

Brent Devine

From: system@affinitylive.com on behalf of Ken Welsh <kenw@lmc.nsw.gov.au>
Sent: Monday, 2 November 2015 1:52 PM
To: Brent Devine
Subject: Submission Details for company Leichhardt Council (org_object)
Attachments: Leichhardt Council Submission on M4 East EIS _Report to Council 27 October 2015 _pdf; M4 East Stage 1b EIS Submission FINAL.pdf

Confidentiality Requested: no

Submitted by a Planner: no

Disclosable Political Donation: no

Name: Ken Welsh
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Govt. Agency: Yes
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Content:
Please find uploaded:
1) A copy of Leichhardt Council's Submission Letter regarding the M4 East EIS
2) A copy of the Council Report, outlining the submission and the reasons behind it - as presented to Council on 27 October 2015

IP Address: - 220.101.0.10
Submission: Online Submission from company Leichhardt Council (org_object)
https://majorprojects.affinitylive.com/?action=view_activity&id=129849

Submission for Job: #6307 WestConnex M4 East
https://majorprojects.affinitylive.com/?action=view_job&id=6307

Site: #2886 WestConnex
https://majorprojects.affinitylive.com/?action=view_site&id=2886

Ken Welsh

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Council Ref: C522/15
Contact: Clare Harley
Phone: 9367 9226
Date: 2 November 2015



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Carolyn McNally
Secretary
Department of Planning and Environment
GPO Box 39,
Sydney NSW 2001

Dear Ms McNally,

RE: Application Number SSI 6307 – WestConnex Stage 1b: M4 East Environmental Impact Statement

I am writing to advise you that Leichhardt Council considered an item in relation to the subject matter at its meeting on 27 October 2015. In doing so, Council resolved (C522/15) to make a submission on the WestConnex Stage 1b: M4 East Environmental Impact Statement (EIS) – State Significant Infrastructure 6307. Council's submission is included in this letter and a copy of the relevant Council report is attached to provide additional detail on Council's consideration of the EIS.

Leichhardt Council has developed a comprehensive integrated planning approach over the past decade, commencing with its initial Strategic Plan (Leichhardt 2020) that was refined as Leichhardt 2025+. Included in this approach was the adoption of Leichhardt's Integrated Transport Plan in February 2014.

Through an extensive community consultation program, Leichhardt's Integrated Transport Plan established the following guiding principles:

- sustainable transport modes that meet user needs should be the priority for policy, investment and service provision decisions;
- the role of private motor vehicles for access to, and travel within, the City should be reduced to ease congestion and improve sustainable outcomes;
- transport modes and services must be integrated with other uses to create seamless and continuous access opportunities; and
- the development of a multi-layered, well-integrated transport system must consider and understand the needs of different users.

It is within this context that Leichhardt Council has prepared its submission on the Stage 1b: M4 East EIS.

Council's key submission points are as follows:

1. Council notes that critical matters in relation to the environmental and economic impact of the Sydney metropolitan area as a whole are not addressed in the released EIS for Stage 1b of WestConnex and therefore requests that these matters be addressed through the provision of further information on:

- a. the impact of Stage 1b, and of the completed proposal (Stages 1, 2 and 3), on Sydney's road infrastructure capacity and usage (such as the projections for average travel times, average lengths of journey and numbers of journeys across the Sydney network (as detailed on page five of the City of Sydney's/SGS report of April 2015);
 - b. the full detail of the business case for the completed WestConnex proposal, including full details and documentation for the amounts shown in the cost/ benefit analysis on page 21 of the Business Case executive summary;
 - c. the cost/benefits of the WestConnex project in relation to a proposal of similar scale directed to the development of mass public transport (light rail, heavy rail, underground metro rail and bus); and
 - d. the impacts on greenhouse gas emissions of a Sydney served by a completed WestConnex in comparison to a Sydney served by a mass public transport system of similar economic scale and geographical reach.
2. Due to the significant impacts and the shortage of information:
- a. Council is opposed to the building of the WestConnex tollway; and
 - b. the time allowed for EIS submissions for Stage 1b: M4 East has been inadequate for both Council and the community and that Council reiterates its request for 90 days.
3. Council is opposed to WestConnex Stage 1b: M4 East as the:
- a. proposed development, as outlined in the EIS, is inconsistent with the aims of Leichhardt Council's adopted Integrated Transport Plan and will not:
 - improve accessibility within and throughout the LGA;
 - create a legible, direct and safe pedestrian and cycling environment;
 - encourage public transport use;
 - provide a safe and efficient road network for all road users;
 - facilitate integration of land use, transport and community & cultural activities;
 - provide convenience for users of Leichhardt;
 - promote health and wellbeing;
 - improve environmental conditions; and
 - support Councils adopted 10 Year mode shift target of reduced private car use from 44% to 28%.
4. Council requests that the following be provided:
- a. Detailed information about Stages 2 and 3 is requested, including proposals for a northern tunnel extension and that such information

should be the subject of public exhibition to enable the community to make informed decisions about the WestConnex project in its entirety. The projected levels of congestion resulting from the completion of Stage 1b: M4 East is such that they appear to necessitate the completion of the M4-M5 Link. Consequently, it is considered that the Stage 1b: M4 East project cannot be considered in isolation of the overall WestConnex Motorway Project.

- b. Further information and consideration by the NSW State Government is requested to ensure that the WestConnex Project is considered in light of the extensive list of related urban projects outlined below. Stage 1b: M4 East EIS does not include definitive consideration of many of the major planning initiatives currently proposed in the Sydney Region, including:

- The Bays Precinct;
- Sydney Metro;
- Northern WestConnex Extension and new harbour crossing;
- Southern WestConnex Extension;
- Central to Eveleigh Urban Transformation;
- Green Square Town Centre;
- Parramatta light rail;
- Redevelopment of Macquarie Park;
- Redevelopment of Sydney Airport and Port Botany;
- Construction of the Western Sydney Airport; and
- Moorebank Intermodal Freight Terminal.

Council is concerned that the traffic modelling included in the EIS is limited and may significantly underestimate future traffic volumes and congestion that will be experienced both in the 2021 and 2031 scenarios. The significant investment of public and private funds which will be required to deliver the projects should justify a fully co-ordinated, evidence-based assessment of how the WestConnex project will contribute to the liveability and social, economic and environmental sustainability of the city.

The timing of the M4 East and the Parramatta Road Urban Transformation Program is such that the traffic model could not include the specific geo-demographic information that is likely to result from the Parramatta Road Urban Transformation Program.

Between the completion of Stage 1b: M4 East and opening of the M4-M5 Link, surface congestion on Parramatta Road and Dobroyd Parade will be such that it is highly likely traffic will divert to Leichhardt's surface road network.

- c. Additional modelling to enable assessment of the likely extent of these impacts on Leichhardt's surface roads. The key routes that require additional information/modelling are:
- Marion Street (and Ramsay Street);

- Flood Street;
- Tebbutt Street/Darley Road/City West Link;
- Tebbutt Street/Marion Street;
- Balmain Road;
- Catherine Street;
- Young Street; and
- Johnston Street.

Such routes have the potential to jeopardise the integrity of several of Leichhardt's precincts by reducing accessibility and amenity in these areas.

- d. Additional information regarding the measures that are proposed to be implemented to protect Leichhardt's residential neighbourhoods and main street shopping areas from additional through-traffic that may result from the Stage 1b: M4 East project.
- e. a condition of any approval be that the new right turn facility from Wattle Street (northbound) to Ramsay Street (eastbound) not be opened to traffic until Stage 3 of WestConnex (if approved) has been completed. This measure is sought to protect Leichhardt from the diversion of excessive amounts of traffic onto the Ramsay Street/Marion Street route.

It is requested that a condition of any approval be that the new right turn facility from the northbound tunnel exit to Waratah Street (eastbound) not be opened to traffic until Stage 3 of WestConnex (if approved) has been completed. This measure is sought to protect Leichhardt from the diversion of excessive amounts of traffic onto the Ramsay Street/Marion Street route.

- f. A review of the adequacy of the funds set aside as part of the Parramatta Road Urban Transformation Project to ensure that funds available will be sufficient to ameliorate congestion impacts, achieve amenity improvements and support liveability and economic objectives. In the event the M4 East is approved, funding will be required to implement place making and environmental improvements along Parramatta Road, Leichhardt.
- g. Additional information in relation to the measures proposed to ensure that hazardous goods vehicles do not attempt to divert from congested areas on Parramatta Road and Dobroyd Parade. It is noted that hazardous goods vehicles will not be permitted in the tunnel and consequently they will be using the surface road network.
- h. a detailed Construction Traffic Management Plan needs to be prepared for review by all affected Councils prior to any approval being issued.
- i. that the Department of Planning and Environment consider and respond to the issues outlined in the independent peer review of the air quality report which was an Appendix to the Council report. (refer to Attachment A to this submission). In summary, Council requests additional consideration and

release of information or imposition of conditions in the event of an approval in relation to the following matters:

- i. Confirmation is required that the NSW EPA has approved the alternative assessment methodology used in the EIS, as the approach does not satisfy all of the requirements of the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*. If the approach adopted in the EIS is not consistent with the relevant EPA requirements for modelling and assessment, further studies should be undertaken and publically exhibited to ensure that the assessment is undertaken in a manner consistent with the requirements of the EPA.
- ii. Consideration should be given to the combining of the two ventilation outlets (for the M4 East and M4-M5 projects that are proposed to be collocated – ‘back to back’) as it could address issues which will arise due to the differing height, volumetric flow, temperature and emissions concentrations. It could also yield savings in terms of energy consumption/costs and routine emission monitoring. If this option has already been considered and rejected confirmation of that study and its findings is sought.
- iii. If the combination of the two ventilation stacks has already been considered and rejected, the computational fluid dynamics of the interaction of the two separate ventilation outlets should be completed to accurately assess the dispersion of pollutants from the two ventilation outlets. This information should be made available to the public for comment.
- iv. Additional information regarding the ‘worst case’ assessment of air quality which considers the maximum emission rates (in g/s) and a peak congested scenario.
- v. There is a need for the completion of a quantitative construction air quality assessment, focusing on the risk of particulate impacts and including the potential for release of crystalline silica.
- vi. In the event of approval of the project the following conditions should be applied:
 - portal emission monitoring; and
 - dampers in the western ventilation outlet should be provided to allow for varying outlet diameters.
- j. local biodiversity plans, objectives, actions and data. Staff of relevant Councils, the Sydney Olympic Park Authority and the Parramatta River Catchment Group should be consulted in relation to local biodiversity plans, objectives, actions and data. Some species considered common throughout NSW and not protected by threatened species legislation, such as the superb fairy wren, are locally vulnerable and Councils and the local community are working to preserve these species. By focusing on the minimum requirement

to protect threatened species, populations and ecological communities only, the importance of biodiversity within the local urban context is over-looked.

- k. greater detail and documentation needs to be provided regarding the biodiversity survey including: the locations surveyed, time spent at each location, where species were found, photos and other documentation. Greater justification needs to be provided within the EIS regarding limiting the survey to a single day and two evening surveys.
- l. Further detail needs to be provided regarding how the loss of established vegetation is to be mitigated. The loss of 15.7 hectares of vegetation including 12.9 hectares of trees is not insignificant within the context of inner western Sydney.
- m. A thorough investigation is required of a public transport alternative and should include consideration of the greenhouse gas savings compared to the Stage 1b: M4 East project and WestConnex as a whole requires inclusion within the EIS. The scope of the public transport alternative considered in the EIS is limited and represents an unrealistic option. This option should have included a mix of public transport improvements, road capacity management initiatives, strategic land use planning, place making and site specific surface road upgrades.

If you require any further information please do not hesitate to contact Clare Harley, Manager Environment and Urban Planning on 9367 9226.

Yours sincerely,



Elizabeth Richardson
Acting Director
Environmental and Community Management

ITEM 3.1 WESTCONNEX STAGE 1 M4 EAST ENVIRONMENTAL IMPACT STATEMENT PUBLIC EXHIBITION

Division	Environment and Community Management
Author	Manager Environment and Urban Planning Strategic Transport Planner
Meeting date	27 October 2015 Ordinary meeting
Strategic Plan Key Service Area	Community well-being Accessibility Place where we live and work A sustainable environment

SUMMARY AND ORGANISATIONAL IMPLICATIONS

Purpose of Report	To provide Council with a draft submission on Stage 1b: M4 East Environmental Impact Statement of the WestConnex Motorway Project (State Significant Development Application 6307) , which is on public exhibition until 2 November 2015.
Background	The WestConnex motorway project was first proposed in the <i>NSW State Infrastructure Strategy 2012 – First Things First</i> and subsequently included in the <i>NSW Long Term Transport Master Plan</i>. The project comprises of three stages to connect the existing M4 motorway from Parramatta to the M5 motorway at Beverly Hills. On 9 September 2015, the WestConnex Delivery Authority submitted a development application and supporting Environmental Impact Statement (EIS) to the Department of Planning and Environment for Stage 1b: M4 East of the WestConnex project. This application proposes the extension of the M4 motorway with twin tunnels from Homebush Bay Drive, Homebush to City West Link Road/Parramatta Road at Haberfield.
Current Status	The M4 East Environmental Impact Statement (EIS) is on public exhibition until 2 November 2015.
Relationship to existing policy	Relates to previous resolutions: C480/12, C495/12, C85/13, C537/13, C11/14, C12/14, C99/14, C157/14, BDC164/14, C492/14 and C13/19P.

Financial and Resources Implications	NIL at this time
Recommendation	That Council: 1. Forward a submission to the Department of Planning and Environment and advise that Council is opposed to the State Significant Development Application (SSI-6307) for WestConnex Stage 1B: M4 East as the: a) proposed development, as outlined in the Environmental Impact Statement is inconsistent with the aims of Leichhardt Council's adopted Integrated Transport Plan and will not: i) improve accessibility within and throughout the LGA; ii) create a legible, direct and safe pedestrian and cycling environment; iii) encourage public transport use; iv) provide a safe and efficient road network for all road users; v) facilitate integration of land use, transport and community & cultural activities; vi) provide convenience for users of Leichhardt; vii) promote health and wellbeing; viii) improve environmental conditions; and ix) support Councils adopted 10 Year mode shift targets as identified in Table 2, including a reduction of private car use from 44% to 28%. 2. Advise the Department of Planning and Environment that Council requests additional information and data as outlined in Section 2 - Review of Stage 1b: M4 East Environmental Impact Statement, including: i) detailed information about Stages 2 and 3 of the WestConnex project; ii) further information and consideration by the NSW State government is requested to ensure that the WestConnex project is considered in light of the extensive list of related urban projects which are currently in planning and development phases; iii) a fully co-ordinated, evidence based assessment of how the WestConnex

	project will contribute to the liveability and social, economic and environmental sustainability of the city; iv) confirmation and verification of the population data used in the traffic modelling for both WestConnex Stage 1b EIS and the Parramatta Road Urban Transformation Strategy and the release of that information; v) additional modelling to enable assessment of the likely extent of impacts on Leichhardt's surface roads including: - o Marion Street (and Ramsay Street); - o Flood Street; - o Tebbutt Street/Darley Road/City West Link; - o Tebbutt Street/Marion Street; - o Balmain Road; - o Catherine Street; - o Young Street; and - o Johnston Street. vi) additional information regarding the measures that are proposed to be implemented to protect Leichhardt's residential neighbourhoods and main street shopping areas from additional through-traffic that may result from the Stage 1b: M4 East project; vii) a condition that any approval be that the new right turn facility from Wattle Street (northbound) to Ramsay Street (eastbound) not be opened to traffic until Stage 3 of WestConnex (if approved) has been completed; viii) a review of the adequacy of the funds set aside as part of the Parramatta Road Urban Transformation Project in light of the detail in the EIS to ensure that funds available will be sufficient to ameliorate congestion impacts, achieve amenity improvements and support liveability and economic objectives; ix) additional information about measures to ensure that Hazardous Goods vehicles do not attempt to divert from congested areas on Parramatta Road and Dobroyd Parade; x) a detailed Construction Traffic
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- Management Plan be prepared for review by all affected Councils prior to any approval being issued;
- xi) confirmation that the NSW EPA has approved the alternative air quality assessment methodology used in the EIS. If the approach adopted in the EIS is not consistent with the relevant EPA requirements for modelling and assessment, further studies should be undertaken and publically exhibited;
 - xii) consideration of combining the two ventilation outlets (for the M4 East and M4-M5 projects). If this option has already been considered and rejected, confirmation of that study and its findings is requested;
 - xiii) if the combination of the two ventilation stacks has already been considered and rejected, the computational fluid dynamics of the interaction of the two separate ventilation outlets should be completed to accurately assess the dispersion of pollutants from the two ventilation outlets. This information should be made available to the public for comment;
 - xiv) additional information regarding the 'worst case' assessment of air quality which considers the maximum emission rates (in g/s) and a peak congested scenario;
 - xv) a quantitative construction air quality assessment, focusing on the risk of particulate impacts and including the potential for release of crystalline silica;
 - xvi) a condition of any approval be include a need for:
 - o Portal emission monitoring
 - o Dampers in the western ventilation outlet should be provided to allow for varying outlet diameters.
 - xvii) staff of relevant Councils, the Sydney Olympic Park Authority and the Parramatta River Catchment Group to be consulted with regards to local biodiversity plans, objectives, actions and data;
 - xviii) greater detail and documentation regarding the survey including the

	locations surveyed, time spent at each location, where species were found, photos and other documentation. xix) further detail regarding how the loss of established vegetation is to be mitigated; and xx) a thorough investigation of public transport alternatives which includes consideration of the greenhouse gas savings compared to the Stage 1b: M4 East project and WestConnex. This information should be placed on public exhibition for community consideration prior to decision making about the project.
Notifications	NIL
Attachments	Attachment 1 : Independent Peer Review – Appendix H, Air Quality Assessment, West Connex M4 East Air Quality Assessment

Purpose of Report

To provide Council with a draft submission on Stage 1b: M4 East Environmental Impact Statement of the WestConnex Motorway Project, which is on public exhibition until 2 November 2015.

Recommendation

That Council:

1. Forward a submission to the Department of Planning and Environment and advise that Council is opposed to the State Significant Development Application (SSI-6307) for WestConnex Stage 1B: M4 East as the:

a) proposed development, as outlined in the Environmental Impact Statement is inconsistent with the aims of Leichhardt Council's adopted Integrated Transport Plan and will not:

- i) improve accessibility within and throughout the LGA;
- ii) create a legible, direct and safe pedestrian and cycling environment;
- iii) encourage public transport use;
- iv) provide a safe and efficient road network for all road users;
- v) facilitate integration of land use, transport and community & cultural activities;
- vi) provide convenience for users of Leichhardt;
- vii) promote health and wellbeing;
- viii) improve environmental conditions; and
- ix) support Councils adopted 10 Year mode shift targets as identified in Table 2, including a reduction of private car use from 44% to 28%.

2. Advise the Department of Planning and Environment that Council requests additional information and data as outlined in Section 2 - Review of Stage 1b: M4 East Environmental Impact Statement, including:

- i) detailed information about Stages 2 and 3 of the WestConnex project;
- ii) further information and consideration by the NSW State government is requested to ensure that the WestConnex project is considered in light of the extensive list of related urban projects which are currently in planning and development phases;
- iii) a fully co-ordinated, evidence based assessment of how the WestConnex project will contribute to the liveability and social, economic and environmental sustainability of the city;
- iv) confirmation and verification of the population data used in the traffic modelling for both WestConnex Stage 1b EIS and the Parramatta Road Urban Transformation Strategy and the release of that information;
- v) additional modelling to enable assessment of the likely extent of impacts on Leichhardt's surface roads including:
 - o Marion Street (and Ramsay Street);
 - o Flood Street;
 - o Tebbutt Street/Darley Road/City West Link;
 - o Tebbutt Street/Marion Street;
 - o Balmain Road;

- o Catherine Street;
 - o Young Street; and
 - o Johnston Street.
- vi) additional information regarding the measures that are proposed to be implemented to protect Leichhardt's residential neighbourhoods and main street shopping areas from additional through-traffic that may result from the Stage 1b: M4 East project;
- vii) a condition that any approval be that the new right turn facility from Wattle Street (northbound) to Ramsay Street (eastbound) not be opened to traffic until Stage 3 of WestConnex (if approved) has been completed;
- viii) a review of the adequacy of the funds set aside as part of the Parramatta Road Urban Transformation Project in light of the detail in the EIS to ensure that funds available will be sufficient to ameliorate congestion impacts, achieve amenity improvements and support liveability and economic objectives;
- ix) additional information about measures to ensure that Hazardous Goods vehicles do not attempt to divert from congested areas on Parramatta Road and Dobroyd Parade;
- x) a detailed Construction Traffic Management Plan be prepared for review by all affected Councils prior to any approval being issued;
- xi) confirmation that the NSW EPA has approved the alternative air quality assessment methodology used in the EIS. If the approach adopted in the EIS is not consistent with the relevant EPA requirements for modelling and assessment, further studies should be undertaken and publically exhibited;
- xii) consideration of combining the two ventilation outlets (for the M4 East and M4-M5 projects). If this option has already been considered and rejected, confirmation of that study and its findings is requested;
- xiii) if the combination of the two ventilation stacks has already been considered and rejected, the computational fluid dynamics of the interaction of the two separate ventilation outlets should be completed to accurately assess the dispersion of pollutants from the two ventilation outlets. This information should be made available to the public for comment;
- xiv) additional information regarding the 'worst case' assessment of air quality which considers the maximum emission rates (in g/s) and a peak congested scenario;
- xv) a quantitative construction air quality assessment, focusing on the risk of particulate impacts and including the potential for release of crystalline silica;
- xvi) a condition of any approval be include a need for:
 - o Portal emission monitoring
 - o Dampers in the western ventilation outlet should be provided to allow for varying outlet diameters.
- xvii) staff of relevant Councils, the Sydney Olympic Park Authority and the Parramatta River Catchment Group to be consulted with regards to local biodiversity plans, objectives, actions and data;
- xviii) greater detail and documentation regarding the survey including the locations surveyed, time spent at each location, where species were found, photos and other documentation.
- xix) further detail regarding how the loss of established vegetation is to be mitigated; and

- xx) a thorough investigation of public transport alternatives which includes consideration of the greenhouse gas savings compared to the Stage 1b: M4 East project and WestConnex. This information should be placed on public exhibition for community consideration prior to decision making about the project.

Background

The WestConnex motorway project was first proposed in the *NSW State Infrastructure Strategy 2012 – First Things First* and subsequently included in the *NSW Long Term Transport Master Plan*. The project comprises three stages to connect the existing M4 motorway from Parramatta to the M5 motorway at Beverly Hills.

On 9 September 2015, the WestConnex Delivery Authority submitted a development application and supporting Environmental Impact Statement (EIS) to the Department of Planning and Environment for Stage 1b: M4 East of the WestConnex project. This application proposes the extension of the M4 motorway with twin tunnels from Homebush Bay Drive, Homebush to City West Link Road/Parramatta Road at Haberfield.

Report

1 Strategic Context

The WestConnex motorway project was first proposed in the *NSW State Infrastructure Strategy 2012 – First Things First*. Table 1 summarises the key forward planning documents which have been prepared by the NSW State government and which make reference to the WestConnex Motorway Project.

Date	Document	Details
October 2012	<i>NSW State Infrastructure Strategy 2012 – First things first</i>	Recommended that the NSW Government progress the development of the WestConnex motorway and that the urban renewal of Parramatta Road be placed at the heart of the WestConnex project. Key benefits included: - relieving congestion on the existing M4/Parramatta Road and M5 East; - supporting freight movements between Sydney's Gateways and the logistic hubs in Western and South Western Sydney; - supporting people movements to Sydney Airport; - acting as a catalyst for urban regeneration along key corridors, particularly Parramatta Road; - enhancing orbital road connectivity South and West of the CBD; and - facilitating improvements in public transport, particularly on the Parramatta Road corridor.
December 2012	<i>NSW Long Term Transport Master Plan</i>	WestConnex identified as an immediate priority to complete critical links in Sydney's motorway network. Also shown on plans are the following connections to WestConnex: - WestConnex Northern Extension – tunnel link enabling a connection to Victoria Road and Anzac Bridge from the WestConnex Motorway. - WestConnex Southern Extension – tunnel link between the M5 and Presidents Avenue, Rockdale.

		- Western Harbour Tunnel – proposed new harbour tunnel to provide a link between WestConnex and North Sydney, bypassing Sydney's CBD. - Beaches Link – proposed tunnel from Seaforth to the Warringah Freeway.
November 2014	<i>Rebuilding NSW – NSW Infrastructure Strategy Update 2014</i>	NSW Government released an update to the <i>NSW State Infrastructure Strategy 2012 – First things first</i> that outlined an amended, northern alignment route for Stage 3 M4-M5 link of the WestConnex motorway for further analysis. The Update also included the proposed motorway connections identified in the <i>NSW Long Term Transport Master Plan</i> .
December 2014	<i>A Plan for Growing Sydney 2014</i>	Plan identifies the need to set aside corridors for future road infrastructure, including: - WestConnex Motorway and its extensions; - Beaches Link; and - Western Harbour Tunnel. Proposes that the WestConnex Motorway will be: - catalyst for major urban renewal and regeneration along the Parramatta Road corridor; - support Sydney Airport and Port Botany; - allow the transformation of centres and suburbs due to decreased traffic on the Parramatta Road corridor; - improvements to local amenity by reducing through traffic on surface roads and allowing for enhanced north-south local connectivity; and - Government will investigate the feasibility of light rail along Parramatta Road for the length of the corridor.

Table 1 - WestConnex Strategic Planning

The WestConnex motorway project is being progressed by the WestConnex Delivery Authority and has three stages:

- **Stage 1: M4**
 - o **Stage 1a:** M4 Widening – Parramatta to Homebush; and
 - o **Stage 1b:** M4 East - the extension of the M4 between Homebush and Haberfield in the form of the twin tunnels, the subject of the current application and environmental impact statement;
- **Stage 2: New M5**
 - o King Georges Road intersection upgrade; and
 - o King Georges Road, Beverly Hills to St Peters; and
- **Stage 3: M4 – M5 link**
 - o proposed twin tunnels between Haberfield to St Peters.

Figure 1 illustrates the three stages of the WestConnex motorway project, including the anticipated start and completion years of each stage.

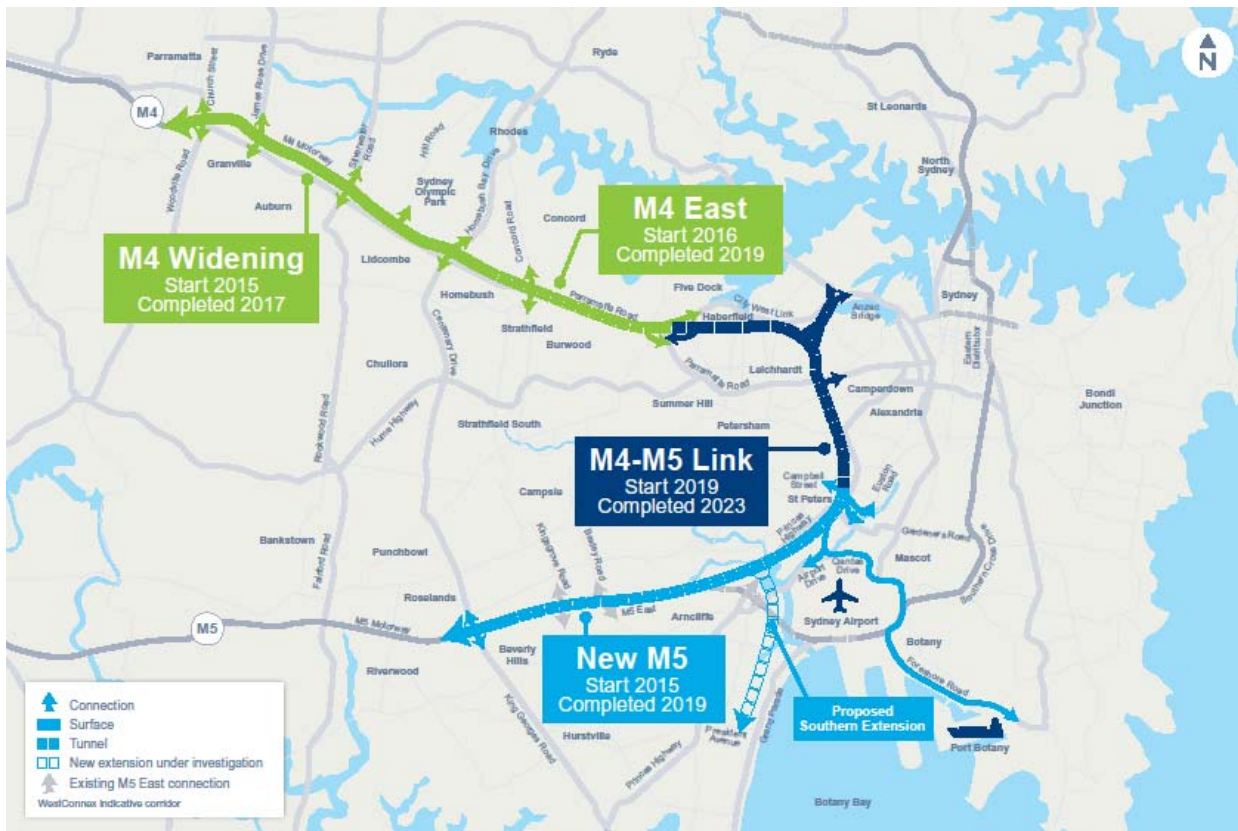


Figure 1: WestConnex motorway project map with stages identified

1.1 Summary of Stage 1b: M4 East Project

Stage 1b: M4 East includes the construction and operation of the following key features:

- widening, realignment and resurfacing of the M4 motorway between Homebush Bay Drive and Underwood Road at Homebush;
- upgrade of the existing Homebush Bay Drive interchange to connect the western end of the new tunnels to the existing M4 and Homebush Bay Drive,
- two new three-lane tunnels (the mainline tunnels), one eastbound and one westbound, extending from west of Pomeroy Street at Homebush to near Alt Street at Haberfield, where they would terminate until the completion of the possible future M4–M5 Link (which is subject to planning approval). Each tunnel would be about 5.5 kilometres long and would have a minimum internal clearance (height) to in-tunnel services of 5.3 metres;
- an interchange at Wattle Street (City West Link) at Haberfield, with an on-ramp to the westbound tunnel and an off-ramp from the eastbound tunnel. The project also includes on and off-ramps at this interchange that would provide access to the M4–M5 Link
- an interchange at Parramatta Road at Ashfield/Haberfield, with an on-ramp to the westbound tunnel and an off-ramp from the eastbound tunnel.
- installation of tunnel ventilation systems, including ventilation facilities at the corner of Parramatta Road and Wattle Street at Haberfield (eastern ventilation facility) to

serve both the M4 East and M4–M5 Link projects. Provision has also been made for a fresh air supply facility at Cintra Park at Concord;

- associated surface road work on the arterial and local road network
- pedestrian and cycle facilities,
- tunnel support systems and services such as electricity substations, fire pump rooms and tanks, water treatment facilities, and fire and life safety systems including emergency evacuation infrastructure;
- motorway operations complex on the northern side of the existing M4, east of the Homebush Bay Drive interchange, installation of tolling gantries and traffic control systems, new and modified noise walls;
- provision of road infrastructure and services to support the future implementation of smart motorway operations

1.2 Local context

Over the past ten years Leichhardt Council has established a specific strategic position regarding many environmental issues. This position includes a positive stance on the reduction of private car dependency and a conversion of private car travel to more sustainable transport modes (public transport and active transport). Additionally, Council's various strategic documents strongly support environmental improvements and contain numerous objectives relating to the achievement of practical sustainability within an enhanced urban environment.

Key to this is Council's concern regarding increased use of private vehicles, particularly at the expense of public and active transport. This position is clearly stated in many of Leichhardt's strategic documents including:

- Leichhardt 2025;
- Integrated Transport Plan;
- Environmental Sustainability Plan;
- Community and Cultural Plan;
- Employment and Economic Development Plan;
- Local Environment Plan; and
- Development Control Plan.

Prior to its inclusion in Council's strategies, this position was the subject of extensive research, benchmarking against world's best practice examples and extensive public consultation. In developing its objective to reduce private car dependency, in favour of sustainable transport, Council considered many issues, including:

- public health;
- community health and well-being;
- road safety;

- mode choice, travel desire-lines and community-wide travel characteristics;
- opportunities for environmental improvement including air quality and noise;
- place making and community building elements such as; opportunities to:
 - o reduce area isolation associated with large traffic volumes which create barriers between communities;
 - o improve visual amenity and streetscape;
- economic considerations relating to:
 - o enhanced vitality of main street shopping areas; and
 - o road maintenance.

The Leichhardt 2025+ Strategic Plan provides direction for all other strategies prepared by Council. In summary, it highlights Council's desire to:

- reduce car dependency;
- encourage the use of public transport;
- achieve integration between land use, transport and community/cultural development;
- promote the health and well-being of its community; and
- develop a connected, sustainable, liveable environment.

Subsequently all of Council's strategic plans have incorporated Leichhardt 2025+'s various goals and objectives. Of particular note in relation to the M4 East are the principles contained in Leichhardt's Integrated Transport Plan (ITP).

Building on the direction provided by Leichhardt 2025+, and integrating with other strategies (including the Community and Cultural Plan and Environmental Sustainability Plan), Leichhardt's Integrated Transport Plan (ITP) was developed after two years of research and community consultation. The ITP was subsequently adopted in February 2014.

Through the ITP's community consultation, the following Guiding Principles were established:

- sustainable transport modes that meet user needs should be the priority for policy, investment and service provision decisions;
- the role of private motor vehicles for access to, and travel within, the City should be reduced to ease congestion and improve sustainable outcomes;
- transport modes and services must be integrated with other uses to create seamless and continuous access opportunities; and
- the development of a multi-layered, well-integrated transport system must consider and understand the needs of different users.

In particular, the ITP objectives aim to:

- improve accessibility within and throughout the LGA;
- create a legible, direct and safe pedestrian and cycling environment;
- encourage public transport use;
- provide appropriate levels of parking;
- provide a safe and efficient road network for all road users;
- facilitate integration of land use, transport and community & cultural activities;
- provide convenience for users of Leichhardt;
- promote health and wellbeing; and
- improve environmental conditions.

Intrinsic to the ITP is also a series of 10 Year Mode Shift Targets, as shown in Table 2. Of particular relevance to the M4 East Environmental Impact Statement, are the targets to reduce private car use from 44% to 28%.

Mode	Existing	Proposed	Change
Vehicle driver	32%	20%	-12%
Vehicle passenger	12%	8%	-4%
Train	2%	2%	-
Bus	12%	14%	+2%
Walk only	36%	40%	+4%
Other modes	6%	1%*	-
Cycling	-	10%	-
Light Rail	-	5%	-
Total	100%	100%	-

* Excludes cycling and light rail

Table 2 – Leichhardt Integrated Transport Plan 10 Year Mode Shift Targets

1.2.1 Council resolutions

Council has previously considered the WestConnex Motorway Project on a number of occasions. (Refer to Table 3.)

Date	Resolution	Summary of resolutions
October 2012	C480/12	• Write to the Minister for Planning and Infrastructure and Transport to request the creation of a WestConnex Taskforce that comprises of representatives of State Government agencies and affected Councils. • Confirm that Council's priority is for increased and better public transport.

		Request information regarding the proposed alignment of the WestConnex motorway and ventilation stacks.
October 2012	C495/12	Request that the NSW Government amend the Draft NSW Long Term Transport Master Plan to incorporate information on the merits and impacts of transit-oriented development undertaken in the context of motorway development such as the WestConnex project relative to transit-oriented development in the context of heavy rail, light rail or 'metro rail' type transit corridors.
March 2013	C82/13	- Write to the Minister for Roads and Maritime Services requesting that Council be represented through a decision making Taskforce to enable them to be informed about the implications of the project for the local community. - Hold a public meeting to inform residents and businesses about details of the WestConnex project.
November 2013	C573/13	- Write to the WestConnex Delivery Authority and Urban Growth and request that Council be provided with the following information specific to the WestConnex motorway: - testing of various toll scenarios and their impact on surface traffic volumes; - mode share assumptions and measures proposed to achieve the proposed mode share; - density assumptions for the designated "investigation areas"; - additional traffic and public transport modelling and analysis of the WestConnex motorway that takes into account: - the forecast population levels associated with the urban revitalisation project, including its geographic distribution; - a series of land use revitalisation scenarios that examine a variety of land use scenarios along the corridor (including a scenario that maintains existing densities in the eastern section of Parramatta Road); - reductions in width of Parramatta Road, to 1 through lane and 1 public transport lane in each direction, between Hawthorne Canal and Camperdown; - the 'constrained case' for Sydney's Kingsford-Smith Airport (as discussed in the 'Joint Study on Aviation Capacity of the Sydney Region') in combination with a new major airport in Sydney's western suburbs; - locations being considered for 'Urban Activation Precincts' in the local government area and inner west generally; - any urban design/built form analysis completed in relation to the route, in particular within Leichhardt; - any urban economic modelling carried out in relation to the route, in particular within Leichhardt, covering matters such as FSR, value capture etc; - any traffic / transport modelling relating to vehicle numbers using the tunnel and vehicle numbers using the ground level route, especially in relation to Leichhardt; - a comprehensive community consultation programme be instigated to consult with the Leichhardt Community on the WestConnex motorway; - given the scarcity of the data and evidence about the benefits of the WestConnex motorway, that Council is unable to support it at this time; - that the NSW Government project public information on the WestConnex, including: - the exact route;

		- the location of entry and exit ramps; - the location of the air pollution stacks; - the analyses done on travel times/vehicle volumes/peak hour traffic; - the analyses done on the routes of trucks/cars that don't want to pay the toll; - location of additional parking for additional cars reaching the Inner West and CBD; and - the cost benefit ratio. - That Leichhardt Council convene a meeting with nearby councils (inviting all interested Councillors) that have already come out opposing the WestConnex (Marrickville, Ashfield) to discuss how best to collaborate moving forward.
February 2014	C11/14	- Council agrees to participate in the Mayoral Governance Group in order to represent Council's views on the WestConnex. - Write to all members of the Legislative Council requesting that they urgently support the release of the business case for the WestConnex project.
April 2014	C99/14	- Mayor write to all NSW MPs asking that they seek the appointment of a mediator to consider the release of the papers that have been restricted through parliamentary privilege with particular focus on the release of the information as has been requested by Leichhardt Council. - Council reiterate its request for outstanding information on the WestConnex project.
February 2015	C13/15P	- Note that in December 2014 the WestConnex Delivery Authority announced an amendment to the proposed alignment of Stage 3 of the WestConnex motorway. - Note that the WestConnex motorway, including the M4-M5 link (between Haberfield and St Peters) and a potential harbour tunnel extension from Rozelle Goods Yard are illustrated in <i>A Plan for Growing Sydney</i>, the <i>NSW Infrastructure Strategy Update 2014</i> and the <i>NSW Long Term Transport Master Plan 2012</i>. - Write to the WestConnex Delivery Authority and Minister for Roads and Maritime Services stating concern that the WestConnex motorway proposal in conjunction with other recent motorway announcements has the potential to: - Result in increased motorway catchment that may alter surface road travel times consequently both attracting additional traffic and potentially diminishing the attractiveness of adjacent public transport; - Impact on the distribution of traffic desire lines along its length, and consequently increasing the number of vehicles at the various portals and on associated surface feeder roads; - Attract additional cars that may impact on the capacity of the motorway to accommodate the additional truck movements that it was originally intended to capture; - Experience higher than expected traffic levels discharging onto Parramatta Road, the City West Link and nearby streets, from Stage 1 prior to the completion of Stage 3; - Result in increased filtration of surface traffic ("rat runs") through Leichhardt's streets endeavouring to access tunnel portals; - Result in detrimental air quality issues associated with increased traffic, associated with the greater than previously planned motorway catchment, as well as the various tunnel vents that will be required. - Note the findings of the NSW Auditor General's report on the WestConnex of December 2014, that found serious flaws in the

		project's governance, and lack of independent monitoring of the project's concept, business case and monitoring.
February 2015	C14/15P	Council support the call for a Parliamentary inquiry into WestConnex.
June 2015	C292/15	- Note that \$40,000 has been allocated in the 2015/16 budget for studies of the WestConnex project. - Establish a taskforce, made up of 3 Councillors (elected by proportional representation) to oversee the expenditure of funds allocated to WestConnex planning studies. Members of the WestConnex Action Groups are to be invited to meet with the Taskforce to contribute to this planning.
August 2015	C354/15P	- Council write to the Premier and the Minister for Planning requesting that the exhibition period for the WestConnex M4 East, New M5 and all future WestConnex Environmental Impact Statements be a minimum of 90 days. - Council write to the Premier and the Minister for Planning its concern at the piecemeal approach to consideration of the planning issues through the EIS process and the need to consider WestConnex as a whole project. - Council write to the Premier and the Minister for Roads, Maritime and Freight the need for the immediate release of the detailed WestConnex business case.

Table 3 - Council's previous resolutions of WestConnex

1.3 Council's Pre-Environmental Impact Statement Submission

Council has previously provided the Department of Planning and Environment with feedback about the matters that needed to be included in the Stage 1b: M4 East Environmental Impact Statement. The current EIS does not address all of the issues that Council requested. (Refer Table 4)

Leichhardt Council comment		EIS response
Air quality	Concerned about air quality impacts from increased traffic as well as from tunnel ventilation outlets.	Chapter 9 (Air quality)
Concept design	Provide background studies, designs and assumptions that have informed the development of WestConnex, including the cost benefit analysis.	Chapter 3 (Strategic context and project need) Chapter 14 (Social and economic)
	Document mode share assumptions and measures proposed.	Chapter 8 (Traffic and transport)
Consultation	A comprehensive consultation program with more detailed information is required for both the M4 and urban renewal projects.	Section 7.6 (Future Consultation)
Economic	Undertake urban economic modelling in relation to the route covering matters such as floor space ratios and value capture.	Beyond the scope of this EIS as the project does not include urban renewal.
Funding	Detail financial modelling carried out in relation to the route, in particular modelling that relates to the proposed toll.	Refer to the WestConnex Business Case
Traffic and	Assess traffic modelling relating to vehicle numbers using the tunnel and vehicle numbers using surface roads.	Section 8.3 Section 8.4

transport	Assess impact on local roads.	Chapter 8 (Traffic and transport) Appendix D
	Detail information on the testing of toll scenarios and impact on surface traffic volumes.	Chapter 8 (Traffic and transport) Appendix D
Urban renewal	Detail scenarios being tested in relation to residential densities, land use mix and population in UrbanGrowth NSW's proposed Integrated Land Use and Transport Structure Plan.	Beyond the scope of this EIS
	Identify the implementation timetable for the Parramatta Road Urban Revitalisation Program.	Beyond the scope of this EIS
	Detail the locations and population growth being considered for urban activation precincts along the Parramatta Road corridor.	Chapter 3 (Strategic context and project need)
	Detail density assumptions for the designated 'investigation areas' as identified by UrbanGrowth NSW.	Chapter 3 (Strategic context and project need)
	Detail urban design/built form analysis completed in relation to the route..	Chapter 13 (Urban design and visual amenity)
	All scenarios and supporting information prepared as part of UrbanGrowth NSW's Integrated Land Use and Transport Structure Plan process should be placed on public exhibition prior to finalisation.	Beyond the scope of this EIS as the project does not include urban renewal.

Table 4 – Council Comments Prior to Preparation of EIS

1.4 Other Considerations

In December 2014, the City of Sydney engaged SGS Economics and Planning to undertake a strategic review of the WestConnex proposal. This was completed in February 2015. A review of that report indicates that the key findings were:

- increased clustering of jobs with good access to public transport has resulted in decreased value of recent motorway projects (Cross City Tunnel and Lane Cove Tunnel);
- there has been an increase in rail patronage and decrease in growth of kilometres travelled by car;
- Sydney has differing levels of public transport accessibility that can result in concentrations of social and economic disadvantage;
- construction of Sydney's second airport at Badgerys Creek and intermodal terminals around Sydney may mean the M5 extensions are not required;
- it is unlikely that there will be sufficient demand to ensure viability of the WestConnex toll roads;
- it is not guaranteed that WestConnex will remove traffic from local roads;
- stated travel time savings are a result of the construction of all the road sections;
- the need for large scale public works to stimulate additional economic activity is questionable;
- alternatives to support Sydney's population and economic growth are available.

The City of Sydney also engaged SGS Economics and Planning with Veitch Lister Consulting to undertake detailed transport modelling to assess the impacts of the WestConnex motorway using the Zenith transport model. Key findings of the modelling include:

- WestConnex will only make minor differences to Sydney's traffic;
- WestConnex will not improve access to the Sydney CBD;
- traffic flows on parts of Parramatta Road will increase by over 20 per cent as vehicles avoid paying the toll;
- there will be increased traffic volumes on the M5 East by up to 25 percent;
- there will be increased congestion on local road networks around St Peters; and
- the construction of the first two stages of the West Connex project is likely to result in a need for the construction of the proposed northern extension and southern extension to support WestConnex.

Copies of these two reports are available at <http://www.cityofsydney.nsw.gov.au/council/news-and-updates/featured-articles/westconnex-wont-benefit-sydney>.

2. Review of Stage 1b: M4 East Environmental Impact Statement

Council officers have reviewed the Environmental Impact Statement and identified the following key issues that have direct relevance to the Leichhardt local government area:

- traffic and transport;
- air quality
- biodiversity; and
- greenhouse gases.

2.1 Traffic and transport

The following traffic and transport impacts of Stage 1b: M4 East have been assessed:

- modelling;
- medium term impacts - impacts on the Leichhardt local government area between the completion of the M4 East and the M4-M5 Link (2019 – 2023);
- long term impacts - impacts on Leichhardt local government area subsequent to the completion of the M4-M5 Link;
- travel time savings;
- public transport;
- active transport; and
- construction traffic.

2.1.1 Modelling

The traffic model examined five key scenarios:

- existing case (2012) – current road network with no new projects or upgrades;
- 'do minimum' (2021) – assumes that the King Georges Road Interchange Upgrade and the M4 Widening projects are complete, but the remaining WestConnex projects, including the M4 East, are not built. It is called 'do minimum' rather than 'do

nothing' as it assumes that projects currently incomplete but scheduled for opening prior to the assessment year are operational, thus the network conditions are different to the existing case (2012);

- 'do something' (2021) – as per 'do minimum' with Stage 1b: M4 East complete and open to traffic, but without any other proposed future WestConnex projects. This scenario includes provision of kerbside bus lanes on Parramatta Road between Burwood Road at Burwood and Chandos Street at Haberfield/Ashfield (however, these bus lanes do not form part of the project);
- 'do minimum' (2031) – a future network including the King Georges Road Interchange Upgrade and M4 Widening projects and some upgrades to the broader transport network, but does not include the project or any other proposed future WestConnex projects;
- 'do something' (2031) – all WestConnex projects are complete, and also includes the Sydney Gateway and the Southern Extension. Bus lanes were included in this scenario as per the 2021 'do something' scenario, along with an eastbound bus lane from west of Hume Highway at Ashfield to east of Sloane Street at Haberfield/Summer Hill, and a westbound bus lane from west of Norton Street at Leichhardt to Hume Highway at Ashfield (however, these bus lanes do not form part of the project).

Information provided on the modelling for the Stage 1b: M4 East Environmental Impact Statement indicates that a region-wide approach has been used to assess the likely impacts of the project. Concern is expressed that the timing of the M4 East and the Parramatta Road Urban Transformation Program is such that the traffic model could not include the specific demographic information that is likely to result from the Parramatta Road Urban Transformation Program.

Given the varying states of progress of many major initiatives in Sydney, it is considered that the project modelling could not adequately include sufficient detail on the following:

- The Bays Precinct;
- Sydney Metro;
- Northern WestConnex Extension and new harbour crossing;
- Southern WestConnex Extension;
- Central to Eveleigh Urban Transformation;
- Green Square Town Centre;
- Parramatta Light Rail;
- Parramatta Road Light Rail;
- Redevelopment of Macquarie Park;
- Redevelopment of Sydney Airport and Port Botany;
- Construction of the Western Sydney Airport; and
- Moorebank Intermodal Freight Terminal.

All of these projects have the potential to alter travel demand and behaviour across the Sydney Region.

In conjunction with Stage 1b: M4 East, it is proposed that there is an opportunity to significantly increase public transport availability within the Parramatta Road Corridor by providing bus lanes on Parramatta Road and increasing the frequency of services by up to an additional 30 buses/hr during peak periods.

In this assessment it has been assumed that the 2021 'do something' option includes modelling of bus lanes between Burwood and Haberfield, while the 2031 'do something' option includes modelling of the 2021 bus lanes, with the addition of an eastbound bus lane between Hume Highway and Sloane Street and a westbound bus lane between Norton Street and the Hume Highway.

However, it is unclear to what extent these services have been included in the modelling, as the Environmental Impact Statement notes that *"these bus lanes do not form part of the project"*. Additionally, it is unclear whether construction traffic has been included in the modelling for the 2021 scenarios.

Much of the modelling data included in the EIS indicates an analysis by the West Connex Delivery Authority of major roads, particularly Parramatta Road and Dobroyd Parade. However, several key surface routes appear to have been neglected. These routes include:

- Ramsay Street/Marion Street;
- Flood Street/ Marion Street; and
- Tebbutt Street/Darley Road/City West Link.

Of particular concern to in relation to the Leichhardt Council area is the likely impact on Marion Street, which has the potential to act as a route by-passing the projected congestion on Parramatta Road and Dobroyd Parade.

2.1.2 Medium Term impacts (2019-2023) – impacts on the Leichhardt LGA between the completion of the Stage 1b:M4 East and Stage 3 - M4-M5 Link

Increased congestion and correspondingly reduced levels of service at key intersections along Parramatta Road and Dobroyd Parade are likely to result in increased through-traffic filtration and loss of amenity in the Leichhardt LGA. As indicated in Tables 6 and 7, the following intersections are of concern:

- Dalhousie Street/Parramatta Road;
- Sloane Street/Parramatta Road;
- Flood Street/Parramatta Road;
- Norton Street/Parramatta Road;
- Crystal Street//Parramatta Road; and
- Dobroyd Parade/Timbrell Drive.

Location	Peak Period Levels of Service									
	2012 Base Case		2021 "Do Minimum"		2021 "Do Something"		2031 "Do Minimum"		2031 "Do Something"	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Parramatta Road/Dalhousie Street	C	B	C	B	E	C	C	B	B	D
Parramatta Road/Sloane Street	D	C	C	C	F	F	C	C	C	B
Parramatta	D	D	D	D	D	D	F	F	E	D

Road/Flood Street										
Parramatta Road/Norton Street	E	D	E	D	F	E	F	F	D	F
Parramatta Road/Crystal Street	F	D	F	F	F	F	F	F	C	F
Dobroyd Parade/Timbrell Drive	E	D	D	C	F	F	D	D	F	F

Table 6 – Projected Levels of Service of Key Intersections

Level of Service (LOS)	Average Delay per vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

Table 7 – Explanation of Level of Service

Of particular note is that the ‘level of service’ analysis shows that:

- In 2021 the “Do Something” option will result in higher levels of congestion (than the “Do Minimum” option) at the following intersections:
 - o Parramatta Road/ Dalhousie Street;
 - o Parramatta Road/Sloane Street;
 - o Parramatta Road/ Norton Street
 - o Dobroyd Parade/Timbrell Drive.
- In the 2031 the “Do Something” option will again result in higher levels of congestion (than the “do Minimum” option) for:
 - o Parramatta Road/Dalhousie Street during the PM peak;
 - o Dobroyd Parade/Timbrell Drive during both the AM and PM peak periods.

The likely implication of such congestion will be the diversion of traffic from Parramatta Road and Dobroyd Parade/City West Link, to:

- Ramsay Street/Marion Street;
- Flood Street/Marion Street;
- Tebbutt Street/Darley Road/City West Link;
- Tebbutt Street/Marion Street.

Additionally, some traffic may divert to:

- Balmain Road;

- Catherine Street;
- Young Street; and
- Johnston Street; and
- other routes outside Leichhardt LGA.

There is no evidence in the Environmental Impact Statement that any modelling of the local surface road network has been conducted, and requests to the WestConnex Delivery Authority for such modelling have not produced any specific data.

The development of such through routes has the potential to significantly impact on local amenity and safety, particularly if heavy vehicles are included in the traffic mix. This traffic will also conflict with the Parramatta Road Urban Transformation Program's proposal to substantially increase population density in the area and to encourage Tebbutt Street to become that precinct's new Main Street.

Significantly adding to the likelihood of traffic diverting to the Ramsay Street/Marion Street route is the proposed provision of a right turn link from Wattle Street (northbound) to Ramsay Street (eastbound). This movement is currently prohibited. In the return direction, road capacity for movement between Ramsay Street (westbound) and both Frederick Street and Parramatta Road has also been substantially increased.

2.1.3 Long Term Implications

In assessing the long term implications of the Stage 1b: M4 East Project, the Environmental Impact Statement has provided a review of traffic circumstances likely to be experienced between the completion of Stage 1b: M4 East (2019) and the opening of the M4-M5 Link (2023). This review is referred to as the 2021 'Do Something' option. The 2031 'Do Something' option attempts to analyse the likely traffic conditions after completion of the total WestConnex project.

When compared to the 2031 'Do Minimum' option some improvement to conditions on Parramatta Road are indicated after completion of the M4-M5 Link. As shown in Table 8 these projected volumes continue to be larger than existing volumes.

Location	Average Peak Hour Volume				
	2012 Base Case	2021 "Do Minimum"	2021 "Do Something"	2021 "Do Minimum"	2031 "Do Something"
Parramatta Road near Norton Street	4083	4723	4845	5283	4245
Dobroyd Parade near Timbrell Drive	3735	5093	5481	5309	5432

Table 8 – Project Average Peak Hour Traffic Volumes

Similarly, in 2031 there is an improvement in the level of service of several intersections, namely Parramatta Road with Norton and Crystal Streets. However, Dobroyd Parade remains at a level of Service "F". It also should be noted that, in 2031, the Dobroyd Parade/Timbrell Drive intersection would operate better under the 'Do Minimum' scenario.

While the Environmental Impact Statement highlights long term reductions in traffic volumes, and improved levels of service at some intersections, notably Norton and Crystal Streets with Parramatta Road, this operational improvement is unlikely to be reflected in reduced route congestion because the mid-block levels of service of Parramatta Road (east of Crystal Street) remains at “F”.

2.1.4 Travel Time Savings

The Environmental Impact Statement places great emphasis on travel time savings, however, the validity of this is unclear in relation to the surface road links between Ashfield and Sydney CBD. While significant travel time savings are likely between Parramatta and Haberfield, increased congestion on both Parramatta Road and Dobroyd Parade/City West Link (particularly between the completion of the M4 East and the opening the M4-M5 Link) is likely to significantly reduce any travel time savings for the “whole of journey”.

2.1.5 Public Transport

It is noted that Leichhardt Council has previously requested that information be provided to the community about the merits and impacts of motorway development such as the WestConnex project relative to transit-oriented development such as heavy rail, light rail or ‘metro rail’ type transit corridors. No such information has been included in the EIS.

The Environmental Impact Statement proposes that there will be significant travel time savings for buses and a component of the argument in favour of the project is based on these savings. However, it is noted that the bus lanes and any other bus improvements are not part of the project and are not guaranteed.

Additionally, it is considered that these savings may be correct for the western part of Parramatta Road, however, the high levels of congestion anticipated (on Parramatta Road and Dobroyd Parade) in the vicinity of Leichhardt local government area has the potential to significantly impact on bus travel times.

Of particular note regarding bus efficiency is the operation of the 444/445 bus routes (between Norton Street and Petersham Station). This route is likely to experience significant delays negotiating the Norton Street/Parramatta Road/Crystal Street intersection.

Additionally, while reference is made to the long term possibility of light rail along Parramatta Road (identified, but not part of the Stage 1b: M4 East project) the traffic volumes project by the Environmental Impact Statement may not support this. It is worth noting that reference to light rail on Parramatta Road is not limited to the Environmental Impact Statement, it has been included in the *Parramatta Road Urban Transformation Strategy*, *Sydney’s Light Rail Future* and *A Plan for Growing Sydney*.

A preliminary analysis indicates that Parramatta Road may have only limited ability to accommodate both a two-way light rail system and the projected levels of through-

traffic. Under normal operating conditions, on-street light rail will require lanes of between 3.0m and 3.5m in width. They also have the potential to significantly reduce the operational efficiency of intersections because of their relatively slow start from signals. Subject to a more detailed study, it is estimated that, to accommodate kerbside light rail, traffic flows on Parramatta Road should be reduced to a maximum of approx. 3,000 cars/hr. This is around 40% less than the volumes current projected for 2031.

2.1.6 Active Transport

The Stage 1b: M4 East Project proposes enhanced bicycle access to Parramatta Road through the provision of the kerbside bus lanes (mentioned earlier in this report). However, with a potential increase of up to 30 buses per hour during peak periods, it is not considered that these lanes will provide desirable bicycle routes.

Additionally, it is suggested that enhanced north-south access across the corridor will be achieved. However, with an identified Level of Service “F” at several intersections along Parramatta Road (including Flood, Norton and Crystal Streets) and traffic volumes comparable (or greater than) existing volumes, it is questioned whether significant improvements will be achieved.

It is considered that, while traffic volumes on the more westerly section of Parramatta Road may reduce, no significant environmental gains (in relation to traffic volumes and congestion levels) are anticipated on Parramatta Road in Leichhardt. Consequently, any opportunities for significant streetscape, place making and urban amenity/environmental improvements along this section of Parramatta Road will be limited.

2.1.7 Construction Traffic

The Environmental Impact Statement does not include sufficient information to enable detailed comments on the likely impacts of construction traffic, associated with the project, in the Leichhardt local government area.

2.1.8 Traffic and Transport Submission Points

Based on the review of the Traffic and Transport chapter of the Stage 1b: M4 East Environmental Impact Statement, the following points are recommended for inclusion in Council's submission:

- Detailed information about Stages 2 and 3 is requested, including proposals for a northern tunnel extension should be the subject of public exhibition to enable the community to make informed decisions about the West Connex project in its entirety. The projected levels of congestion resulting from the completion of Stage 1b: M4 East is such that they appear to necessitate the completion of the M4-M5 Link. Consequently, it is considered that the Stage 1b: M4 East project cannot be considered in isolation of the overall WestConnex Motorway Project.
- Further information and consideration by the NSW State government is requested to ensure that the West Connex Project is considered in light of the extensive list of related urban project. The Stage 1b: M4 East EIS does not

include definitive consideration of many of the major planning initiatives currently proposed in the Sydney Region, including:

- o The Bays Precinct;
- o Sydney Metro;
- o Northern WestConnex Extension and new harbour crossing;
- o Southern WestConnex Extension;
- o Central to Eveleigh Urban Transformation;
- o Green Square Town Centre;
- o Parramatta light rail;
- o Redevelopment of Macquarie Park;
- o Redevelopment of Sydney Airport and Port Botany;
- o Construction of the Western Sydney Airport; and
- o Moorebank Intermodal Freight Terminal.

Consequently it is considered that the traffic modelling included in the Environmental Impact Statement is limited and may significantly underestimate future traffic volumes and congestion that will be experienced both in the 2021 and 2031 scenarios. The significant investment of public and private funds which will be required to deliver the projects should justify a fully co-ordinated, evidence based assessment of the how the West Connex project will contribute to the liveability and social, economic and environmental sustainability of the city.

- Confirmation and verification of the data used Concern is expressed that the timing of the M4 East and the Parramatta Road Urban Transformation Program is such that the traffic model could not include the specific demographic information that is likely to result from the Parramatta Road Urban Transformation Program.
- Between the completion of Stage 1b: M4 East and opening of the M4-M5 Link, surface congestion on Parramatta Road and Dobroyd Parade will be such that it is highly likely traffic will divert to Leichhardt's surface road network. Additional modelling is therefore requested to enable assessment of the likely extent of these impacts on Leichhardt's surface roads. The routes which require additional information/modelling are:
 - o Marion Street (and Ramsay Street);
 - o Flood Street;
 - o Tebbutt Street/Darley Road/City West Link;
 - o Tebbutt Street/Marion Street;
 - o Balmain Road;
 - o Catherine Street;
 - o Young Street; and
 - o Johnston Street.

Such routes have the potential to jeopardise the integrity of several of Leichhardt's precincts by reducing accessibility and amenity in these areas.

- Additional information is sought regarding the measures which are proposed to be implemented to protect Leichhardt's residential neighbourhoods and main

street shopping areas from additional through-traffic that may result from the Stage 1b: M4 East project.

- It is requested that a Condition of any approval be that the new right turn facility from Wattle Street (northbound) to Ramsay Street (eastbound) not be opened to traffic until Stage 3 of WestConnex (if approved) has been completed. This measure is sought to protect Leichhardt from the diversion of excessive amounts of traffic onto the Ramsay Street/Marion Street route.
- A review of the adequacy of the funds set aside as part of the Parramatta Road Urban Transformation Project is required in light of the detail in the EIS to ensure that funds available will be sufficient to ameliorate congestion impacts, achieve amenity improvements and support liveability and economic objectives. In the event the M4 East is approved funding will be required to implement place making and environmental improvements along Parramatta Road, Leichhardt
- Additional information is required about measures to ensure that such Hazardous Goods vehicles do not attempt to divert from congested areas on Parramatta Road and Dobroyd Parade. It is noted that hazardous goods vehicles will not be permitted in the tunnel and consequently they will be using the surface road network.
- It is requested that a detailed Construction Traffic Management Plan be prepared for review by all affected Councils prior to any approval being issued.

2.2 Air quality

Council officers engaged independent environmental monitoring and assessment consultants, Air Noise Environment, to peer review Environmental Impact Statement in relation to air quality. A full copy of their assessment has been included as Attachment 1.

The consultants found that there are a number of matters which require additional consideration, release of information or imposition of conditions in the event of approval:

- confirmation that the EPA has approved the Air Quality Assessment methodology used in the modelling and assessment of potential air pollutants or additional information which demonstrates compliance with the relevant EPA requirements for assessment and modelling;
- additional information regarding the 'worst case' assessment of air quality which considers the maximum emission rates (in g/s) and a peak congested scenario;
- completion of a quantitative construction air quality assessment, focusing on the risk of particulate impacts and including the potential for release of crystalline silica;
- further consideration and information in relation to proposed co-location of two ventilation buildings;
- necessity of incorporating portal emission monitoring if a condition requiring no portal emissions is imposed; and
- provision of dampers in the western ventilation outlet to allow for varying outlet diameters

2.2.1 Submission Points

An independent, peer review has been undertaken by 'Air Noise Environment' and it will be requested that the Department of Planning consider and respond to the detail of the issues raised in Attachment A of that review. In summary, it is recommended that the submission request additional consideration, release of information or imposition of conditions in the event of approval in relation to the following matters:

- Confirmation is required that the NSW EPA has approved the alternative assessment methodology used in the EIS, as the approach does not satisfy all of the requirements of the 'Approved Methods for the Modelling and Assessment of Air Pollutants in NSW'. If the approach adopted in the EIS is not consistent with the relevant EPA requirements for modelling and assessment further studies should be undertaken and publically exhibited to ensure that the assessment is undertaken in a manner consistent with the requirements of the EPA.
- Consideration should be given to the combining of the two ventilation outlets (for the M4 East and M4-M5 projects which are proposed to be collocated – 'back to back') as it could address issues which will arise due to the differing height, volumetric flow, temperature and emissions concentrations. It could also yield savings in terms of energy consumption/costs and routine emission monitoring.
 - o If this option has already been considered and rejected confirmation of that study and its findings is sought.
 - o If the combination of the two ventilation stacks has already been considered and rejected the computational fluid dynamics of the interaction of the two separate ventilation outlets should be completed to accurately assess the dispersion of pollutants from the two ventilation outlets. This information should be made available to the public for comment.
- additional information regarding the 'worst case' assessment of air quality which considers the maximum emission rates (in g/s) and a peak congested scenario.
- there is a need for the completion of a quantitative construction air quality assessment, focusing on the risk of particulate impacts and including the potential for release of crystalline silica.
- In the event of approval of the project the following conditions should be applied:
 - o Portal emission monitoring
 - o Dampers in the western ventilation outlet should be provided to allow for varying outlet diameters.

2.3 Biodiversity

The biodiversity impacts of Stage 1b: M4 East motorway extension have been considered in relation to the following categories:

- impacts on flora and fauna;
- ecological assessment methodology; and
- mitigation of impacts.

2.3.1 Impacts on flora and fauna

Biodiversity legislation applicable to the project affords protection to threatened species, populations or ecological communities. Strict adherence to this means that the intrinsic value of trees and other vegetation and its contribution to urban biodiversity at the local scale is not considered by the Environmental Impact Statement.

Construction of the project will result in the removal of approximately 15.7 hectares of vegetation, comprising about 12.9 hectares of planted trees and vegetation (mainly from alongside the M4) and about 2.8 hectares of grassland with scattered trees.

The Environmental Impact Statement states that the project is located in a highly urbanised environment with no intact, remnant native vegetation communities within the project footprint or immediately adjacent to the study area (150 metres). Vegetation has been planted and comprises a combination of private gardens, landscaped parks, reserves or strips of vegetation planted as landscaping works.

The Environmental Impact Statement states the vegetation is not commensurate with any threatened ecological communities listed under the *Threatened Species Conservation Act 1995* (NSW) (TSC Act) or the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act).

Although the Environmental Impact Statement concludes that the 15.7 hectares of vegetation to be removed is of limited habitat value other than for species typical of urban areas, it is reasonable to say that the extent of vegetation to be removed is not insignificant within the local context. In this regard the Environmental Impact Statement does not acknowledge the importance of trees or urban biodiversity within a densely populated area. It is not clear the number of established trees to be removed as part of the proposal or the extent of landscaping to compensate for this vegetation loss. The cumulative tree loss in the context of the entire WestConnex project is also not provided.

One threatened fauna species, the Grey-headed Flying-fox (*Pteropus poliocephalus*) was recorded within the project footprint. The Environmental Impact Statement concludes the removal of trees will have a negligible impact on the available foraging habitat for this species as it is highly mobile and no roosting or breeding camps were observed within the project boundary.

The Environmental Impact Statement states several threatened micro-bat species could occur within the project footprint potentially roosting under bridges and culverts on occasion, although no evidence of roosting bats was detected during the field survey. It is important to note however, the limitations of the field survey which are described below.

2.3.2 Flora and fauna assessment methodology

The methodologies for the biodiversity assessment within the Environmental Impact Statement were:

- desktop assessment to describe the existing environment and landscape features of the study area and to identify threatened biota potentially affected by the project;
- field surveys to describe the biodiversity values of the project site and surrounding study area and determine the likelihood of threatened biota and their habitats occurring in the project site or being affected by the project; and
- assessment of potential impacts of the project on threatened biota and biodiversity values.

The Environmental Impact Statement states that given the highly modified nature of the environment, the survey effort focused on assessing the habitat provided by the vegetation to be removed rather than developing a comprehensive list of species present. As such the survey is limited in its scope consisting of just a single day and two evenings in February 2014. The Environmental Impact Statement does not adequately document the survey locations; time spent at each location, where species were recorded, photos or other site-specific details. The Environmental Impact Statement acknowledges that due to the limited scope, not all species present will have been recorded.

Although the various NSW databases are accessed to identify threatened species that may occur, other local biodiversity plans and data held by local councils have not been considered, or their local biodiversity objectives.

2.3.3 Mitigation of impacts

The Environmental Impact Statement is limited in terms of outlining measures to mitigate the impact on biodiversity. This appears to be based on the premise that the project does not significantly impact on any threatened species, populations or ecological communities. This approach however does not acknowledge the significance of urban biodiversity and the clearing of 15.7 hectares of vegetation within the local context. The Environmental Impact Statement does not outline the extent to which the lost vegetation will be replaced, how habitat values will be maintained or improved and does not advocate for compensatory habitat.

Impacts during construction will be mitigated via a Construction Flora and Fauna Management Plan (FFMP) to be developed following project approval.

2.3.4 Submission Points

- Staff of relevant Councils, the Sydney Olympic Park Authority and the Parramatta River Catchment Group should be consulted with regards to local biodiversity plans, objectives, actions and data. Some species considered common throughout NSW and not protected by threatened species legislation, such as the superb fairy wren, are locally vulnerable and Councils and the local community are working to preserve these species. By focusing on the minimum requirement to protect

threatened species, populations and ecological communities only, the importance of biodiversity within the local urban context is over-looked.

- Greater detail and documentation needs to be provided regarding the survey including the locations surveyed, time spent at each location, where species were found, photos and other documentation. Greater justification needs to be provided within the EIS regarding limiting the survey to a single day and two evening surveys.
- Further detail needs to be provided regarding how the loss of established vegetation is to be mitigated. The loss of 15.7 hectares of vegetation including 12.9 hectares of trees is not insignificant within the context of inner western Sydney.

2.4 Greenhouse gas

The greenhouse gas impacts of the Stage 1b: M4 East motorway extension has been considered in relation to the following categories:

- methodology and assumptions; and
- projected operational greenhouse gas emission savings.

2.4.1 Methodology and assumptions

To assess the emissions associated with the fuel consumed by vehicles using the project, and to evaluate any potential GHG emissions savings as a result of the project, the four road use scenarios described earlier in this report were considered by the Environmental Impact Statement:

- operation 'do minimum' (2021);
- operation 'do something' (2021);
- operation 'do minimum' (2031); and
- operation 'do something' (2031).

The Environmental Impact Statement uses accepted greenhouse gas emissions inventory standards, however as previously outlined earlier in this report, concerns are raised about the traffic model assumptions and boundary used in the Environmental Impact Statement and the inadequate consideration of the public transport alternative with road upgrades. Carrying out a comprehensive evaluation of the public transport option and comparing this to the project in terms of greenhouse gas emissions warrants investigation in the Environmental Impact Statement.

2.4.2 Project construction and operation greenhouse gas emissions

The Environmental Impact Statement greenhouse gas assessment concludes a net beneficial outcome with regards to greenhouse gas emissions as a result of the project as compared with not undertaking the project:

- 56,764 tonnes CO₂e saved by 2021 compared to the 'without project' scenario; and
- 45,437 tonnes CO₂e saved by 2031 compared to the 'without project' scenario.

The Environmental Impact Statement assumes that as improvements to traffic flow and congestion are achieved through increased speeds, reduced travel distances and reduced frequency of stopping, fuel efficiency is improved and subsequently GHG

emissions associated with road use are reduced when compared to the base case scenario ('without project'). However, as previously mentioned, a thorough investigation of the project compared with the public transport alternative deserves investigation. Further, the traffic model itself is not considered adequate as outlined earlier. The construction of motorways is not considered to be consistent with best practice greenhouse gas abatement projects related to transportation and the Environmental Impact Statement itself acknowledges that greenhouse gas savings will decrease over time as traffic volumes increase.

2.4.3 Submission Points

- A thorough investigation is required of a Public Transport alternative and should include consideration of the greenhouse gas savings compared to the Stage 1b: M4 East project and WestConnex as a whole requires inclusion within the Environmental Impact Statement. The scope of the public transport alternative considered in the Environmental Impact Statement is limited and represents an unrealistic option. This option should have included a mix of public transport improvements, road capacity management initiatives, strategic land use planning, place making and site specific surface road upgrades.

Attachments

1. Attachment 1: Independent Peer Review – Appendix H, Air Quality Assessment, West Connex M4 East Air Quality Assessment

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Leichhardt and Marrickville Councils
c/o Marrickville Councils
PO Box 14
Petersham
NSW 2049
Attention: Kendall Banfield

19 October 2015

Ref: 4358RepLet02.odt

Dear Kendal

RE: INDEPENDENT PEER REVIEW - APPENDIX H, AIR QUALITY ASSESSMENT, WESTCONNEX M4 EAST AIR QUALITY ASSESSMENT

This letter report presents the outcome of an independent expert review of the Air Quality Impact Assessment (Appendix H) of the Westconnex M4 East Environmental Impact Assessment. The independent peer review represents an impartial, independent review that has been based on knowledge and experience of current practices, procedures and information. The views expressed in the report are those of the reviewer, hence may not represent those of the client, however both Marrickville and Leichhardt Council have had the opportunity to review and comment on the review prior to finalisation.

The expert review has considered all aspects of the Appendix H Air Quality Assessment. In particular, as per the brief provided by Marrickville and Leichhardt Councils and the scope of work agreed for this peer review, the following issues have been specifically commented on in this report:

- The adopted methodologies for the air quality assessment and their suitability in the context of the project information.
- The suitability of the inputs and assumptions underlying the air quality modelling and the traffic scenarios considered in the modelling. In particular, ventilation rates (efflux velocity) and temperature of emissions have been reviewed in the context of the influence on dispersion, and emission rates.



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- The suitability of the meteorological datasets prepared for the atmospheric dispersion modelling.
- The adequacy of local background air quality data utilised in the assessment of cumulative (project plus background) impacts.
- The adopted air quality goals and health risk standards, and suitability for assessment of the risk of impacts.
- The suitability of the proposed in-tunnel and external monitoring methodologies for determining compliance with typical approval conditions (referencing the NorthConnex approval as a primary example) and external ambient air quality goals.
- Whether the assessment has been completed in a manner that is consistent with the analysis and recommendations of the Advisory Committee on Tunnel Air Quality.
- The suitability of the assessment methodologies adopted for the construction air quality assessment, including review of the modelling inputs and assumptions.
- The overall predicted cumulative impact from the project, in conjunction with existing background and emissions from future stages of the WestConnex project. A particular focus will be the proposed co-location of the eastern ventilation stack with the WestConnex Stage 3 ventilation stack.
- The expected impact on the Marrickville and Leichhardt Local Government Areas both for the overall cumulative project impacts.
- The overall conclusions of the assessment and how robust these conclusions are based on the review of the methodologies and assumptions.
- The appropriateness of proposed mitigation strategies, and identification of any additional mitigation measures or controls that could further reduce the potential exposure of the local population to air pollution emissions from the project.

The Peer Review Team

This peer review has been completed by Air Noise Environment personnel with extensive experience in completing air quality impact assessments of major infrastructure projects, and road tunnels in particular. The review team comprised the following personnel:

- Principal Consultant: Claire Richardson, BSc(Hons), MAAS.
- Technical Director: Craig Beyers, BEng(Env), MAAS.
- Senior Environmental Engineer: Samuel Wong, BEng(Chem), MAAS.

This team has been involved in air quality assessment of the majority of tunnel projects completed in Australia over the last 20 years, including the following:

- Clem7 Tunnel (Brisbane)
- Cross City Tunnel (Sydney)
- Lane Cove Tunnel (Sydney)



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- West Connex Stage 2b (bid phase)
- M5 East duplication (bid phase)
- East-West Link (Melbourne)
- Airport Link Northern Busway (APLNB), Brisbane
- EastLink Motorway (Melbourne)
- M5 East Motorway (Sydney)

The ANE team, in conjunction with Holmes Air Sciences, was also responsible for leading the development of a guideline for the monitoring, modelling and assessment of air quality impacts for road and tunnel projects in NSW on behalf of the NSW RTA.

The project team has expertise in air quality and meteorological modelling, including the use of the GRAL model adopted for use in the M4 East Air Quality Assessment.

Structure of the Review

The review information is presented in three ways. Firstly, comments on the questions identified in the scope of work are addressed in Attachment A. Secondly, specific comments are tabulated in Attachment B in a format that will allow cross-referencing with the relevant sections/pages in the Environmental Impact Assessment documentation. Finally, overall analysis and conclusions are presented in the main body of this letter report, based on a broader synthesis of the more detailed information presented in Attachment B.

Overall Analysis and Comment

Overall, it is considered that the Air Quality Assessment presented in Appendix H of the West Connex M4 East Environmental Impact Assessment presents an in depth, high quality analysis of the air quality issues associated with this major project. As with any project of this complexity, there are numerous uncertainties associated with the analysis of potential impacts, and the Air Quality Assessment has sought to address these in a thorough, scientifically sound manner.

The additional analyses has included further developing current methodologies in an attempt to improve the assessment of specific aspects, particularly where approaches used in the past have been less than ideal. Whilst these attempts to develop improved methodologies are an important step in developing our understanding of the impacts of complex infrastructure projects, there are inherent risks in the application of methodologies that have had limited application to tunnel projects in the past. This has resulted in some specific issues that have not been satisfactorily addressed in the Air Quality Assessment. These issues relate primarily to the inability of the dispersion modelling methodology (GRAM/GRAL model) to consider:

- building downwash effects;
- data from multiple meteorological stations;
- hourly time varying emission rates;
- time varying emission temperatures; and



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- limitations on the number of receptors where predicted impacts can be considered in detail.

The assessment report has sought to address these limitations through sensitivity analysis and verification of the datasets used. However, these factors combine to introduce significant uncertainty to the predicted concentrations for the predicted short term nitrogen dioxide concentrations.

These effects are likely to be most apparent for the dispersion of emissions from the ventilation stations. The estimates for variability presented in the assessment confirm +/- 50 % variability each for building downwash and emission temperature for 24 hour average predicted concentrations. Additional uncertainty would be added to the predicted impacts of the ventilation stations as a result of the smoothing of hourly emission rates, as these uncertainties relate to 24 hour average data. This could result in predicted non-compliances at a number of additional receptors in close proximity to the ventilation outlets. There is also variability introduced due to the use of a single meteorological station that is located in the centre of the overall WestConnex modelling domain, as opposed to stations in closer proximity to the M4 East, for the prediction of the meteorological data used in the GRAL modelling.

The overall uncertainty associated with the modelling predictions is considered to be significantly reduced for the road related emissions. It is important to recognise that road traffic emissions are the overwhelmingly dominant source in the modelling domain. Similarly, the additional uncertainties are likely to be reduced for the pollutants with longer averaging times (CO, PM₁₀ and PM_{2.5}) and are most significant for predicted 1-hour average nitrogen dioxide concentrations.

The adopted methodology does not satisfy all of the requirements of the 'Approved Methods for the Modelling and Assessment of Air Pollutants in NSW' however, the Air Quality Assessment report does not confirm that the NSW EPA has approved the alternative assessment methodology that has been adopted. Confirmation should be sought from NSW EPA to confirm that the GRAM/GRAL modelling methodology is acceptable.

One of the issues identified in the review relates to a factor that is unique to this assessment. This is the co-location of two ventilation outlets with differing characteristics - height, volumetric flow, temperature and emission concentrations. Combining the two ventilation outlets is an option that would address these issues and could yield savings in terms of energy costs and routine emission monitoring. However, assuming that this option has already been considered and rejected, it is recommended that computational fluid dynamics of the interaction of the two ventilation outlets is completed to accurately assess the dispersion of pollutants from the two ventilation outlets.

A further area of significant relevance to the air quality outcomes of this project relates to the potential for the traffic volumes for the project to differ markedly from those considered in the Air Quality Assessment. As noted in the EIS, history demonstrates that operational traffic volumes through road tunnels can differ markedly from those projected at the design phase. In many cases traffic volumes are lower (Cross City Tunnel, Clem7, Airport Link, for example). In some cases, traffic volumes are higher and the traffic mix differs significantly from the original projects. The M5 East Motorway tunnel is an example of this issue. The EIS has attempted to address this by considering a worst case scenario, whereby it is assumed that the emission concentrations from the tunnel ventilation outlet are equivalent to the licence limits imposed on the NorthConnex ventilation outlets.





However, the 'worst case' assessment presented in the Air Quality Assessment does not consider the maximum emission rates (in g/s), hence the worst case scenario is not in fact considered. Furthermore, a peak congested scenario has not been considered in the air quality assessment. It is considered that these scenarios should be modelled/remodelled.

Additional specific issues that have been identified in the review, and warrant further consideration, are as follows:

- completion of a quantitative construction air quality assessment, focussing on the risk of particulate impacts and including the potential for release of crystalline silica;
- low efflux velocity for ventilation outlets at night, with potential for stack tip and building downwash issues to be enhanced;
- necessity of incorporating portal emission monitoring if a condition requiring no portal emissions is imposed;
- provision of dampers in the western ventilation outlet to allow for varying outlet diameters.

Overall Conclusions

The Air Quality Assessment predicts compliance with the air quality goals for the majority of pollutants. The short term predicted non-compliances are related principally to road traffic emissions, and these impacts are also present for the existing environment. Overall reductions in pollutant impacts are predicted for the majority of receptors.

Providing the issues identified in this review are addressed, and the conclusions of the Air Quality Assessment do not change significantly as a result, it is concluded that the local and regional air quality as a result of the Westconnex M4 East project is not likely to be detrimentally affected to a significant degree.

Disclaimer

This document has been prepared with all due care and attention by professional environmental practitioners according to accepted practices and techniques. This document is issued in confidence and is relevant only to the issues pertinent to the subject matter contained herein. Air Noise Environment Pty Ltd holds no responsibility for misapplication or misinterpretation by third parties of the contents of this document. If this document does not contain an original signature, it is not an authorised copy. Unauthorised versions should not be relied upon for any purpose by the client, regulatory agencies or other interested parties.





Where site inspections, testing or fieldwork have taken place, the report is based on the information made available by the client or their nominees during the visit, visual observations and any subsequent discussions with regulatory authorities. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Air Noise Environment Pty Ltd is both complete and accurate. It is further assumed that normal activities were being undertaken at the site on the day of the site visit(s).

Yours sincerely



for Air Noise Environment Pty Ltd
Claire Richardson BSc(Hons), MAAS
Principal Consultant



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Attachment A
Response to Questions Raised in Brief and Scope of Work

Issue	Peer Review Comments
The adopted methodologies for the air quality assessment and their suitability in the context of the project information.	The adoption of an alternative meteorological and dispersion modelling package (GRAM and GRAL) has introduced some limitations in the assessment methodology, relative to the current approved regulatory models. Whilst the NSW EPA Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales does not preclude the use of alternative air quality models, the Air Quality Assessment does not confirm that the NSW EPA were approached regarding the suitability of the model for this assessment. The GRAM/GRAL model does not contain features necessary for addressing a number of the requirements of the NSW Approved Methods for the M4 East project. These include building downwash, prediction of hourly cumulative receptor concentrations (this has been completed for averaged emissions over 3 periods a day only, not be hour, due to computational limitations), and consideration of site specific meteorology (a single meteorological dataset has been incorporated to represent the overall WestConnex project area). The GRAM/GRAL model provides an approach that allows consideration of road emissions and ventilation emissions in a single model. The latest version of the approved regulatory model CALPUFF/CALMET (V7 released in June 2015) provides this feature, however prior to release of V7 summation of predictions from two different models (for example, CALINE4 and CALPUFF) would have been required to complete analysis of the roads and ventilation outlets. Due to computational limitations, use of the GRAL model for the M4 East assessment also limits the number of discrete receptors that can be considered in detail.

Issue	Peer Review Comments
	Specific comments on the modelling approach are provided in Attachment B.
The suitability of the inputs and assumptions underlying the air quality modelling and the traffic scenarios considered in the modelling. In particular, ventilation rates (efflux velocity) and temperature of emissions will be reviewed in the context of the influence on dispersion, and emission rates.	Specific comments are provided in Attachment B.
The suitability of the meteorological datasets prepared for the atmospheric dispersion modelling.	The meteorological dataset has been prepared to represent the WestConnex project as a whole, and is based on Bureau of Meteorology data for Canterbury Racecourse. This approach results in the meteorological dataset poorly representing the specific meteorological conditions for the M4 East project (as indicated by the relatively poor correlation between the predicted meteorology at Sydney Olympic Park and Rozelle) although the broader annual trends at these locations appears to be well represented (as demonstrated by the cumulative frequency comparisons in Appendix H - Meteorological data analysis and model evaluation). The adoption of the GRAM and GRAL model for the meteorological and dispersion modelling is the reason for the assimilation of only a single observational meteorological dataset. Had one of the currently approved regulatory models, such as CALMET and CALPUFF, been adopted in the assessment, numerous meteorological dataset could have been incorporated. This may have improved the performance of the meteorological modelling, possibly to a significant degree.
The adequacy of local background air quality data utilised in the assessment of cumulative project	Background air quality data has been compiled from existing ambient monitoring stations operated by the NSW EPA in the vicinity of the project. The data has been analysed and compared, and the approach adopted for

Issue	Peer Review Comments
plus background) impacts.	selection of the background air quality monitoring dataset for use in the cumulative assessment is considered acceptable. It is noted that the cumulative impact assessment has summed the contributions of the local roads, the ventilation outlets and existing background air quality. This introduces conservatism, as the existing background air quality will be largely defined by the existing road traffic emissions. In addition, background contributions in the 'fresh' air drawn into the tunnel for maintenance of in-tunnel air quality is considered in the ventilation calculations. This adds conservatism to the vent outlet modelling, as the existing background concentrations are added again as part of the cumulative impact assessment. These approaches are likely to over estimate the influence of existing background concentrations, hence it is concluded that a conservative approach has been adopted with respect to the influence of existing background concentrations on the cumulative predictions.
The adopted air quality goals and health risk standards, and suitability for assessment of the risk of impacts.	The air quality goals and criteria adopted in the Appendix H Air Quality Assessment are consistent with the current requirements in NSW and the Commonwealth. In addition, proposed national standards for particulates have been considered. The authors of the Air Quality Assessment have also discussed the issue of ultra fine particles and the use of particulate numbers as an assessment approach. Due to the absence of criteria and goals, and the fact that ultrafines are considered in the Air Quality Assessment as PM_{2.5} includes this size fractions, the Air Quality Assessment has not assessed this issue further. This approach is considered acceptable given the current lack of defined air quality goals and standards for ultra fine particles measured by particle number.
The suitability of the proposed in-tunnel and external monitoring methodologies for determining compliance with typical approval conditions	The proposed monitoring methodologies have not been identified in the air quality assessment. The methodologies would generally be identified in a condition of approval (for example, refer to NorthConnex Instrument of Approval E10). Therefore, the fact that the monitoring requirements are not defined in the Air

Issue	Peer Review Comments
(referencing the NorthConnex approval as a primary example) and external ambient air quality goals.	Quality Assessment is not considered to be a significant omission. It is noted that, if zero portal emissions is to be a condition of approval, this would require monitoring in the outbound portals.
Whether the assessment has been completed in a manner that is consistent with the analysis and recommendations of the Advisory Committee on Tunnel Air Quality.	The Advisory Committee on Tunnel Air Quality made three recommendations in the Interim Report published in July 2014. These relate to completion of further research and assessment of the following key issues: - portal emissions - in-tunnel nitrogen dioxide limits - in-tunnel nitrogen dioxide monitoring The air quality assessment does not consider portal emissions, and assumes that there will be a requirement for no portal emissions as per previous tunnel projects in Sydney. The air quality assessment makes reference to existing in-tunnel nitrogen dioxide goals. Monitoring methods are not specified, however, this would generally be defined in the conditions of approval and not necessarily at the EIS stage. Eleven Technical Papers were prepared to support the Interim Report of the Advisory Committee on Tunnel Air Quality. These present that state of knowledge relating to tunnel related air quality, and do not make specific recommendations
The suitability of the assessment methodologies adopted for the construction air quality assessment, including review of the modelling inputs and	The construction air quality assessment has not adopted a quantitative approach, and has not included air dispersion modelling of potential impacts



Issue	Peer Review Comments
assumptions.	
The overall predicted cumulative impact from the project, in conjunction with existing background and emissions from future stages of the WestConnex project. A particular focus will be the proposed co-location of the eastern ventilation stack with the WestConnex Stage 3 ventilation stack.	Specific comments on the approaches adopted in the modelling are presented in Attachment B.
The expected impact on the Marrickville and Leichhardt Local Government Areas both for the overall cumulative project impacts.	The predicted air quality impacts for the Western portion of the M4 East project are most relevant for the Marrickville and Leichhardt Council areas. In particular, the proposed co-location of the M4 East eastern and the M4 - M5 western vent stations are of relevance. The air quality assessment has identified air quality non-compliances may be occurring for the 'do minimum' scenario, and are likely to occur in the future. The modelling of the ventilation stations has considered the two proposed outlets and concluded there will be negligible impacts from the ventilation emissions. Due to the method adopted for the modelling of the ventilation emissions, there is considerable uncertainty associated with the predicted emissions from the ventilation outlets. These concerns are identified in more detail in Attachment B.
The overall conclusions of the assessment and how robust these conclusions are based on the review of the methodologies and assumptions.	Atmospheric dispersion modelling is a complex process that attempts to apply, in a scientific way, estimation and calculation methods to predict extremely complex temporal and spatial processes. Inevitably, assumptions must be adopted and the uncertainty associated with these assumptions is considered by applying validation and sensitivity analysis techniques. The Air Quality Assessment has sought to address specific uncertainties posed by the modelling approaches that have been adopted through analysis of this type. However, there are



Issue	Peer Review Comments
	some aspects of the modelling where it is considered that specific assumptions and approaches have not been fully justified and the uncertainties associated with the method considered. These include the meteorological data inputs, building downwash and emission temperature for the ventilation outlets, averaging of emissions rates across periods of many hours rather than completing hourly cumulative assessments, and the generic meteorological dataset that has been adopted. These variables could significantly affect the outcomes of the dispersion modelling for project specific emissions only, hence would not necessarily result in significant increases in the predicted cumulative concentrations at specific receptors. It is important to recognise that the existing background pollution concentrations (defined by current road traffic emissions) are the dominant feature of the current air quality climate. These emissions are predicted to result in non-compliances for a number of existing near road receptors as well as the same types of receptor for the future modelling scenarios.
The appropriateness of proposed mitigation strategies, and identification of any additional mitigation measures or controls that could further reduce the potential exposure of the local population to air pollution emissions from the project.	Mitigation measures are not proposed for the construction or operational phases of the project. For the construction phase, mitigation is likely to be required with respect to management of dust emissions. As a quantitative assessment has not been completed, there has been no quantification of risk, or development of mitigation solutions. For the operational phase non-compliances are predicted for a number of near road receptors. This is also predicted for the 'do minimum' (ie, the status quo) scenario. Therefore, the mitigation tool of primary relevance will be management of vehicle emissions in the region. This is consistent with the conclusions of the Advisory Committee on Tunnel Air Quality.

Attachment B
Detailed Comments on Appendix H - Air Quality Assessment

Section/Page	Issue	Comment
Section 2.4.1, Page 19 Figure 2.3, Page 20, Figure 2-4 Page 21, Figure 2-6, Page 22 Section 8.3.6 Page 109 Section 8.7.3, Page 179	'back-to-back' ventilation outlets for M4 East and M4-M5 link projects. Building downwash Interaction of the plumes from the two outlets	The location and indicative layouts are provided for the two ventilation stacks. Elevations showing the heights of the proposed ventilation buildings are not provided. Buildings attached to stacks and vents can cause significant impacts on the effective dispersion of plumes due to turbulence (plume downwash impacts). The height of the ventilation buildings, and other buildings and structures in close proximity to the ventilation outlets (eg, fire water tanks, electrical plant rooms, tunnel operations buildings) are an essential consideration in atmospheric dispersion modelling from tunnel ventilation outlets. This downwash has not been satisfactorily addressed in the EIS Appendix H. As identified in Section 8.3.6 of the Air Quality Assessment, it was impractical to incorporate the building downwash effects in the GRAL model due to run times and the ability to assess the data at an appropriate resolution. A sensitivity analysis of the issue of building downwash is presented in Section 8.7.3 however only the potential influence of existing buildings in the vicinity of the project are considered. The sensitivity analysis identifies a possible increase in predicted concentrations of 50 % based on 24 hour and annual average calculations. The likely difference for 1 hour predictions is not provided, and this is significant for NO₂ which has a 1 hour average and has predicted non-compliance for some RWR receptors. Furthermore, the sensitivity analysis does not consider the proposed ventilation buildings and other project related buildings. This omission is critical for the assessment of the dispersion of emissions from the ventilation outlet - it is the ventilation building that houses the ventilation fans that has the most significant influence on

Section/Page	Issue	Comment
		building downwash. The Air Quality Assessment identifies that the eastern M4 East ventilation outlet and the western M4-M5 ventilation outlet will be located 'back-to-back'. The ventilation outlets are proposed to be different heights - 30.5 m for the M4 East vent and 25.0 m for the M4-M5 vent. The diurnal emission profiles for the vents will also differ. Maximum emissions will occur during the morning for the M4 East vent, and in the afternoon for the M4-M5 vent - this is because the two vents service traffic travelling in different directions. These issues cause additional complexities surrounding the effective dispersion of emissions from the two vents. There is uncertainty surrounding the maintenance of effective dispersion where the two plumes interact, particularly due to the different heights of the emission points, the differing velocities, the potential downwash and, potentially, the slightly different temperatures involved. True co-location of the emissions in a single vent would resolve these issues, and potentially improve dispersion and reduce energy costs for the operation of these tunnels. Operating costs associated with emissions monitoring and management would also be reduced. If co-location of the emission points in a single ventilation outlet is not possible, it is recommended that Computational Fluid Dynamics modelling is completed to assess the issues surrounding the mixing of the two tunnel vent plumes.
Section 2.4.2 Page 23, Section 4.5 Page 35	Portal Emissions	Prevention of emissions of tunnel air via the outbound portals requires operation of jet fans to reverse the flow of air against the traffic. This increases energy costs, and needs to be considered in the context of the overall environmental impact of the project. Portal emission are permitted for some tunnel projects (eg, City Link Melbourne) for off peak periods. However, where there are sensitive receptors in close proximity to tunnel portals, portal emissions can result in elevated pollutant concentrations in the vicinity of the portals.

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		Therefore, the potential for portal emissions must be considered on a case by case basis. If a zero portal emission condition is included in the approval for the project, in-portal monitoring will be necessary to demonstrate compliance with this requirement.
Section 5.5, Page 42 and Section 7.4 Page 70	Particulate Emissions, construction	Where silica is present in the material being bored, there is potential for crystalline silica emissions to occur during tunnel boring due to the high temperatures caused at the boring face. The potential for crystalline silica to be released is primarily relevant to occupational exposure, however it is considered appropriate to consider this issue in the construction environmental management plan if sensitive receptors are located in close proximity to tunnelling shafts and air extracts.
Section 7	Construction Assessment	The construction assessment does not quantify air quality impacts in terms of predicted concentrations of air pollution. The approach that has been adopted is a risk based semi-quantitative method. It is acknowledged that the specific detailed information relating to the construction works necessary for completing accurate dispersion modelling may not be available at the time of preparing an EIS and, even when it is, there are likely to be significant changes during the construction phase as different site constraints are addressed. Previous tunnel EIS (eg, Northconnex) have attempted to quantify the air quality impacts during the construction phase, however, such analyses are reliant on the data available at the time. As a result, the predictions must be considered indicative. For many sensitive receptors, the primary impacts of a major infrastructure project are during the construction phase. Therefore, it is important that the assessment process ensures that, as and when the relevant construction information becomes available, there is an opportunity for assessment by the regulatory authorities and those that may be potentially affected by these impacts. The absence of more detailed construction information in the Air Quality Assessment limits the opportunity for local authorities, regulatory agencies and

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		potentially affected receptors to consider and comment on this aspect of the project. For the Westconnex M4 East EIS the Noise Impact Assessment (Appendix I) does consider in detail the potential impact of construction noise. This indicates that sufficient data is available to complete an indicative quantitative assessment of the construction air quality impacts.
Section 8.2, Appendix I	Emission rates	Hourly emission rates have not been adopted in the Air Quality Assessment, due to the limitations of the GRAL model. The approach has been to consider average emissions from three time periods in the day (Hours 00 -05, 06 - 17, 18 - 23). The effect of this is to smooth out the variability in the data, with lower emission rates assumed for peak hours, and higher for off-peak hours, within the three time periods adopted. This is not strictly in accordance with the requirements of the NSW EPA 'Approved Methods for the Modelling and Assessment of Air Pollutants in NSW' document, for a Level 2 air dispersion modelling assessment. This requires addition of hourly predicted emissions from the source to the corresponding hourly background concentration. The use of averaged emission rates smooths out the variability in the predicted hourly concentrations. This is not considered to be a significant issue where 24 hour average criteria are relevant (eg, for PM₁₀ and PM_{2.5}). For pollutants with criteria referenced to averaging periods that are less than 24 hours, such as NO₂, and to a lesser extent CO, the smoothing of emissions is likely to result in an underestimate of peak predicted impacts. This variability has not been quantified in the assessment.
Section 6.4, Section 8.3.5, Page 105	Meteorological Data	The model domain for the GRAMM meteorological analysis encompassed the entire WestConnex project area. The reason for this was to allow for consistency with air quality assessments for future sections of the WestConnex project. A single meteorological station is included in the GRAL model due to model limitations.



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		The GRAMM modelling has adopted 2014 meteorological data from the Canterbury Racecourse AWS station, which is in the centre of the adopted model domain. The Sydney Olympic Park BOM and Rozelle stations are located in closer proximity to the western and eastern ventilation outlets respectively. The low predicted vs measured correlation at the Sydney Olympic Park and Rozelle stations ($R^2 = 0.6$ and $R^2 = 0.45$ respectively) introduces additional uncertainty into the modelling predictions for sensitive receivers for the M4 East project due to the use of the Canterbury Race Course meteorological data as opposed to the local datasets.
Section 8.2.3, Table 8-3, Page 90	Road widths	Table 8-3 indicates that the road widths are narrower for Motorways than Highways and Regional Arterials. This appears unusual, and may be a typographic error. However, this is likely to only have a marginal influence on the modelling results unless receptors are in close proximity to the modelled road.
Section 8.3.6, Page 109	Receptors	Both gridded (RWR) and discrete receptors have been considered, as is standard practice for an air quality assessment. However, due to limitations in GRAL, only 31 discrete receptors have been considered in the assessment. These receptors have been selected on the basis of landuses. Detailed analysis of predicted concentrations has been presented in the Air Quality Assessment report for these 31 receptors. Review of the location of the 31 receptors confirms that these represent a range of near road receptors, and specific sensitive receptors that are more remote from the Project. Few receptors are within the 500 m of the ventilation outlets although a number of RWR receptors are included in these areas. Because of this, the 31 discrete receptors are not likely to be representative of the worst case impacts from the ventilation outlets, although the RWR receptors are likely to represent these impacts.



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Section 8.3.6, Page 116	Outlet Diameters	The eastern VSO and the M4-M5 eastern VSO are identified as having a single outlet diameter. The western VSO is identified as having three outlet diameters. This will require provision of two dampers in the stack however this is not confirmed in Appendix L (Ventilation Report) of the Air Quality Assessment so this design requirement cannot be verified.
Section 8.3.6, Page 116	Vent emission temperatures	Average temperatures were adopted in the modelling for summer and winter. This is an over simplification of reality. Data for currently operating tunnels confirms that there are periods when the tunnel emission temperature is higher than the external ambient air, eg at night in the winter. Conversely, there are significant periods when the emission temperature is lower than the ambient air, eg peak morning periods in the summer. Where the emission temperature is assumed to be higher than the external ambient air, initial plume rise due to buoyancy is accounted for in the model. Where temperature averaging results in specific hours of the day where the temperature should be lower than ambient, but the model adopts a higher than ambient temperature, the predictions may overestimate plume dispersion. The effect of this is to underestimate receptor concentrations. The sensitivity analysis suggests a variability of +/- 50 %, with predicted receptor concentrations 1.5 times higher where the emission temperature is 10 degrees lower than that adopted in the modelling. Again, the loss of resolution in the input data due to the averaging of emission rates and temperatures across 3 periods a day could introduce a higher variability for this parameter.
Section 8.3.6, Table 18	Efflux Velocity	Table 18 confirms that relatively low efflux velocities have been modelled for some periods of the day (as low as 3.3 m/s at night for the M4 East). Both stack tip downwash and building downwash can significantly increase predicted receptor concentrations where the vertical efflux velocity is insufficient to overcome the effect of cross wind conditions above a specific velocity.



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		As building downwash caused by the ventilation building and other project buildings has not been considered in the modelling, there is considerable uncertainty associated with adoption of the low efflux velocities for the night time period in particular, and much higher predicted receptor concentrations (ventilation outlet only) could be expected as a result.
Section 8.3.7, Table 8-2, Page 117	M5 East Ventilation Outlet Temperature	A constant temperature of 30 degrees has been adopted based on the annual average of the data reviewed for the purposes of the Air Quality Assessment. As noted previously, application of an average temperature will over estimate dispersion for some periods, and underestimate dispersion for others. The sensitivity analysis suggests a variability of +/- 50 %. It is noted that the M5 East ventilation outlet is somewhat unusual, as the emissions from the tunnel are transported via an underground duct over a distance of a few hundred metres prior to discharge via the stack. This may result in differing temperature variability than compared to other tunnels in Sydney.
Section 8.3.7 and Table 8-21 and 8-22, Page 118	Regulatory worst case scenario emission rates	The regulatory worst case scenario has not presented the results for the maximum permitted emission rates in g/s, as only a 'medium case scenario' is presented. The assessment notes that an alternative 'high' and 'low' emission scenario were tested and gave 'very similar' results. If the high emission rate scenario was adopted, the mass emission rates presented in Table 8-22 would be significantly higher. The higher volumetric flow rates would be expected to result in improved dispersion of emissions, however presentation of the modelling results for the worst case "polluting to the limit" scenario is considered appropriate from a transparency perspective. If the NorthConnex licence conditions are mirrored in the approval for the M4 East project, there will need to be continuous monitoring of emissions via a process control system. When emissions from the ventilation outlet approach the licence limits, traffic management measures will need to be implemented to prevent emissions.

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		exceeding the licence limits.
Section 8.3.7, Table 8-22, Page 118	Outlet temperature	A constant temperature of 25 degrees has been adopted based on the annual average of the data reviewed for the purposes of the Air Quality Assessment. As noted previously, application of an average temperature will over estimate dispersion for some periods, and underestimate dispersion for others. The sensitivity analysis suggests a variability of +/- 50 %.
Section 8.4.4, Pages 138-140	One hour NO ₂ predictions	The one hour predicted NO₂ results are presented for the 31 community receptors; the cumulative predicted concentrations are within the overall limit of 246 µg/m³, but at or above 200 µg/m³ in all cases. The surface roads were the biggest contribution. For the RWR receptors, there are predicted exceedances of the 1-hour NO₂ criterion for a significant number of near road receptors. The NO_x/NO₂ conversion rates adopted in the assessment are based on an empirical formula developed specifically for the WestConnex project area. Different conversion rates were adopted for prediction of hourly and annual average concentrations. The adoption of alternative methods is permitted in the NSW EPA 'Approved Methods for the Modelling and Assessment of Air Pollutants in NSW', subject to appropriate detailed scientific assessment. The method adopted in the Air Quality Assessment appears valid, however it is noted that the approach is likely to be more accurate for the emissions from the road based sources than the ventilation outlets, as the monitoring data used to determine the empirical relationship is primarily defined by vehicle emissions. As the road based emission sources are the dominant source in the project area, this assumption is considered reasonable.
Section 8.5, Table 8-27,	Regulatory Worst Case	The predicted 1-hour NO ₂ concentrations, ventilation outlets only, are likely to result in exceedance of the



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Page 171	Scenarios	criterion of 246 $\mu\text{g}/\text{m}^3$ when combined with background and surface road emissions for the regulatory worst case scenarios. The extent of this has not been quantified. This is of particular relevance if operational traffic is significantly higher than projected, and the tunnel emissions routinely approach the expected licence limits. In simple terms, based on this modelling, the project as proposed could result in regular and extensive exceedance of the 1-hour NO_2 criteria if the project operates at significantly higher traffic flows than have been considered as the normal operating scenario.
Section 8.7.1, Page 178	Outlet Temperatures	The sensitivity analysis identifies a factor difference of around 1.5 if the temperature is 10 degrees lower than the average of 25 degrees assumed in the modelling. Therefore, for peak morning periods in the summer when the external temperature could be 10 degrees higher than the tunnel emissions, predicted one hour concentrations could be 50 % higher for the tunnel ventilation emissions. The analysis presented in the assessment considers the impact of temperature changes on 24 hour average predictions only. The differences on 1 hour predictions for NO_2 are not presented. The predictions for this pollutant exceed the assessment criteria for some RWR receptors, and the pollutant that is closest to the regulatory limit for the discrete receptors. Therefore, analysis of the impact on 1-hour predicted concentrations is considered essential to determine the sensitivity of the modelling to this assumption.

