forecast delays and queuing patterns expected from the simulation models to understand the flow on-impacts and the sensitivity of key assumptions. Further details could also have been added as how to better manage construction period impacts at key construction 'hot spots' along City West Link and within the Wattle Street interchange.

Key conclusions regarding the content of the EIS are summarised below:

- The EIS could have considered augmenting the network-wide travel time benefits calculations with the microsimulation modelling results for the areas in the WRTM covered by the microsimulation models;
- Further evidence could have been provided regarding actual and modelled intersection traffic volumes and delay comparisons for each peak period to verify the suitability of the calibrated/validated models as the basis for future year assessments;
- Further information could have been provided in the EIS on how to interpret year 2033 traffic volumes from the WRTM as idealised 'demand' flows, not flows that would, in all probability, actually be realised;
- The EIS could have included statistics on public transport person trips, public transport person-kilometres travelled and public transport person-hours travelled with and without the project for each modelled scenario to allow for interpretation of the impacts on public transport patronage as required under SEARs item 2(d);
- The M4-M5 Link mid-block LoS assessment for the Anzac Bridge interface point with and without the project in 2033 could have been reported;
- Further, more specific details, or at least typical examples of management measures, to mitigate construction period intersection impacts, site access impacts and local parking management impacts could have been provided;
- The EIS could have included more specific management measures for the impacted intersections along Wattle Street and along Dolbroyd Parade; and
- The EIS could have considered documenting examples of active transport/construction traffic interface management measures as a suite of typical treatments to apply in a future CTAMP.

Recommended Conditions

Should the project be approved, suggested conditions to be attached to the approval are listed below:

- Re-evaluate the need for upgrades to the Parramatta Road/Wattle Street/Frederick Street intersection to mitigate the operational period impacts expected under the 'cumulative' scenario traffic volumes and include these upgrade works as part of the project;
- Identify specific traffic management measures to ensure that queues back from the Anzac Bridge into the project do not extend to a location where they block non-CBD traffic movements at the Rozelle interchange and include these measures as part of the project;
- Undertake a St Peters to Sydney Airport traffic study to identify projects to capitalise on the opportunities and mitigate the impacts of the M4-M5 Link;
- Prepare a contingency strategy as part of the CTAMP should the M4 East and New M5 tunnels not be open in time to cater for M4-M5 Link haul trucks when the project commences its excavation works;
- Provide specific details regarding the extents and nature of local traffic and parking impacts generated by each construction site by time of day and day of week in the CTAMP, as well as the associated specific management measures to address these impacts;
- Include specific mitigation measures for the local parking impacts on Lilyfield Road within the CTAMP;
- Include an on-street parking management strategy for the residential streets south of Victoria Road near the Iron Cove Link construction site in consultation with Council as part of the CTAMP;
- Include a risk assessment within the CTAMP for areas where lane narrowing and roadside barriers may impact on cyclists;
- On-demand shuttle buses be provided for access between Site C11 and nearby construction sites; and
- Assess the impacts of The Crescent/James Craig Road intersection together in the same model with the intersection of The Crescent/City West Link and The Crescent / Victoria Road as part of preparing the CTAMP for this area. Through movement minimum and maximum phase times for these intersections are not to be adjusted to favour construction site vehicle departures.

1. INTRODUCTION

1.1 BACKGROUND

The WestConnex M4-M5 Link is part of the WestConnex program of works which includes:

- the M4 widening, which has been constructed and is open to traffic;
- the King Georges Road Interchange Upgrade, which has been constructed and is open to traffic;
- the M4 East, which is under construction; and
- the New M5, which is under construction.

These project elements are shown schematically in Figure 1.1. The M4-M5 Link provides a direct connection between the M4 East and the New M5, opening a range of travel markets to using all three pieces of infrastructure for connecting across southern and south-western Sydney whilst also providing access to existing and proposed future Harbour crossings.

NSW Road and Maritime Services (Roads and Maritime) is the proponent for the WestConnex M4-M5 Link project and is seeking approval to construct and operate it. This approval is being sought under Part 5.1 of the *Environmental Planning and Assessment Act 1979*. The NSW Minister for Planning has been requested to declare the project to be State Significant Infrastructure and an Environmental Impact Statement (EIS) has been prepared, dated August 2017.

1.2 SCOPE AND LIMITATIONS

This report provides an independent peer review of the Traffic and Transport Assessment and the Active Transport Assessment undertaken as part of the WestConnex M4-M5 Link EIS. The parts of the EIS on which this review has focussed were:

- Volume 1, Chapter 5: Project description;
- Volume 1, parts of Chapter 6, Construction work, relevant to traffic and transport needs and impacts;
- Volume 1, Chapter 8: Traffic and transport;
- Volume 1, Chapter 29: Summary of environmental management measures (relevant to traffic and transport aspects);
- Volume 2B, Appendix B: Secretary's Environmental Assessment Requirements (SEARs) checklist;
- Volume 2B, Appendix H: Technical working paper: Traffic and transport; and
- Volume 2B, Appendix N: Technical working paper: Active transport strategy.

This peer review report is structured as follows:

- Chapter 2 provides a description of the project to provide the context for the following chapters;
- Chapter 3 reviews the assessment methodologies, key assumptions and breadth and depth of coverage of each issue;
- Chapter 4 reviews the description of the existing road network performance;
- Chapter 5 reviews the traffic and transport impacts with the project in its operational phase and considering the management measures proposed;
- Chapter 6 reviews the construction period impacts and management measures for traffic and transport;
- Chapter 7 reviews the Submissions and Preferred Infrastructure Report;
- Chapter 8 reviews the key issues in the submissions received and how they were responded to; and
- Chapter 9 provides conclusions and recommended conditions for consideration by the Department of Planning in preparing its response to the EIS.

This review is on the basis that WestConnex project stages 1 and 2 are approved and will be implemented as proposed. It should be highlighted that this review has not included detailed verification of transport models although some reasonableness checks of published outputs have been completed based on site investigations and local knowledge of prevailing traffic patterns and conditions. Furthermore, this review has assumed that the construction methodologies and construction period traffic estimates are reasonable and has focussed on the documentation of the impacts on traffic, public transport, pedestrians and cyclists during the construction period.

Source: WestConnex M4-M5 Link, Technical working paper: Traffic and transport

Figure 1.1: Overview of WestConnex and Related Projects

1.3 SEARs

The Secretary's Environmental Assessment Requirements (SEARs, 3 May 2017) lists out the impacts which the EIS must address. The requirements relevant to traffic and transport and active transport considerations are:

- *The Proponent must assess construction transport and traffic (vehicle, pedestrian and cyclists) impacts, including, but not necessarily limited to:*
  - *(a) a considered approach to route identification and scheduling of transport movements, particularly outside standard construction hours;*
  - *(b) the number, frequency and size of construction related vehicles (passenger, commercial and heavy vehicles, including spoil management movements);*
  - *(c) construction worker parking;*
  - *(d) the nature of existing traffic (types and number of movements) on construction access routes (including consideration of peak traffic times and sensitive road users and parking arrangements);*
  - *(e) access constraints and impacts on public transport, pedestrians and cyclists;*
  - *(f) the need to close, divert or otherwise reconfigure elements of the road, cycle and pedestrian network associated with construction of the project. Where the closure, diversion or reconfiguration are temporary, provide an estimate of the duration of the altered access arrangements; and*
  - *(g) the cumulative traffic impacts of other key infrastructure projects preparing for or commencing construction, including but not limited to other stages of WestConnex.*
- *The Proponent must model and/or assess the operational transport impacts of the project including, but not necessarily limited to:*
  - *(a) forecast travel demand and traffic volumes (expressed in terms of total numbers and heavy and light vehicle numbers) for the project and the surrounding road, cycle and public transport network, including potential shifts of traffic movements on alternate routes outside the proposal area (such as toll avoidance) and impact of permanent street closures directly attributable to the SSI;*
  - *(b) travel time analysis;*
  - *(c) performance of key interchanges and intersections by undertaking a level of service analysis at key locations, for peak periods;*
  - *(d) wider transport interactions (local and regional roads, cycling, public and freight transport), taking into account the Sydney City Centre Access Strategy, planned future urban release areas such as the Bays Precinct and planned future port activities and uses;*
  - *(e) the redistribution of traffic and impacts on traffic volumes and levels of service on the road network resulting from changes to the design of the M4-M5 Link as modelled in the traffic assessments for the M4 East and New M5 projects;*
  - *(f) induced traffic and operational implications for existing and proposed public transport (particularly with respect to strategic bus corridors and bus routes and permanent closure/relocation of bus stops) and consideration of opportunities to improve public transport;*
  - *(g) impacts on cyclists and pedestrian access and safety, including on known routes and future proposals such as along Lilyfield Road;*
  - *(h) opportunities to integrate cycling and pedestrian elements with surrounding networks and within the project; and*
  - *(i) property and business access and on street parking.*
- *The assessment must provide an explanation for the scope of the modelled area, including justification of the nominated boundaries.*

Whist providing a broad review of traffic and transport impacts, this peer review report pays particular attention as to whether the SEARs have been adequately met in the EIS.

2. PROJECT DESCRIPTION

2.1 OVERVIEW

The assessment of the impacts of the WestConnex M4-M5 link (*the project*) are at two geographical levels which align with the two levels of traffic modelling undertaken for the project.

At the 'strategic' level, the project provides connections between the M4 East at the Wattle Street interchange and the New M5 at the St Peters interchange, with connections to the surface road system at Rozelle and near the Iron Cove Bridge. Between these locations, the M4-M5 Link comprises of underground twin-tunnels able to accommodate up to four traffic lanes in each direction. The strategic, network-wide impacts of the project are related to how it changes the volume and pattern of traffic by re-assigning traffic demands away from the surface road network, including how it reduces travel times for a number of origin-to-destination movements. These impacts have been assessed using the WestConnex Road Traffic Model Version 2.3 (WRTM v2.3).

The project is proposed to be constructed and opened to traffic in stages, generally as follows:

- Stage 1: between the Wattle Street interchange and St Peters Interchange, with two traffic lanes in each tunnel/direction of travel and expected to open in 2022; and
- Stage 2: the Rozelle Interchange and the Iron Cove Link (as well as connections to the proposed future Western Harbour Tunnel and Beaches Link project), with up to four traffic lanes in each direction operational in 2023 when this stage is expected to be open to traffic.

The majority of the traffic and transport impacts, including the active transport impacts introduced by the project, are localised in the areas surrounding where the project connects to the surface road system. These areas are the primary focus of this peer review.

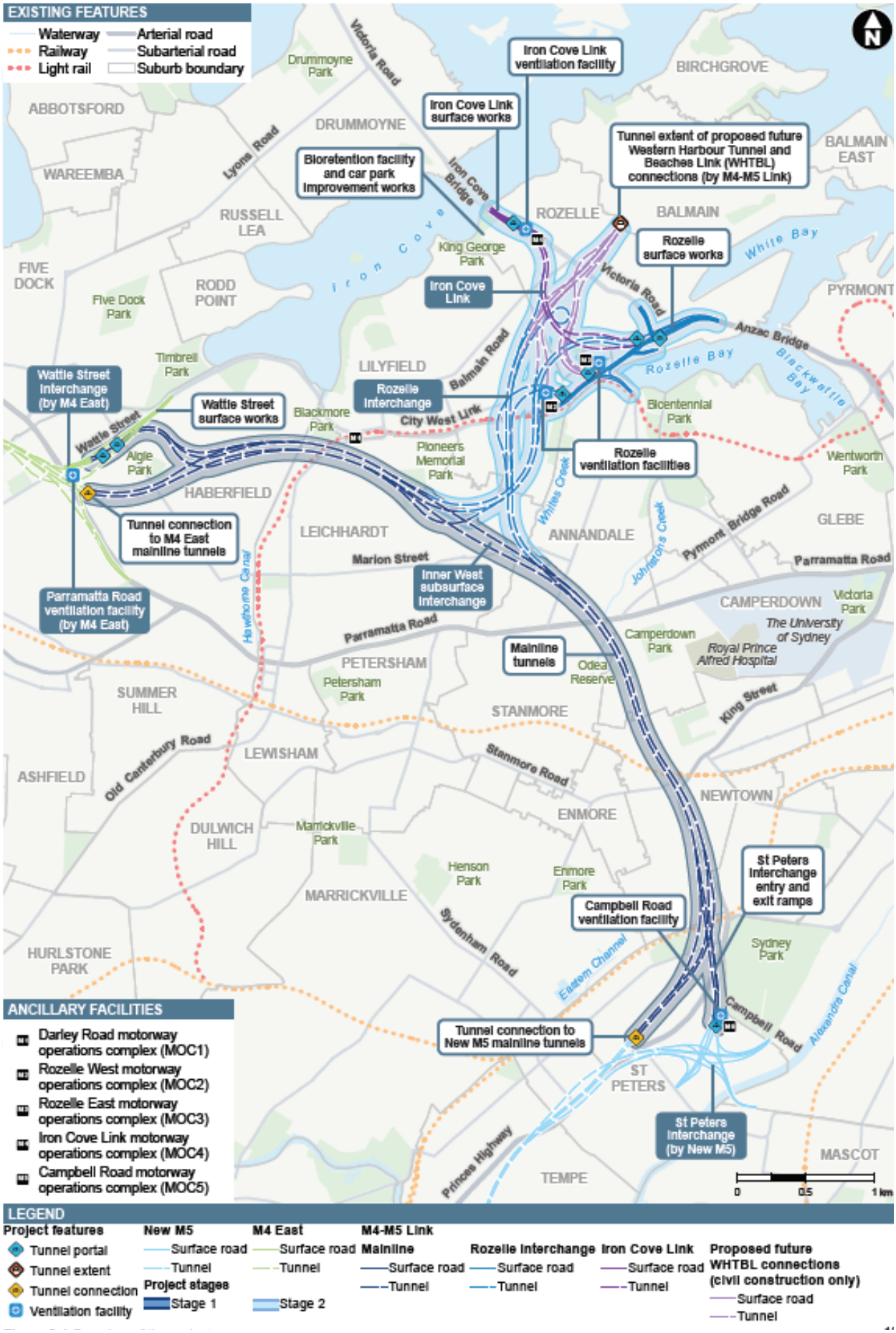
Figure 2.1 shows the Stage 1 and Stage 2 works proposed along with the proposed connections to adjoining projects and surface roads.

2.2 KEY INTERFACE AREAS

The key interface areas with the surface road network are:

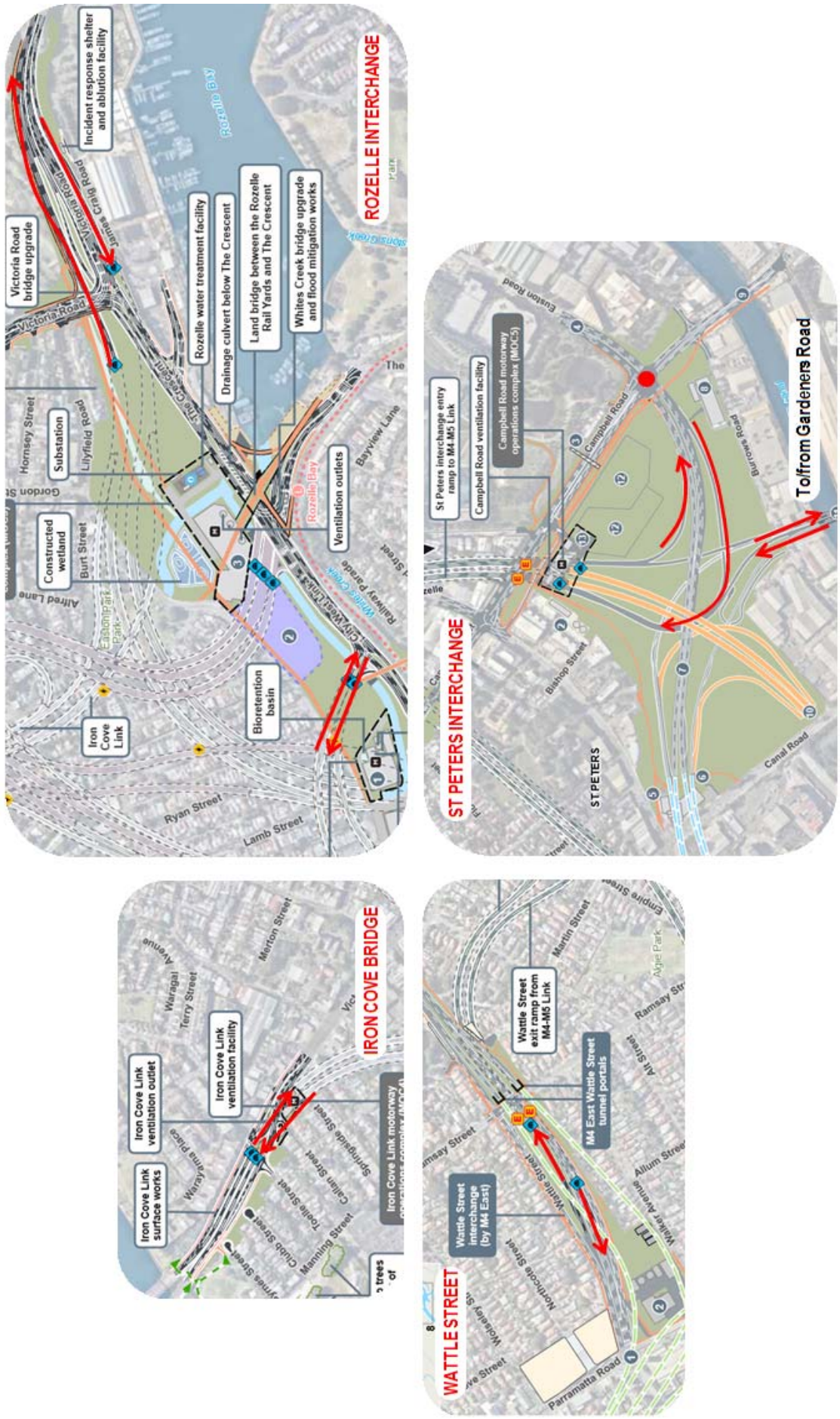
- at the Wattle Street interchange: with ramps that connect to/from Wattle Street (in addition to the M4 East ramps which connect to/from Dobroyd Parade);
- at the St Peters Interchange: with an entry ramp from Campbell Street eastbound with connections also to/from Campbell Road and to/from Euston Road (via the Euston Road/Campbell Road intersection) and connections to/from Gardeners Road;
- at the Rozelle Interchange: At an intersection with City-West Link south of The Crescent for connection to the M4-M5 to/from the south (only) and ramp connections to/from the Anzac bridge for connection to the M4-M5 to/from the west (only); and
- near the Iron Cove Bridge: with access between the M4-M5 Link and the bridge.

The key interface areas and the above connections are summarised in Figure 2.2.



Source: WestConnex M4-M5 Link, Technical working paper: Traffic and transport

Figure 2.1: Project Staging and Key Connections



Source: WestConnex M4-M5 Link, Technical working paper: Traffic and transport

Figure 2.2: Key Interface Areas and Surface Connections

2.3 SURFACE WORKS BY INTERFACE AREA

2.3.1 Wattle Street Area

Ramp connections between the M4-M5 Link and Wattle Street will allow traffic to connect between the M4-M5 Link and Parramatta Road at its intersection with Wattle Street. Some surface roadworks are proposed to integrate the ramps into the Wattle Street interchange which is being constructed as part of the M4 East project. An additional right turn lane from Wattle Street (originating from the M4-M5 ramp exit) is proposed to be added to the Wattle Street intersection with Parramatta Road.

2.3.2 St Peters Interchange Area

The St Peters Interchange is being constructed as part of the New M5 project with the new ramp connections to the M4-M5 link constructed under that project. The impacts on the surface road system associated with the opening of the M4-M5 Link are therefore mostly associated with new traffic movements introduced at nearby intersections when the M4-M5 Link is open to traffic and construction works associated with the mainline tunnel before that.

2.3.3 Rozelle Interchange Area

The Rozelle Interchange area includes multiple connections to the M4-M5 link and makes allowances for future connections to the proposed future Western Harbour Tunnel. These connections involve significant surface works along City West Link and its intersections including at The Crescent and at its Victoria Road intersection. These works are summarised in Figure 2.3.

A new signalised intersection is proposed approximately 300m south of the realigned intersection of The Crescent with City West Link. This new intersection provides access to entry and exit ramps from the M4-M5 Link for movements to/from the south towards the St Peters Interchange. A new pedestrian and cyclist bridge across City West Link is also proposed across the southern leg of this intersection. The signalised 'T' intersection of the The Crescent with City West Link is also planned to be upgraded and realigned whilst allowing for a fourth leg to be added in the future for access to ramps to/from the proposed Western Harbour Tunnel and Beaches Link. These upgrades are extended further to the James Craig Road and City West Link intersection which is also widened as is the Victoria Road / City West Link intersection. The pedestrian bridge to the east of this intersection is replaced with a new pedestrian/cyclist underpass as part of these works.

Further to the north-east, the ramps from the M4-M5 Link connect to the Western Distributor, west of the Anzac Bridge, along with other ramps. In the city-bound direction, there are three lanes from the M4-M5 Link/Iron Cove Link plus two lanes from City West Link plus two lanes from Victoria Road merging into the four lanes on the Western Distributor. In the outbound direction, the four lanes on the Western Distributor expand to two lanes towards the M-M5 Link / Iron Cove Link, three lanes to City West Link and three lanes to Victoria Road.

2.3.4 Iron Cove Bridge Area

The Iron Cove Link provides direct connections to and from the Iron Cove Bridge, essentially allowing traffic on the bridge to bypass Victoria Road to connect to the Western Distributor (and vice versa) as well as providing a direct connection to/from the M4-M5 link for access to/from the M4 East and New M5 as well. The surface works at the western end of the Iron Cove Link predominantly include the closure or reconfiguration of side street intersections on Victoria Road between Callan Street and the Iron Cove Bridge, as well as new pedestrian crossings across the Victoria Road corridor.

Source: WestConnex M4-M5 Link, Technical working paper: Traffic and transport

Figure 2.3: Rozelle Interchange-Related Surface Works

2.4 STAGING AND CUMULATIVE IMPACT CONSIDERATIONS

2.4.1 Staging

The M4-M5 Link will be constructed and opened in two stages. When Stage 1 is open, traffic will be able to travel between the Wattle Street Interchange and the St Peters Interchange attracting a range of cross-Sydney trips between the M4 and M5 corridors. The full benefits of the M4-M5 Link will not be realised until the Iron Cove Link and Rozelle Interchange works are completed in Stage 2 and CBD and north of the CBD travel markets are better catered for with motorway connections. There is only one year expected between the opening of Stages 1 and 2. The impacts associated with Stage 1 are expected to be a subset of the scale of impacts expected under Stage 2. That is, the volume of traffic movements at the Wattle Street Interchange and the St Peters Interchange are expected to be higher under Stage 2 than under Stage 1. For these reasons, this Peer Review has focussed on the Stage 2 configuration's impacts.

2.4.2 Cumulative Impacts

In addition to the WestConnex program, there are a number of relevant road and public transport projects being planned and implemented in Sydney which will have direct relevance to the volume of traffic using the M4-M5 Link. The 'strategic' road projects which have been included in the 'Do Minimum' network assumptions and WRTM V2.3 traffic model are:

By 2023

- NorthConnex;
- M4 widening;
- M4 East; and
- New M5.

By 2033

- the projects listed above (by 2023); and
- other broader road network and public transport projects that are inherent in the WRTM v2.3 but not specifically listed in the EIS documentation.

However, there are a number of other project proposals which are worthy of consideration in a "Cumulative Impacts" assessment. The projects which have been included in the cumulative impacts assessment were:

- Proposed Sydney Gateway (by 2023);
- Western Harbour Tunnel (by 2023);
- Beaches Link (by 2033); and
- F6 Extension (by 2033).

The effects of major public transport improvements such as Sydney Light Rail, Sydney Metro Northwest and Sydney Metro CBD and Southwest on traffic demands have also been included insofar as the traffic volumes that are exported out of the mode choice modelling and into the WRTM V2.3.

What is not included however are the traffic reduction effects of any light rail extensions (which are unknown at this stage) or Sydney Metro West which might be in place by the 2033 assessment year, should it be approved. This has been a consequence of the timing of the finalisation of the EIS and the announcement of the early planning of the Sydney Metro West being similar. Notwithstanding this, the Sydney Metro West would be expected to be in direct competition with origin-destination travel markets otherwise using the M4 East and the M4-M5 Link although the scale of reduction in traffic demand with Sydney Metro West would be expected to be relatively small, particularly by 2033.

3. ASSESSMENT METHODOLOGIES AND ASSUMPTIONS

3.1 TRAFFIC MODELLING

3.1.1 Models and Process

In this chapter, the 'Project case' refers to the networks and results which include the M4-M5 Link. The 'Do Minimum' case refers to the networks associated with what has been assumed to be in place in each modelled year but without the M4-M5 Link.

It is understood that in broad terms, the traffic modelling process involved:

- strategic modelling using the WestConnex Regional Traffic Model (WRTM):
  - running the "base demand model" which is founded on the Strategic Travel Model (STM) for the Sydney Greater Metropolitan Area to forecast person-trip demands by zone. Then, through trip distribution and mode choice modelling, to create traffic demands for private vehicles, light commercial vehicles, and heavy commercial vehicles for peak and off-peak demand periods;
  - using these vehicle demands, running the WRTM toll choice assignment model which was based on a distributed Value of Time (VoT) multi-class equilibrium assignment methodology;
  - including induced demand effects associated with the increased accessibility between trip producers and trip attractors that is provided because of the project in the project case, as well as modal shift from public transport due to increased traffic accessibility; and
  - using the absolute growth in traffic demands between the base year and each future year and adding these traffic demands to the calibrated base year traffic matrices so as not to diminish the improvements achieved when calibrating and validating the base year models to survey data.
- creating and/or refining microsimulation models:
  - for each of the interchange areas, creating, calibrating and validating local microsimulation models;
  - running future year Do Minimum and Project case models to understand the effects of complex vehicle movements in these areas due to the expected changes in traffic demands and local networks; and
  - similar to the WRTM forecasting process, using the growth in traffic demands calculated from each relevant cordon of the WRTM and adding traffic to each microsimulation model's traffic demands to create future year traffic demands.

3.1.2 Suitability Assessment of the Models and Modelling Methodologies

The traffic modelling process and hierarchy of models used is conventional for major road project assessments. An intermediate 'level' of mesoscopic modelling could have also been considered for a geographical area spanning between St Peters and Rozelle and west to the Iron Cove Bridge to more sensitively understand re-routing impacts in nearby local government areas for access to new interchanges as well as the traffic relief benefits for routes that would compete with the M4-M5 Link. Most of these considerations however would have more appropriately been addressed in the modelling for the New M5 and the M4 East as the subject interchanges are being created in those projects. There is therefore considered to be no significant additional benefit for a level of mesoscopic modelling introduced specifically for the M4-M5 Link assessment.

The underlying issue with essentially-unconstrained strategic WRTM demand forecasts 20-30 years from the base year is 'locking in' the demographic assumptions at the outset of the process. That is, there is no mechanism for reviewing the forecast Do Minimum road network conditions and then reviewing and updating demographic assumptions based on whether the forecast congested conditions are reasonable representations of what future communities would accept. That is, the Do Minimum case presumes no dampening or re-distribution of demographic growth (or economic growth) based on excessive congestion.

Notwithstanding this, the modelling approach used is considered to be the most appropriate methodology based on the models available in Sydney. It is important however to interpret the strategic modelling results in a relative sense (i.e. the differences between the Do Minimum case and the Project case) rather than necessarily focussing on the absolute results of either case.

It is understood that the base year microsimulation models have been independently reviewed and determined as being as being 'fit for purpose'. The reviews did raise a number of relatively minor modelling issues with all three of the models that were not resolved prior to the application of these models. However, it is not expected that these issues would have a material effect on the outcomes revealed by the modelling.

In terms of the future year microsimulation modelling, it is important to highlight that these models' traffic growth assumptions are taken from the WRTM and are therefore presumed to be 'unconstrained' levels of traffic demand growth. If, for example, road links in the WRTM just outside the simulation model boundaries are over capacity, the growth levels fed into the simulation models are based on over-capacity demands which, by virtue of the over-capacity definition in the WRTM, cannot be realised within the peak period being assessed. As with the WRTM strategic modelling, the interpretation of the microsimulation modelling results should be undertaken in a comparative way to understand the relative impacts and benefits that the project provides compared to the long term Do Minimum condition.

A limitation of the modelling and the benefits assessments procedures however is the absence of the consideration of the microsimulation modelling results in the network-wide benefits calculations, particularly in relation to travel time benefits. Procedures could have been introduced to overlay the microsimulation modelling travel time benefit results into the WRTM-based benefits assessment for the areas covered by the microsimulation models.

3.2 Operational Period Assessment Criteria and Methods

The assessment criteria have considered three 'levels' of assessment: at overall network level, at key mid-block locations and at key intersections. These levels of assessment are appropriate for a project such as this one which has broad community benefits as well as quite localised impacts and benefits, particularly where it interfaces with the surface road system.

It is agreed that mid-block Level of Service (LoS) should only be reported in locations where there are traffic flow conditions that are unaffected by upstream or downstream intersections. In this case, this relates to mid-block LoS only being reported for motorways and only if the on-ramps immediately upstream and the off ramps immediately downstream are not blocked due to intersection constraints such that the LoS section is either 'starved' of arrival traffic or potentially affected by queue-back traffic. The LoS criteria for mid-block locations on the M4, the New M5 and the M4-M5 Link have been based on Volume-to-Capacity (V/C) ratios and Flow Density outputs in accordance with the Austroads Guide to Traffic Management Part 3. These criteria and methods are appropriate for these roads.

Impacts on the surface road system have been considered using the microsimulation models created for each interchange area where the surface road system connects to the tunnels. The model-wide output parameters used to describe AM and PM peak hour impacts are generally appropriate and consistent with the outputs of microsimulation models that are usually extracted and compared at a local network level. The intersection LoS criteria which have been used are also appropriate and based on the RMS (2002) average delay thresholds.

However, one of the key benefits of using microsimulation models is the visualisation of queuing patterns and pinch points, in order to better understand the causes and effects of pinch points. The EIS would have benefited from showing queueing patterns and typical queue lengths near interchanges and at the exit and entry points of the M4-M5 Link to demonstrate the impacts and limitations of the project and particularly of its interchanges. This would allow determination, for example, if queues from surface road constraint points queued back into the project (or back into local surface roads) and what capacity and safety considerations would be a consequence of this.

4. EXISTING ROAD NETWORK PERFORMANCE

4.1 OVERVIEW

The review of the reported existing road network performance has focussed on the local network performance and the year 2015 AM and PM peak intersection performance for the:

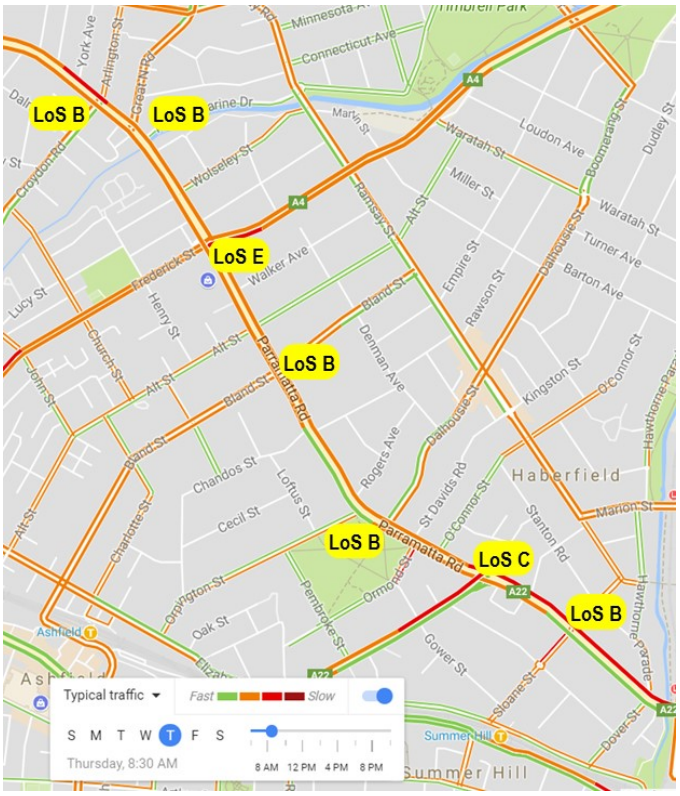
- Wattle Street interchange area;
- Rozelle interchange area; and
- St Peters Interchange area.

4.2 WATTLE STREET INTERCHANGE AREA

The microsimulation model for the Wattle Street interchange area extends from the Parramatta Road/Sloane Street intersection in the east to the Parramatta Road/Arlington Street intersection in the west. Table 6-2 of the *Technical Working Paper: Traffic and Transport*, lists the 'modelled' LoS for each key intersection in this area for the AM and PM peaks. This table shows most intersections at LoS B or C reflecting an average delay of up to 28 seconds at LoS B and 42 seconds per vehicle LoS C.

These findings (presumably from the microsimulation modelling) are inconsistent with site observations and with Section 6.2.1 of the report which states '*The Parramatta Road corridor currently functions under high levels of traffic demand, with the demand often exceeding the capacity of the road, especially eastbound during the AM peak period. This results in congested conditions and long queues and delays during peak periods*'. It would be expected that a number of intersections in this section would be operating at LoS D/E/F in the AM peak with some intersections operating at LoS E/F in the afternoon peak as well.

Figure 4.1 provides a comparison of 2017 AM peak traffic speeds from *Google Traffic* versus EIS-reported 2015 peak LoS at key intersections.



Source: Google Traffic

Figure 4.1: AM Peak Comparison of Google Traffic Speeds and EIS-reported LoS

4.3 ROZELLE INTERCHANGE AREA

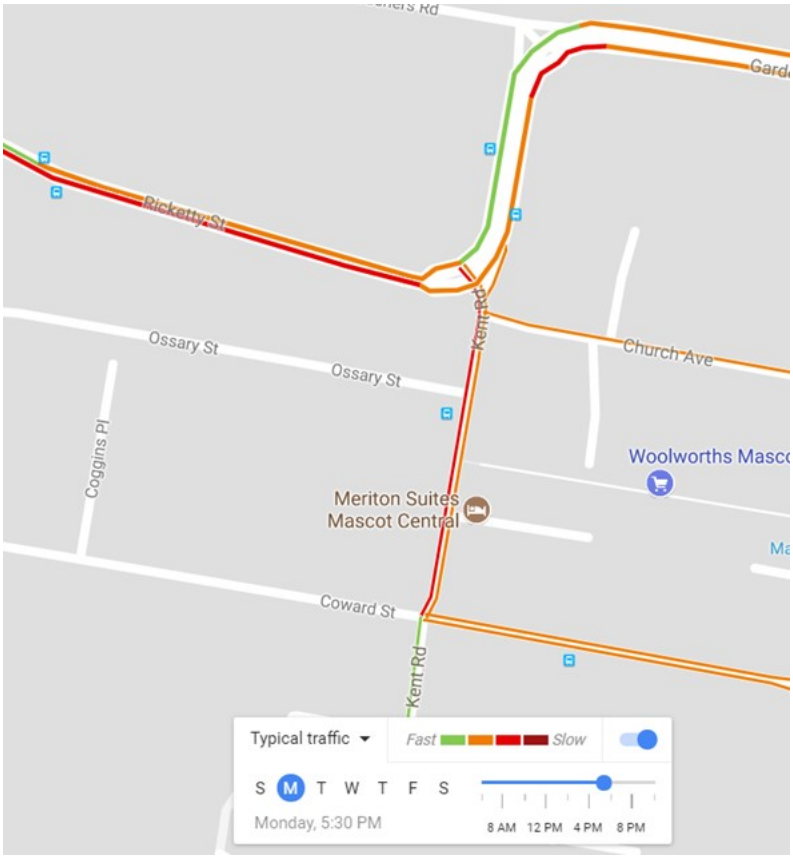
Table 6-9 of the *Technical Working Paper: Traffic and Transport*, lists the modelled LoS for each key intersection in this area for the AM and PM peaks. This table provides LoS outputs which are similar to those experienced on-site given that queue lengths and delays do vary from day-to-day in highly congested corridors. The LoS of F shown at the intersections of Victoria Road with Darling Street, Robert Street and with The Crescent may reflect that both directions of travel on Victoria Road are heavy in the afternoon peak with congestion in both directions (unlike the morning peak which experiences mostly inbound congestion).

4.4 ST PETERS INTERCHANGE AREA

Table 6-18 of the *Technical Working Paper: Traffic and Transport*, lists the modelled 2015 LoS for each key intersection in this area for the AM and PM peaks. The general ranges of LoS reported appear to concur with site observations although the reported key intersection delays may be different to those observed. For example, in the PM peak, a LoS F is reported at the Princes Highway/May Street 'T' intersection whereas site observations suggest that other surrounding intersections act as the key pinch points in this corridor.

The Ricketty Street/Kent Road intersection which experiences over-capacity conditions for at least two of its three approaches in the PM peak (i.e. the Kent Street approach and the Right turn from Ricketty Road into Kent Street is reported as LoS A in both peaks. The *Google Traffic* performance of this intersection in the 2017 PM peak is shown in Figure 4.2.

The EIS would have benefitted from providing further evidence of actual and modelled intersection traffic volumes and delay comparisons for each peak period to verify the suitability of the calibrated/validated models as the basis for future year assessments



Source: Google Traffic

Figure 4.2: Google Traffic Speeds at Ricketty Street/Kent Road

5. OPERATIONAL PERIOD PERFORMANCE REVIEW

5.1 NETWORK IMPACTS AND BENEFITS

5.1.1 Do Minimum

Comparing the 2023 Do Minimum modelling results to the 2015 Base Case results reveals that even with Do Minimum projects such as NorthConnex, the M4 widening, M4 East and the New M5, Vehicle Hours Travelled (VHT) grow at a faster rate than Vehicle Kilometres Travelled (VKT) meaning that traffic speeds across the network continue to decline between 2015 and 2023. This trend escalates between 2023 and 2033 with the WRTM reporting VHT almost doubling from 2015 to 2033.

The rate of change in congestion reported by the WRTM is not unexpected. The almost-doubling of VHT between 2015 and 2033 under Do Minimum however could be a consequence of the demographic inputs into the WRTM being 'locked in'. It would be expected, to some extent, that if the levels of congestion reported by the WRTM were being approached, then the accessibility-economic relationships would influence land use development and hence realise alternative demographic growth outcomes than those that have been input into the model. An example of the potential for 'over-assignment' of traffic demands is evident in Figure 8-2 of the *Technical Working Paper: Traffic and Transport* which shows significant traffic growth between 2015 and 2023 on many north-south arterial roads approaching the CBD which would be considered to be at or very close to their practical daily capacity now and hence would simply not accommodate the levels of increase forecast.

That is, the Do Minimum volumes should be considered as the volume being demanded of the network under certain demographic growth assumptions and not necessarily the traffic that could be supplied by the network in 2033, or that the community would accept as being reasonable. Caveats about these modelling effects would have been beneficial to include in the EIS documentation.

Apart from a discussion of congestion affecting the travel time of on-road buses, there is little discussion of the impact of the project on public transport modal shares and particularly any reductions in heavy rail/future Metro usage as a consequence of the project. These statistics (from the STM) would have been more specifically addressed the SEARs relating to impacts on public transport.

5.1.2 With the Project

The project essentially 'opens up' a range of trip markets that may not use the M4 East or the New M5 alone; and particularly for 'cross-town' trips south of the harbour. The key benefit of the project is to draw traffic from surface roads into the tunnel system, including the M4-M5 Link and this is expected. This has a greater effect on east-west roads than it does on north-south roads with the north-south screenline results showing little differences in the north-south daily volumes in 2033 with and without the project. With the exception of Southern Cross Drive, the 'Cumulative' scenario also reports similar 2033 north-south surface road volumes to the without project scenario, however the M4-M5 Link volumes increase significantly.

These results are expected and demonstrates that the north-south surface road links (generally between the airport and the harbour) are largely unaffected by the M4-M5 Link due to either their high levels of saturation (meaning that any released capacity is quickly filled up) or due to the shorter nature of these trips and hence limited relevance for using the M4-M5 Link. This is reinforced in Figure 10-2 in the *Technical Working Paper: Traffic and Transport* which shows that most of the increases due to the project in 2033 are between the M4 and the airport whilst most of the reductions are on major east-west roads.

The results in Table 10-1 of the *Technical Working Paper: Traffic and Transport* demonstrate that VKT increases and VHT reduces with the project and this is typical when new motorway-standard roads are added to congested networks.

In terms of the LoS on the M4-M5 Link, the results in Table 10-5 and Table 10-6 are reasonable. However, the critical section for LoS determination is expected to be at the interface with the Anzac Bridge and particularly on the bridge with its four lanes each way.

5.2 WATTLE STREET INTERCHANGE AREA

5.2.1 Without the Project

The year 2033 'without project' traffic demand within the interchange model area is forecast to be approximately 25% more traffic than 2015 levels; partly as a consequence of background traffic growth and partly due to the introduction of the M4 East ramps. Notwithstanding this, the LoS analysis for key intersections in the area shows no worsening in LoS between 2015, 2023 and 2033, with the exception of the Parramatta Road/Liverpool Road and City West Link/Timbrell Drive intersection in the PM peak. The results also suggest a reasonable level of 'unreleased' traffic in the future year models or a key pinch point which is 'gating' traffic so that specific intersection volumes do not increase over time. RMS provided typical queue profile screenshots from the year 2023 simulation models which confirmed the significant level of queueing and 'blocking back' in the simulation models in both the AM and PM peaks.

The travel times for 2015 were not compared to the 2023 and 2033 travel times in Figure 8-3 and Figure 8-4 in the *Technical Working Paper: Traffic and Transport* and such a comparison would have allowed a more holistic interpretation of the modelling results.

5.2.2 With the Project

The simulation models include the M4-M5 Link segments and hence the total demand volumes within the interchange area increase with the project but network statistics improve significantly. In broad terms, this is reasonable and expected. Table 10-12 of the *Technical Working Paper: Traffic and Transport* shows some marginal changes to intersection performance without and with the project and most of the key intersections are shown to operate at peak hour LoS of D or better in all years and for all scenarios. Given the forecast increases in traffic demand, particularly associated with ramp entry and exit points, this is difficult to rationalise without viewing queue length outputs from the simulation models to understand pinch point 'gating effects' and key over-capacity movements.

Signal management strategies will need to be employed to ensure that City West Link eastbound flows are cleared in the AM peak in order to not block back to the Wattle Street interchange ramps. This means that a number of side streets (e.g. Timbrell, Mortley, Ramsay) will effectively need to be 'held back' with long queues ensuing on these roads; and longer than in the 'Do Something' case. In the PM peak, queueing on the Wattle Street approach to its intersection with Parramatta Road is likely to block back along Wattle Street and into the westbound exit tunnel portal. The modelling suggests that this queue does not extend back to the tunnel mainline however this cannot be confirmed with the information provided. Furthermore, these queue lengths would be expected to continue to grow beyond the opening year and could very likely extend to the tunnel mainline by 2033.

The travel time results show some excessively long times between City West Link and Frederick Street with and without the project and these results would appear to be in conflict with the reasonable LoS results for the Wattle Street / Parramatta Road intersection. Queue length results/screenshots from the simulation model would assist in rationalising some of these conflicts.

The EIS-proposed management measures to address the Parramatta Road/Wattle Street queueing issues is to 'monitor and manage' the Frederick Street-Milton Street corridor and to 'manage lane use'. It is unlikely that these management measures would be sufficient to mitigate the impacts generated and further consideration of potential upgrades to the intersection of Wattle Street/Parramatta Road/Frederick Street could be contemplated.

5.3 ROZELLE INTERCHANGE AREA

5.3.1 Without the Project

The microsimulation model boundary for this area is relatively large and extends well into the CBD allowing for congestion effects in the CBD blocking back into the Rozelle interchange area to be understood; which is important when determining the design details and potential benefits of the project in this area. Average model network speeds are slower in the morning peak than the evening peak in 2015 and in 2023 with far

more stops in the AM than the PM even though the PM has higher traffic demands. This is expected due to the 'confluence' effects of traffic towards Anzac Bridge in the AM peak and the weaving-capacity limitations inbound in this area. By 2033, without the project traffic demands have increased by 7%-10% (from 2023) although what the network is able to supply is only marginally greater than in 2023. This simply highlights the saturated nature of the intersections and road links in this modelled area.

The intersection performance results in Table 8-11 and 8-12 in the *Technical Working Paper: Traffic and Transport* tell a different story with most intersections in the PM peak operating at LoS F with only two of the eight intersections documented operating at LoS F the AM peak. The PM peak results are most likely associated with congestion in both directions of through traffic movement whereas congestion in the AM peak is more directional (i.e. inbound).

The travel time results without the project appear difficult to rationalise with some reductions between 2023 and 2033 in the inbound direction in the AM peak. Also, AM peak travel times are approximately double those in the PM peak but the PM peak intersection LoS (based on delay) is much worse than the AM peak. These results contradictions are more likely to be associated with traffic 'held up' at entries to the model rather than any traffic redistribution or re-assignment changes.

Excessive queuing is expected in Victoria Road and in City West Link, particularly inbound in the AM peak stemming back from the Anzac Bridge merge area. These queues may extend back through the network to the edges of the modelled area.

5.3.2 With the Project

The 2023 AM peak modelling results show that, soon after opening, queues will extend back across the Anzac Bridge and into the Rozelle Interchange. Also, due to the faster and higher volume arrival rates from the M4-M5 Link components of the interchange, inbound City West Link traffic will also be affected. The same 'traffic confluence' issue is realised inbound in the PM peak although due to the higher outbound volume, the 'traffic dispersion' benefits of the M4-M5 Link apply to a larger proportion of the demand and therefore introduce more benefits than in the AM peak.

These issues remain evident in the 2033 modelling essentially due to the 'capping' of the volume of traffic which can enter and pass through the network, given the constraints outside of the modelled area. Whilst no queue length plots have been provided in the EIS, it is conceivable that these queues could generate secondary impacts to non-radial movements such as between the Iron Cove Link and the M4-M5 Link to the south of the interchange.

The intersection LoS results presented in Table 10-19 of the *Technical Working Paper: Traffic and Transport* need to be interpreted with caution given the highly-saturated nature of the microsimulation model network from which the average intersection delay values were derived. Even minor changes in assumed signal phasing and timing at some intersections may have significant consequential downstream effects.

The travel time comparisons reinforce the consequences of essentially 'flooding' the Anzac Bridge with traffic in the AM peak with queues filtering back and impacting the Rozelle Interchange and consequently Victoria Road and the Iron Cove Link inbound in 2023 and in 2033. Consistent with the overall network performance statistics, travel time benefits of the project are evident in the PM peak period for all routes except for City West Link.

Queue length screenshots confirm these operating conditions with the project in 2023. In the AM peak in particular, queues extend from the Anzac Bridge back into the interchange ramps and the ends of the model near Victoria Road. In effect, these queues could, by 2033, be expected to block trips from the Iron Cove bridge intending to access the south via the M4-M45 link. Functionally, one of the key purposes of WestConnex was to connect origins and destinations within the Victoria Road, the M4 and the M5 corridors and the queueing back potentially undermines some of this functionality.

Overall, the modelling results suggest that some improvements are expected at surface road intersections in 2023 with the project, particularly in the PM peak hour which has more balanced flows on Victoria Road,

although by 2033, these benefits are reduced due to continued growth in network traffic demands. Notwithstanding these benefits, once the Rozelle Interchange is operational it is likely that AM queues will extend back from the Anzac Bridge into it and consequentially into Victoria Road and into the Iron Cove Link. These fundamental constraints suggest further consideration of how to manage these congestion pinch point issues so as to not undermine the investment made in the Rozelle Interchange works. The EIS identified a range of investigations to be undertaken to manage these issues and the scope of these investigations appears appropriate. However, without any commitment to works or management measures which can be modelled and assessed at this stage it is difficult to foresee that the measures under investigation would alter the fundamental constraints.

5.4 ST PETERS INTERCHANGE AREA

5.4.1 Without the Project

The St Peters Interchange modelled area is relatively large and encompasses the northern access points to Sydney Airport. Average travel times are expected to worsen significantly without the project between 2023 and 2033 with average traffic speeds down to 9kph in the 2033 AM peak and practically all key intersections in the modelled area operating well over capacity. Travel times from King Street to the airport would more than double under these conditions. The demand levels, as identified in the EIS, could simply not be satisfied by the assumed network and would be unlikely to eventuate.

The entire modelled area is expected to be heavily congested with extensive queueing in both peak periods.

5.4.2 With the Project

By 2033, the network is so overly saturated that the benefits of the project are small in absolute terms with many intersections still operating over capacity in both peak hours. The PM peak is worsened compared to without the project and this is expected with the M4-M5 Link essentially feeding more traffic into an area that is already heavily congested, particularly in the PM peak hour where airport demands and outbound peak traffic demands co-inside.

The simulation modelling queue length outputs for the project case show no visually significant reduction in queues compared to the do minimum case. The network is so heavily saturated that it is very difficult to draw any firm conclusions regarding the relative impacts and benefits of the project in this area.

The management measures identified in the EIS rely on the proposed 'Sydney Gateway' being constructed and no real alternative has been offered in lieu of this. A more detailed St Peters – Sydney Airport corridor study would be beneficial to develop additional intersection upgrade/management projects to manage the expected issues in this area.

5.5 CUMULATIVE IMPACTS

The modelling suggests that the primary influence of future projects such as the proposed Sydney Gateway project and the proposed Western Harbour Tunnel and Beaches Link (WHTBL) are to increase traffic on the M4-M5 link by drawing traffic away from the Harbour Tunnel/Bridge, CBD, Anzac Bridge and the Eastern Distributor. These results appear logical, particularly for access to/from Sydney airport.

The additional projects make the M4 East a more attractive proposition, hence drawing more traffic into the Wattle Street interchange area and exacerbating the issues in the Project case along Frederick Street. Therefore, the management measures proposed under the Project case, including any re-consideration of the need for upgrading the Parramatta Road / Wattle Street / Frederick Street intersection should consider the traffic volumes under the 'cumulative' scenario.

For the Rozelle interchange area, it is clear that the proposed WHTBL reduces AM peak inbound traffic on Anzac Bridge, allowing City Link West traffic to take up this capacity and significantly reduce travel times on this route, which is logical. Victoria Road is still subject to long travel times though, presumably due to the high approach volumes on this route.

In the St Peters interchange model area, it is clear that the proposed Sydney Gateway project improves overall network conditions in the area however key north-south routes are still operating with poor LoS in 2033. Again, it is expected that these traffic simulation models are so over-saturated that extracting meaningful localised results will be problematic.

5.6 STAGED OPENING CONSIDERATIONS

In terms of operational period impacts, the opening of Stage 1 in 2022 prior to the opening of Stage 2 in 2023 will not generate any unique traffic impacts than need to be separately assessed for 2022 conditions and the approach of assessing operational impacts in 2023 with the entire project is appropriate. That is, the findings for the 2023 Project case assessment are expected to adequately cover impacts and management needs for when Stage 1 opens to traffic in 2022.

5.7 ACTIVE TRANSPORT

The majority of active transport impacts are associated with the construction phase of the project with closed or impacted routes re-instated at the end of construction. The new facilities to be constructed in Lilyfield and in Rozelle are considered to be improvements on the existing facilities in these areas.

5.8 LOCAL PROPERTY ACCESS AND PARKING

The impacts associated with the removal of on street parking are mostly associated with the construction period. The permanent losses of on street parking are considered to be relatively minor given the locations and scale of these losses. Similarly, property accesses that are directly or indirectly impacted are most affected during the construction phase with very few residual impacts on properties which have not been acquired for the project.

6. CONSTRUCTION PERIOD IMPACTS

6.1 METHODOLOGIES

6.1.1 General

Most of the construction activity associated with the M4-M5 Link is underground with the most noticeable traffic impacts associated with:

(i) Temporary roadworks near construction compounds and surface works areas which reduce traffic capacity due to lane closures, detours, turn bans etc.

(ii) Additional light and heavy vehicle traffic near construction compounds and surface works areas.

(iii) The combined effects of (i) and (ii).

There are also construction period impacts on pedestrian and cyclist infrastructure and on bus stops and routes which have been covered in the EIS. Physical impacts on property access and to on-street parking areas are also key considerations. The breadth of coverage of these items in the EIS appears appropriate with exceptions discussed below.

6.1.2 Methodologies Appraisal: Network / Cumulative Impacts and Timing

The method of considering two potential construction options at certain sites as well as the consideration of both mid-block LoS and assessing the LoS of 'clusters' of intersections are considered appropriate. Construction is proposed to commence in 2018 with Stage 1 being opened to traffic in 2022 and Stage 2, involving the Iron Cove Link, the Rozelle interchange and direct connections to/from Anzac Bridge open in 2023. The M4 East is proposed to be open to traffic in 2019 and the New M5 in 2020. The construction impact assessment year has been selected as 2021.

The EIS suggests that the M4 East and the New M5 tunnels will be 'complete or almost complete' by late 2018 and that the tunnels will be available to use for haul truck access to/from the M4-M5 link. There is no basis upon which to dispute this claim but it would seem appropriate to provide a contingency strategy given the scale of the consequences to local traffic should these two tunnels not be available in time.

6.1.3 Methodologies Appraisal: Localised Impacts

The most contentious localised impacts around construction access points usually relate to additional traffic congestion for access to/from sites, the potential for construction worker parking in nearby residential streets and the street closure impacts on the accessibility and amenity of nearby residents. Whilst it is accepted that many of these issues are a matter of detail that will be assessed further as the construction strategy evolves, the EIS should at least demonstrate that the management measures are possible.

The level of detail provided in the EIS for some locations is considered insufficient to provide confidence that reasonable management measures are possible. For example, there are no specific management measures put forward for the Wattle Street/Parramatta Road/Frederick Street intersection with a significant increase in construction-related peak hour PCUs at this already congested intersection. Another example is that parking for the majority of the construction workforce is proposed to be either in local streets, at remote sites, or not provided at all with encouragement of public transport access. No demonstration of how this could be achieved has been provided on a site-by-site basis.

6.2 HAUL ROUTES AND TIMES

It is recognised that the location of spoil sites and hence haulage routes may change as the details of the construction contract evolve. There is some reliance on the M4 East being available to use for haulage and should this not be the case, there will be increased pressure on Parramatta Road west of Wattle Street for the intervening period.

The calculation of construction vehicle movements has assumed 24/7 operations. This may not be the case and the estimated peak hour volumes may be in the order of 20% higher if this is not the case.

However, given the scale of the volumes reported in Table 7-15 of the *Technical Working Paper: Traffic and Transport* this would not be expected to introduce any significant additional impacts to those reported in the EIS. Generally, the haul routes appear reasonable, with any site-specific access issues detailed below.

6.3 CONSTRUCTION SITES

6.3.1 Haberfield Sites

A review of the proposed construction sites and associated works around Haberfield have raised the following considerations under Option A:

- the heavy vehicle and light vehicle entry points off Wattle Street are via the inner lane which means that construction-related vehicles approaching from Parramatta Road, particularly before the M4 East is available for use will all use the 'slow speed' left turn lane into Wattle Street. This intersection is already highly congested and the additional long trucks attracted to this lane will exacerbate delays and queues at this location. There are no specific mitigation measures identified to address this issue;
- it is highly likely that construction vehicles will make use of Walker Avenue for parking. The need for a parking management plan in this street would be worthy of inclusion; and
- the impacts of closing Northcote Street and the additional traffic this would divert to Wolsely Street which also is the primary access for the parking site for the Haberfield works area. Even though this is a presumably an issue covered in the M4 East EIS ideally it should be replicated here for completeness.

A review of the proposed construction sites and associated works around Haberfield have raised the following considerations under Option B:

- the proximity of the light vehicle car park driveways on Bland Street and on North Street to Parramatta Road. These could be high turnover car parks and could introduce sight line and blocking back issues.

6.3.2 Darley Road Site

A review of the proposed construction site and associated works around Darley Road, including the parking loss during construction, have not raised any issues which are not covered in the EIS. Whilst there has been a lot of community feedback regarding traffic-related issues at this site, the additional construction traffic volumes generated and the location of their turning movements to/from the site are not considered to significantly impact existing conditions.

6.3.3 Rozelle Site

A review of the proposed construction sites and associated works around Rozelle suggest that the most significant local impacts will be on Lilyfield Road. A parking management plan may need to be considered to prevent all day construction-related parking near businesses on this road.

The impacts of the two signalised accesses proposed off City West Link should be specifically assessed and addressed given the importance of this route in the network. For example, upgrading the intersection of The Crescent/City West Link to its ultimate form as 'early works' would provide the additional capacity to augment the fourth leg to this intersection for construction access.

6.3.4 The Crescent and Victoria Road Civil Sites

There are no significant issues of concern with the access arrangements at these sites although particular attention would be required on clearing the entry-ways as quickly as possible given the impacts of queues from these access points back onto the highly-trafficked frontage roads.

The haul routes shown suggest a right turn out of the site C6 into The Crescent which would be extremely difficult to achieve safely given prevailing traffic volumes and sight lines.

6.3.5 Iron Cove Link Site

There are no issues of concern with the access arrangements at this site. Given the amount of construction activity expected at this site, light construction vehicles will be in high demand and a parking management strategy would be needed for the residential streets south of Victoria Road. Key requirements/objectives of such a strategy would have been beneficial to include in the EIS.

6.3.6 Pyrmont Bridge Road Tunnel Site

With the potential exception of the impacts of construction vehicle parking in Chester Street, the absence of significant vehicle impacts as determined in the EIS appears reasonable.

6.3.7 Campbell Road Site

The EIS identifies that there are no local traffic or parking impacts associated with this site and this appears reasonable. Most of the access entries are right turns in however the traffic signals and turn pockets proposed are expected to be sufficient to manage the volumes involved.

6.4 INTERSECTION IMPACTS ASSESSMENT

6.4.1 Cluster 1: Parramatta Road and Wattle Street Corridors in Haberfield

The EIS identifies specific intersection delay impacts along Wattle Street and along Dolbroyd Parade with reasonably large increases in additional traffic in these locations in peak periods however no locationally-specific mitigation measures are recommended.

6.4.2 Cluster 2/Cluster 3: City West Link (Leichhardt and Lilyfield) and The Crescent in Lilyfield

Some of the approach roads to the signalised intersections in Cluster 2 and Cluster 3 include tight turns and steep grades for heavy vehicles which will significantly affect clearance times for entry and exit phases. Whilst the EIS suggests that the Cluster 3 area will not have any significant intersection delay impacts, site observations suggest that this area is over-capacity now and adding more, slower, larger vehicles at the signalised intersections with additional phases will only exacerbate these issues. Given that this location has the highest volume of construction vehicle movements of all of the sites, a specific strategy for managing the impacts along City West Link through this construction zone appears to be worthy for inclusion in future construction traffic management plans.

6.4.3 Cluster 4: Victoria Road in Rozelle

The EIS suggested that the intersections along Victoria Road which are over capacity which will be impacted however no specific strategy to manage these impacts has been identified.

6.4.4 Cluster 5: Parramatta Road in Camperdown

There are no construction-related congestion issues in this cluster and this appears to be reasonable.

6.4.5 Cluster 6: Princess Highway in St Peters

Congestion along the Princes Highway corridor is expected during the construction period and this is reasonable. The analysis of the intersection of the upgraded Campbell Street/Princess Highway intersection to demonstrate that heavy vehicles can be accommodated within the provided pocket lengths and with the available phase times would have been valuable to include, so that consequential traffic impacts are avoided.

6.5 ACTIVE TRANSPORT IMPACTS

Where existing routes/paths have been physically cut by construction works, reasonable alternative routes have been recommended, and in some cases, provide better connections to what previously existed. A key exception is the length of route diversion at the Iron Cove Link site required because of the closure of the southern shared path adjacent to Victoria Road. A key consideration in the future detailed design of the project could be potential options to narrow the construction compound in this location to retain this shared path and its accesses to adjacent streets, and to manage the crossing of the construction vehicle access that would be needed.

Notwithstanding the above, the majority of active transport impacts are 'interface impacts' where off-road routes cross driveways and roads for construction-related vehicles. In multiple locations, the EIS suggests that this would be managed with 'traffic management measures', although no details or examples of treatments are provided.

Impacts which are not covered at all in the EIS are those due to lane narrowing due to construction sites or temporary works which result in lanes which are of insufficient width to cater for heavy vehicles and on-road cyclists. Identification of potential high-risk areas and examples of potential management measures would have been worthy of inclusion in the EIS.

7. REVIEW OF THE SUBMISSIONS AND PREFERRED INFRASTRUCTURE REPORT

7.1 CONTEXT AND SCOPE

The WestConnex M4-M5 Link Submissions and Preferred Infrastructure Report (SPIR) has been reviewed and our findings are presented in this chapter.

Elements of the WestConnex M4-M5 Link Concept Design used for the Environmental Impact Statement (EIS) were changed to "*minimise environmental impacts, address design and constructability issues and to address issues raised during the public exhibition of the EIS*". Some of these issues related to the limited on-site truck storage at compounds and the likelihood that trucks would queue or circulate on surrounding streets. Also, concerns were raised regarding insufficient construction worker parking at a number of sites which would be expected to result in overflow parking impacts in residential streets.

The SPIR has proposed an additional "*construction ancillary facility*" at White Bay (Rozelle) for truck marshalling and construction workforce parking. The traffic and transport impacts and proposed management measures associated with this site (referred to as Site C11) and its truck access routes have been reviewed along with the extent to which the new site mitigates or worsens some of the issues raised regarding the concept design used for the EIS.

7.2 TRAFFIC AND TRANSPORT IMPACTS OF SITE C11

7.2.1 Construction Workforce Parking

The addition of 50 construction worker car parks (approximately) has been proposed. No assessment has been provided regarding how these workers will access each construction site after parking their vehicles (shuttle bus, car-pooling etc.) or whether the 50 bays will simply be for truck drivers parking their truck at Site C11 overnight.

Unless shuttle buses are provided to nearby sites, it is unlikely that these parking spaces would divert any expected construction workforce parking impacts way from other sites, as there would simply be no reason for construction personnel to park at the White Bay facility.

7.2.2 Roadway and Intersection Level of Service (LoS) Changes

The roadway LoS (or V/C ratio changes) between the EIS and the SPIR are less than 1% at practically every location. Similarly, intersection volume PCU changes are negligible and these modelling results are expected. In some locations such as along City West Link, truck volumes increase as trucks "shuttle" between the proposed marshalling yard and each site (sometimes duplicating trips). However, City West Link is better placed than residential streets are to accommodate these circulating/waiting truck movements.

The only potential congestion issue is localised near Site C11 at the intersection of The Crescent with James Craig Road. In particular, the PM intersection performance deteriorates from LoS C to LoS E. With relatively uniform green times for each phase, it is likely that the additional delays will be borne by traffic approaching on James Craig Road; mostly trucks on their way to another site. The CTAMP could mandate that signal timings not be adjusted to dissipate these queues to the detriment of other traffic on The Crescent, particularly given the potential queue-back risks into the City West Link / The Crescent intersection and the Victoria Road / The Crescent intersection nearby.

It appears that the intersection of The Crescent/James Craig Road has not been assessed together (i.e. in the same model) as the intersection of The Crescent/City West Link and the intersection of The Crescent / Victoria Road and it is unclear whether the isolated intersection analysis has used 'fixed' signal times or allow the signal times to be optimised in SIDRA.

The CTAMP should ensure that the additional truck turning movements at the James Craig Road/The Crescent intersection does not lead to queuing back into the intersections either side by not modifying default maximum and minimum phase times significantly from existing times

7.2.3 Pedestrians and Cyclists

The pedestrian (zebra) crossing on Somerville Road has very low usage by pedestrians and is not considered to be a high-risk location associated with additional trucks passing through this location. In addition, CTAMP measures are recommended in the SPIR to address potential risks at this location.

There are multiple pedestrian crossings at signalised intersections along Johnston Street and given that these are managed by signals and some are within 40kph school zones, the impacts of the minor increase in traffic expected are considered to be minimal.

7.3 IMPACTS AND BENEFITS FOR OTHER SITES

7.3.1 Parramatta Road West (Site C1b)

There are no issues with the haul routes between this site and the proposed marshalling yard at Site C11.

7.3.2 Darley Road Site (Site C4)

Under the EIS scheme, trucks arriving from the west would access the Darley Road site via a new right turn at the intersection of James Street and City West Link. This movement is currently not available. In addition to the potential capacity impacts in this location, this change introduced safety concerns with slow moving right turning trucks, grade changes, pedestrian/cyclist conflicts and the potential for trucks to queue into eastbound through traffic lanes. By redirecting trucks to enter from the east (i.e. from Site C11), these issues are addressed and the intersection does not need to be modified. Whilst the intersection performance results do not show any change, there are clear safety benefits due to this modification.

7.3.3 Pyrmont Bridge Tunnel Site (Site C9)

Whereas under the EIS concept trucks would arrive from the west via Parramatta Road, under the SPIR trucks coming from the marshalling area (Site C11) would use The Crescent, turn right into Johnston Street, turn left onto Parramatta Road and then left into Site C9. Whilst Johnston Street is a through traffic-carrying road with reasonably high volumes it is fronted by a number of sensitive land uses such as Annandale TAFE, Annandale North Public School, Annandale Public School and local shops and restaurants. There are also multiple signalised intersections along this route with heavy pedestrian demands.

The SPIR identifies seven heavy vehicle movements per hour (southbound only) and a total of 30 two-way traffic movements per hour introduced into Johnston Street. At just over 5% of existing two-way volumes, this is not considered to be a significant increase given that this route already carries moderate traffic volumes with some heavy vehicles.

8. REVIEW OF SUBMISSIONS AND PROPONENT RESPONSES

8.1 GENERAL

A large proportion of the submissions received from stakeholders and the community related to traffic and transport issues with the most common responses related to:

- Construction impacts and network performance;
- Construction impact on pedestrians and cyclists;
- Operation traffic modelling technical queries;
- Construction traffic routes;
- Traffic safety during construction;
- Quality, independence and adequacy of the operational traffic modelling;
- Operational impact on network performance (and on the performance specifically related to key interchanges); and
- Construction impacts to parking.

8.2 LOCAL GOVERNMENT CONCERNS AND RESPONSES

8.2.1 City of Sydney

City of Sydney (CoS) raised a number of issues. The key issues raised and identified as being worthy of further comment are summarised below:

- CoS raised the issue of weekend period peak construction impacts not being addressed. The proponent responded that volumes and impacts would be similar on weekends as weekdays. Weekend peak volumes may be similar to weekday peak however capacity and signal timings are quite different with less tidal flow, more side street movements and allowed on street parking in many locations. A weekend-specific construction period plan would appear worthy of inclusion in the CTAMP;
- CoS raised the issue that all construction traffic parking should be off street. Whilst this may be practically impossible to 'police' even if include under the CTAMP, the CTAMP could attempt to restrict parking to off street area and on street areas immediately fronting development sites;
- CoS raised multiple concerns regarding the accuracy of the traffic and transport modelling from both a project benefits perspective and a project impacts perspective. The underlying issue which is not responded to is the limitation of the strategic modelling to accommodate intersection-related effects in its travel time calculations and hence in its equilibrium traffic assignment processes. For example, excessive queueing due to merging issues between the project and other traffic on Anzac Bridge is not readily reflected in link delays back through the network where queue would propagate to. Similarly, intersection congestion "throttles" at entry and exit points to the motorway network are not accounted for. Whilst these effects are largely indeterminate given the modelling tools used, the potential consequences of these effects could have been explained in more detail in the EIS; and
- CoS raised issues regarding the uncertainty or lack of definition of impacts on streets and intersections surrounding the project. The degree to which these impacts and upgrade needs can be determined now is limited to the modelling tools available. The proponent's approach of conditioning the review of local network performance following the project's implementation appears the be the only practical mechanism to address these issues at this time. This review however relies upon benchmarking current performance and it would be reasonable to include such benchmarking studies within the remit of the CTAMP.

8.2.2 Inner West Council

Inner West Council raised a number of issues. The key issues raised and identified as being worthy of further comment are summarised below:

- A number of local road impacts were identified as being insufficiently addressed. In general, the proponent has responded that further studies will be undertaken to identify ways to mitigate these

impacts. It is unclear however if these impacts can be sufficiently mitigated with reasonable works or strategies and no certainty over if these projects will be undertaken;

- Overflow construction worker parking impacts have been identified and the potential implementation of resident permit parking schemes were identified by the respondent, subject to local council implementation. The CTAMP could be used to identify potential resident parking permit boundaries for consideration by each council;
- Exit blocking from Frederick Street has been responded to with measures of monitoring and managing lane usage utilisation. It is unclear what specific mitigation measures would be implemented, how, when and by who; and
- The issues raised regarding construction vehicle access via City West Link Road have referred to isolated intersection modelling revealing minor changes in intersection performance. There is a need to assess City West Link Road between The Crescent and the Victoria Road intersection as a system of intersections to confirm preferred operational arrangements. This work could be a requirement of the CTAMP.

8.2.3 City of Canada Bay Council

City of Canada Bay Council raised a number of issues. The key issues raised and identified as being worthy of further comment are summarised below:

- The reduction in traffic on Victoria Road with the Iron Cove Link is a timely opportunity to improve public transport operations. The proponent has identified this as a matter for TfNSW however given that the proponent is effectively the NSW state government, there would be some merit in conditioning the consideration of introducing longer sections of bus lanes on Victoria Road between Iron Cove Bridge and Anzac Bridge as an 'associated project'.

8.3 COMMUNITY CONCERNS AND RESPONSES

There were thousands of community responses with traffic and transport issues being one of the most common themes raised. The thrust of the issues raised have been addressed elsewhere in Bitzios Consulting's review of the EIS and the SPIR.

Construction vehicle access to the Darley Road construction site was one issue that generated significant community attention. Whilst this area is congested, with multiple modes, multiple user types and alignment difficulties near the City West Link / James Street intersection, the incremental impacts of the turning construction vehicles, based on the traffic volumes in the EIS, are expected to be relatively minor. Parking by general construction vehicles in the vicinity of this site would need to be monitored and managed through the CTAMP.

9. CONCLUSIONS AND RECOMMENDED CONDITIONS

9.1 CONCLUSIONS

A review of the M4-M5 Link EIS has been completed considering traffic and transport impacts, including active transport impacts, during the operational and construction phases of the project.

The assessment processes, including the strategic and microsimulation models used, is generally considered appropriate and complete in responding to the SEARs. Some of the limitations of the EIS in terms of responding to the SEARs include:

- The EIS could have considered augmenting the network-wide travel time benefits calculations with the microsimulation modelling results for the areas in the WRTM covered by the microsimulation models;
- Further evidence could have been provided regarding actual and modelled intersection traffic volumes and delay comparisons for each peak period to verify the suitability of the calibrated/validated models as the basis for future year assessments;
- Further information could have been provided in the EIS on how to interpret 2033 traffic volumes from the WRTM as idealised 'demand' flows, not flows that would, in all probability, actually be realised;
- The EIS could have included statistics on public transport person trips, public transport person-kilometres travelled and public transport person-hours travelled with and without the project for each modelled scenario to allow for interpretation of the impacts on public transport as required under SEARs item 2(d);
- The M4-M5 Link mid-block LoS assessment for the Anzac Bridge interface point with and without the project in 2033 could have been reported;
- Further, more specific details, or at least typical examples of management measures, to mitigate construction period intersection impacts, site access impacts and local parking management impacts could have been provided;
- The EIS could have included more specific management measures for the impacted intersections along Wattle Street and along Dolbroyd Parade;
- The EIS could have considered documenting examples of active transport/construction traffic interface management measures as a suite of typical treatments to apply in the CTAMP;
- Limited details on the calibration and validation performance of the microsimulation models used was provided in the EIS (although this information has been separately provided to the reviewer following the EIS);
- Insufficient details of 'pinch point' effects and traffic queuing patterns without and with the project were provided in the EIS to understand key traffic signal phasing assumptions and any consequential impacts of traffic capacity limitations on queue propagation;
- No public transport modal share impacts on the rail system or bus system, or light rail due to the project have been documented in the EIS;
- No tangible measures have been offered to manage the impacts generated at the Wattle Street/Parramatta Road/Frederick Street intersection or the queue-back impacts from the Anzac Bridge into the proposed Rozelle interchange;
- No construction period on-street parking management methodologies have been nominated to take forward into future detailed design phases to manage construction worker parking demand near work sites nor have any specific methods been documented to manage construction access interfaces with pedestrians and cyclists; and
- There are insufficient details to demonstrate acceptable mitigation of City West Link traffic delays during construction.

9.2 RECOMMENDED CONDITIONS

Should the project be approved, suggested conditions to be attached to the approval are listed below:

- Re-evaluate the need for upgrades to the Parramatta Road/Wattle Street/Frederick Street intersection to mitigate the operational period impacts expected under the 'cumulative' scenario traffic volumes and include these upgrade works as part of the project;
- Identify specific traffic management measures to ensure that queues back from the Anzac Bridge into the project do not extend to a location where they block non-CBD traffic movements at the Rozelle interchange and include these measures as part of the project;
- Undertake a St Peters to Sydney Airport traffic study to identify projects to capitalise on the opportunities and mitigate the impacts of the M4-M5 Link;
- Prepare a contingency strategy as part of the CTAMP should the M4 East and New M5 tunnels not be open in time to cater for M4-M5 Link haul trucks when the project commences its excavation works;
- Provide specific details regarding the extents and nature of local traffic and parking impacts generated by each construction site by time of day and day of week in the CTAMP, as well as the associated specific management measures to address these impacts;
- Include specific mitigation measures for the local parking impacts on Lilyfield Road within the CTAMP;
- Include an on-street parking management strategy for the residential streets south of Victoria Road near the Iron Cove Link construction site in consultation with Council as part of the CTAMP;
- Include a risk assessment within the CTAMP for areas where lane narrowing and roadside barriers may impact on cyclists;
- On-demand shuttle buses should be provided for access between Site C11 and nearby construction sites; and
- Assess the impacts of The Crescent/James Craig Road intersection together in the same model with the intersection of The Crescent/City West Link and The Crescent / Victoria Road as part of preparing the CTAMP for this area. Through movement minimum and maximum phase times for these intersections are not to be adjusted to favour construction site vehicle departures.

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