M4 East EIS Review

Final Report

City of Sydney

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SGS Economics & Planning

Independent insight.

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EXECUTIVE SUMMARY

First announced in 2012, WestConnex is a suite of projects, including the M4 Widening, the M4 East, the new M5, a M4-M5 Link, a Western Harbour Tunnel, the Southern Gateway (a link to the Illawarra), the Sydney Gateway (a link to the port and airport. Should all stages of WestConnex be completed it would be the largest continuous motorway in Australia.

The Environmental Impact Statement (EIS) for the M4 East was released on the 10th of September, 2015. The purpose of the EIS is to identify comprehensive mitigation and management measures that would be implemented to avoid, manage, mitigate, offset and/or monitor impacts during construction and operation of the project.

The M4 East EIS followed the release of the M4 Widening EIS in August 2014. These two documents and the Strategic Review and Transport Modelling of WestConnex prepared by SGS Economics & Planning and Veitch Lister Consulting comprise the only detailed public information on the potential impacts of WestConnex.

A review of the transport and socioeconomic sections of the M4 East EIS has highlighted a number of issues:

- The M4 East EIS mentions alternatives to the M4 East (public transport and freight rail improvements and demand management policies) but provides no information on the outcomes of these alternatives. It is merely stated that the M4 East is the best solution to the challenges facing the corridor.

- The M4 East EIS has assumed that all sections of WestConnex listed above (with the possible exception of the Western Harbour Tunnel)[1] are completed by 2031. Given the scale of building required and early stages of planning of many sections of WestConnex this creates project risks. If all sections are not completed simultaneously the traffic flowing from the M4 East will have adverse impacts on the inner west and central Sydney. The M4 East EIS has not addressed the risks in terms of the traffic and socioeconomic impact of the whole project.

- The M4 East is only evaluated post 2021 in combination with other WestConnex sections. There are risks that the M4 East will generate additional traffic that will only be addressed by other sections of WestConnex.

- The M4 East EIS itself acknowledges that the forecasted peak traffic patterns appear to be counter intuitive – westbound in the morning peak and eastbound in the afternoon peak. When compared to recent traffic trends in Sydney this outcome is hard to comprehend. The EIS explanation of this outcome is contrived and complicated and a more likely explanation is a miscalculation in the transport modelling.

- The origin and destination of the users of the M4 East is not explained in any detail within the M4 East EIS. Without this it is difficult to understand the impacts on the broad road network in eastern or western Sydney.

[1] The status of this project is not clearly defined in the M4 East EIS

- The M4 East EIS does not explain how toll levels and people's perception of tolls changes into the future. Given the impacts this can have on existing surface roads and the recent toll road failures in Sydney this appears a significant omission.

- Assumptions around the location, supply and cost of car parking (a key component of travel cost to eastern Sydney) is not explained by the M4 East EIS.

- The M4 East EIS documents make no reference to sensitivity tests, nor does the EIS list any results. It should be expected that in a project of this significance, the sensitivity of the model to various assumptions would be tested and potential alternative outcomes be tested in some detail. In particular, the sensitivities to the impacts on the road network of differing toll levels and land use changes along Parramatta Road would be significant.

- The transport model used by the M4 East EIS does not include public transport assignment or even public transport demand forecasting. The M4 East EIS provides no information about the impact on public transport demand, including whether tolls would induce some people to switch to public transport. Due to the lack of a mode split process in the transport modelling, the competing disbenefits of traffic congestion and rail crowding have not been tested for the EIS.

- The M4 East EIS inclusion of bus lanes along Parramatta Road, which are not part of the project (or Westconnex), does reduce road space and traffic flows assuming that traffic does in fact divert into the M4 East tunnel. Based on public information, when these bus lanes will be delivered is unclear.

- The implications of increased bus traffic along Parramatta Road into the Sydney city centre are not addressed by the M4 East EIS. How the central city road network will deal with increased bus traffic is unknown.

- The M4 East EIS avoided car crash benefit has been based on total daily vehicle kilometres travelled and average crash severity. However, crashes in the off-peak periods are likely to be much more severe (and therefore more costly) because of higher possible speeds. If more crashes along the corridor occur in peak period then the car crash benefit could be overstated.

- The absence of a long term modelling (for example 2041) from the M4 East EIS means that any longer term traffic or socioeconomic impacts are not being identified, mitigated or monitored.

The information contained in the EIS does not reduce any of the concerns around the adverse impacts previously raised in the Strategic Review and Transport Modelling of WestConnex prepared by SGS Economics & Planning and Veitch Lister Consulting. That is, WestConnex will not address the transport challenges being faced by Sydney in the future.

1 INTRODUCTION

The purpose of the Environmental Impact Statement (EIS) is to identify comprehensive mitigation and management measures that would be implemented to avoid, manage, mitigate, offset and/or monitor impacts during construction and operation of the project. The EIS for the M4 East section (see Figure 1) of WestConnex was released on the 10th of September, 2015.

FIGURE 1 WESTCONNEX ALIGNMENT (DECEMBER 2014)

Source: WestConnex Delivery Authority, 2014

The M4 East is a complex road project, with a number of key features, including:

- The widening and realignment of the M4 between Homebush Bay Drive and Underwood Road at Homebush.
- Construction of two 5.5 km three-lane tunnels extending from west of Underwood Road at Homebush to near Alt Street at Haberfield.
- The upgrade of the existing Homebush Bay Drive interchange connecting the western end of the M4 East to the existing M4 and Homebush Bay Drive.
- An interchange at Concord Road at North Strathfield/Concord. Access to the existing M4 to Concord Road would be maintained via Sydney Street.
- An interchange at Wattle Street (City West Link) at Haberfield.
- An interchange at Parramatta Road at Ashfield/Haberfield.

The M4 East will also interact with a number of other proposed projects, including a new M5, a M4-M5 Link, a Western Harbour Tunnel, the Southern Gateway (a link to the Illawarra) and the Sydney Gateway (a link to the port and airport).

The EIS is prepared as per the provisions made for environmental assessment of State Significant Infrastructure projects under Part 5.1 of the Environmental Planning and Assessment Act 1979. The Act stipulates that the EIS be prepared to provide assessment of all potential environmental issues identified during the planning and assessment of the project. The public exhibition of the EIS commenced on the 10th of September and has been extended until the 2nd of November due to its complex nature and missing information not included in the 10th of September release. The EIS focuses on the impacts, not the net community benefit of the proposed M4 extension.

This report provides a peer review of the material contained within the EIS and its supporting documents, with foci on the key transport outcomes and socio-economic narrative for the project.

2 IDENTIFIED ISSUES

This section presents a range of issues identified during the review. To highlight the various issues material has been drawn from the M4 East EIS and previous SGS Economics and Planning and Veitch Lister Consulting reports which examined the impact of WestConnex. These reports[2] are:

1. Strategic Review of the WestConnex Proposal: Final Report
2. WestConnex Transport Modelling: Summary report
3. WestConnex Transport Modelling: Technical report

No real analysis on assessment of alternatives to the M4 East

The M4 East EIS states a number of different alternatives to the project were considered but provides no information on the outcomes of these alternatives. These include:

- Improving the existing arterial roads, such as upgrading Parramatta Road, Victoria Road and/or alternative road corridors such as Patterson Street, Queens Road and Ramsay Road.
- Investing in public transport and freight rail improvements in isolation, without any improvement to the road network.
- Demand management policies which are intended to reduce individual trips and make alternative mode options more viable.

However, no real analysis of these options is presented. One would expect the type of analysis shown below on the topic of demand management to be considered by the M4 East EIS.

Demand Management Option Assessment

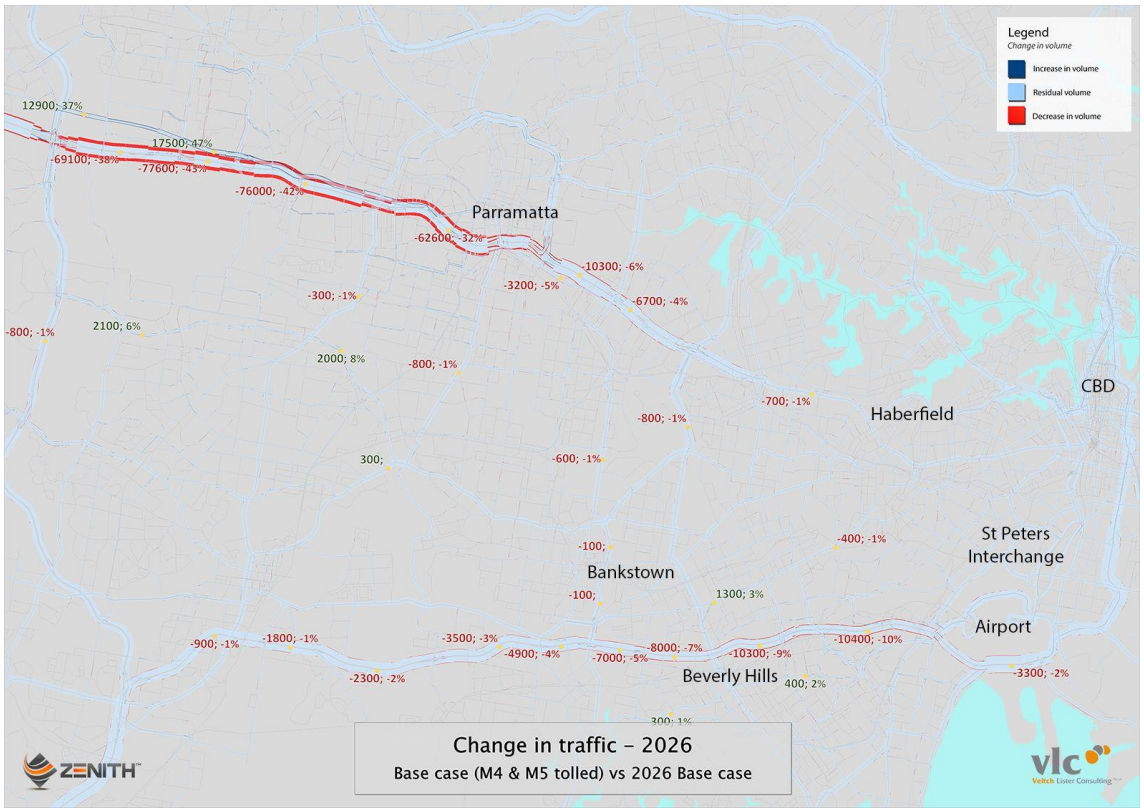
The Bureau of Transport Statistics has previously produced research drawing from Household Travel Surveys that shows there are still a number of discretionary trips being made in peak periods that could be shifted to non-peak times.

Rather than increasing road capacity by building new road infrastructure, congestion on the existing road network may be better managed through a new or updated price mechanism. The Zenith model shows a major driver of improved volume-to-capacity ratio on the M4 is the introduction of tolls. If this were desired, a reduction in usage could be achieved simply by tolling the motorway without upgrading. Figure 2 shows the impact of the introduction of tolls on the full length of the M4 and on the M5 East from Beverly Hills to Princes Highway in the base case (i.e. without WestConnex).

The model predicts a heavy reduction on the M4 (of about 40 per cent) and an increase on the Great Western Highway (of about 50 per cent). There will be a small reduction on Parramatta Road, mainly due to the reduction in traffic coming from the M7 via the M4. Other local roads will see a slight increase in traffic volumes.

[2] http://www.cityofsydney.nsw.gov.au/council/news-and-updates/featured-articles/westconnex-wont-benefit-sydney

FIGURE 2 IMPACT OF M4 AND M5 TOLLED (BASE CASE)



Source: Veitch Lister Consulting

Assumptions that all sections of WestConnex completed by 2031

The M4 East EIS is assessing a *Do something* compared with a *Do minimum* to understand the impacts of the M4 East. These two scenarios are defined below:

> ***Do minimum***: A future network scenario including the King Georges Road Interchange Upgrade and the M4 Widening projects and some upgrades to the broader transport network over time. However, this scenario does not include the M4 East or subsequent WestConnex projects. This represents the future conditions without the projected environmental assessment measure.
>
> ***Do something***: As per the 'do minimum', but with the project complete and open to traffic. Additionally, this scenario excludes subsequent WestConnex projects in 2021, but assumes all WestConnex projects are complete (including the Sydney Gateway and the Southern Extension) by 2031. This represents the operational impacts of the environmental assessment measure. It is unclear if the Western Harbour Tunnel is included in the *Do something*.

Future motorway extensions related to WestConnex (namely the Western Harbour Tunnel, Sydney Gateway and the Southern Gateway) are shown in Figure 3. Below is a brief summary of the status of each of the projects contained within the Do something scenario.

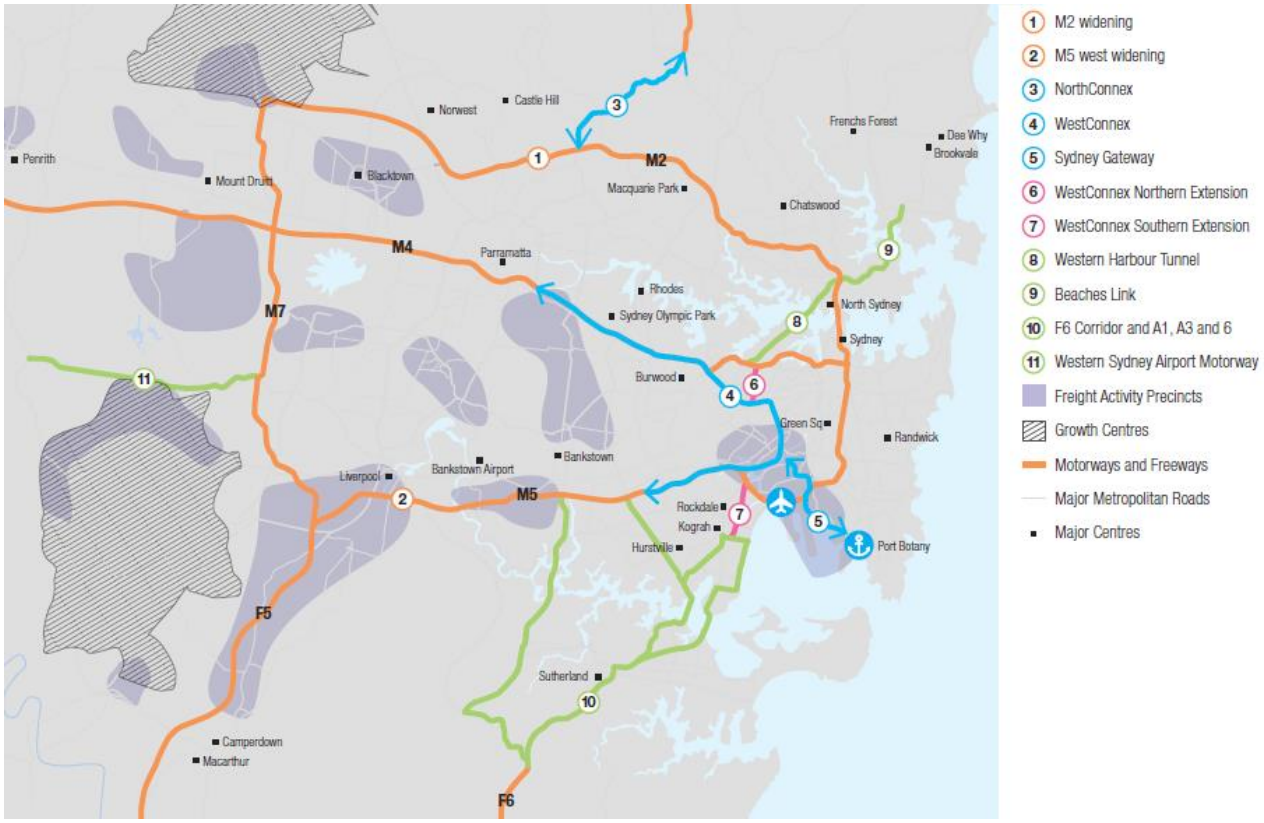
WestConnex Stage 2 – M5 East

The second stage of the WestConnex project, the construction of new tunnels on the eastern section of the M5 from Beverly Hills to St Peters, has commenced in part, with construction being undertaken on the upgrade of the Kingsgrove interchange of the existing M5. A commitment deed has been signed with

the selected joint venture between Leighton, Samsung and Dragados, though no contract has yet been signed for the completion of the work and an EIS has not yet been exhibited for the project.

WestConnex Stage 3 – M4 to M5 Link: The third stage of the WestConnex project, a link between the M4 and M5 extensions which comprise Stages 1 and 2 of WestConnex, has featured in several of the State's strategic documents, including the *State Infrastructure Strategy Update* (the *Strategy Update* 2014) and *A Plan for Growing Sydney* (2014). As yet there have been no detailed arrangements made for funding or construction of the project, nor has there been a specific alignment for the project produced, aside from broad indications of the location of interchanges and connections with other parts of the road network.

FIGURE 3 VISION FOR SYDNEY'S MOTORWAY NETWORK



Source: INSW, 2014 (adapted from TfNSW 2012)

Western Harbour Tunnel: The *Strategy Update* has identified that a third road harbour crossing is under investigation by the State Government as part of its strategic motorway planning program. It is undergoing investigation for the viability of the project, with the *Strategy Update* identifying that a business case should be prepared to assess the project in conjunction with or immediately after the delivery of the WestConnex Stage 3. At this stage there is no design or costing for this project.

Southern Gateway: The *Strategy Update* identifies that the government is undertaking detailed investigation as to the potential options for providing increased connectivity to the Sutherland Shire and Illawarra Regions via the A1 (Princes Highway), A3 (King Georges Road), A6 (Alfords Point Road) and F6 Corridors. The *Strategy Update* notes that substantial upgrades to these corridors are likely to be very expensive. The investigative study is yet to be completed. At this stage there is no design or costing for this project.

Sydney Gateway: The Sydney Gateway is identified in the *Strategy Update* only as an indicative alignment for which further investigation is required. It has also appeared in the 2012 *NSW Long Term Transport Master Plan*, as a potential alignment to be investigated for "enhanced Port Botany links", with no detailed description being provided. At this stage there is no design or costing for this project.

Parramatta Road Bus Rapid Transit: *Sydney's Bus Future* (2013) identifies the implementation of Bus Rapid Transit infrastructure along Parramatta Road as a potential option for investment for investigation over the long term. The *Strategy Update* also reiterates the potential for a BRT line along Parramatta Road, dependent on its viability in light traffic conditions after the implementation of the various stages of WestConnex.

There is no detail in terms of the design of these projects presented in the EIS. For example:

> *… the proposed M4-M5 Link design is not yet defined and is yet to be endorsed. As a consequence, the functionality of a future CBD connection is not yet determined. Due to capacity constraints on the ANZAC and Sydney Harbour bridges the provision of this connection is not possible without an additional harbour crossing*[3].

Given the scale of building required and early stages of planning of many sections of WestConnex, expecting all sections to be completed by 2031 is somewhat ambitious. This creates project risks which the M4 East EIS should have considered. If all sections are not completed simultaneously the traffic flowing from the M4 East will have adverse impacts on the inner west and central Sydney.

Also any adverse impacts from the M4 East's opening in 2021 are not assessed by the M4 East EIS. **The** M4 East is only evaluated post 2021 in combination with other WestConnex sections. There are risks that the M4 East will generate additional traffic (see Figure 5) that will only be addressed by other sections of WestConnex.

FIGURE 4 VOLUME CAPACITY RATIO 2026 (PROJECT STAGE 1 & 2)

Source: Veitch Lister Consulting

Traffic conditions in the rest of Sydney will deteriorate quickly during the construction phase. This will continue after the completion of the M4 East (Stage 1) and M5 Stage 2. This deterioration will be alleviated in part when WestConnex Stage 3 is complete. The benefits of WestConnex accrue primarily

[3] Volume 2A Appendix G Part 1 page 4-6

once the entire project has been constructed. At the completion of just Stages 1 and 2, roads in the inner Sydney area are more likely to be at capacity, as depicted in the map below.

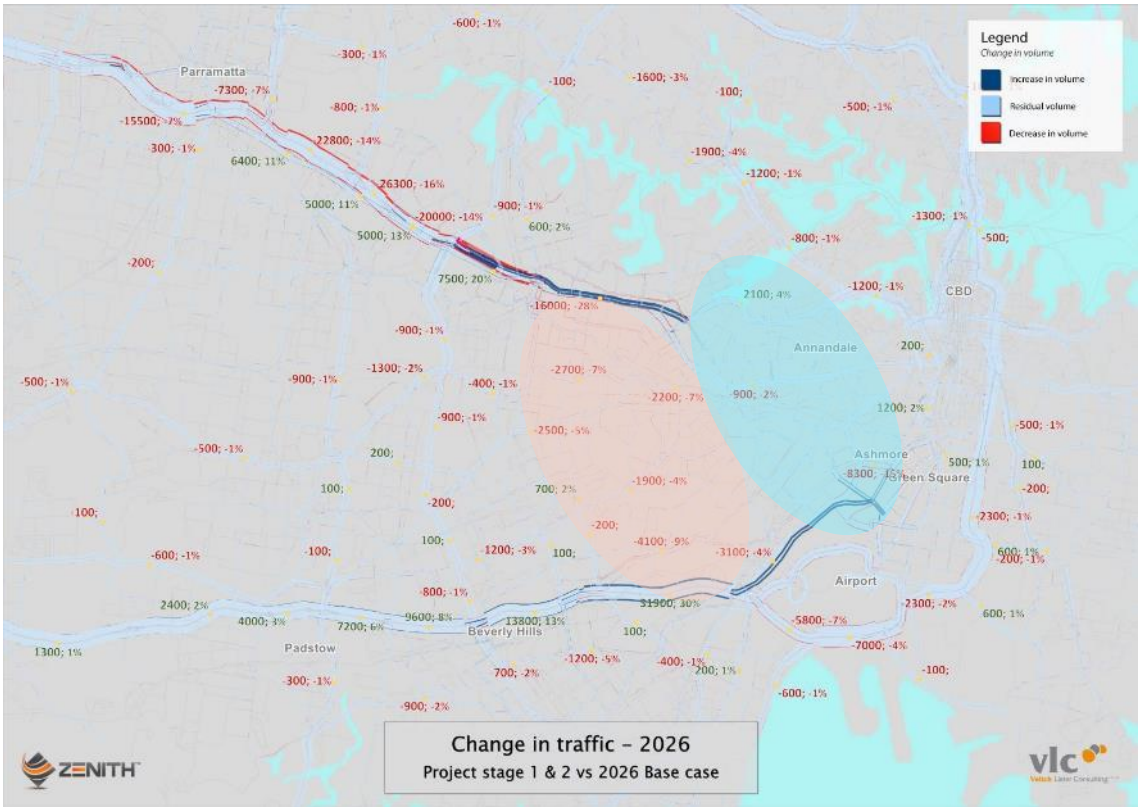
The M4 East EIS has not addressed the risks in terms of the traffic and socioeconomic impact of the project. Figure 5 provides an example of impacts which are not being considered by the EIS. Figure 5 shows the change in traffic volumes if only WestConnex Stage 1 and 2 are operational.

WestConnex Stage 1 and 2 create two distinct corridors on the local network (highlighted in Figure 5):

- the first one (in red) where the traffic volumes generally decrease by a small amount;
- the second one (in light blue), between Haberfield and St Peters precincts, where volumes generally increase.

There are risks that EIS should have identified around increased surface road traffic (and associated amenity and possible business impacts) which could result if Stage 3 of WestConnex is not completed at the same time as the M4 East.

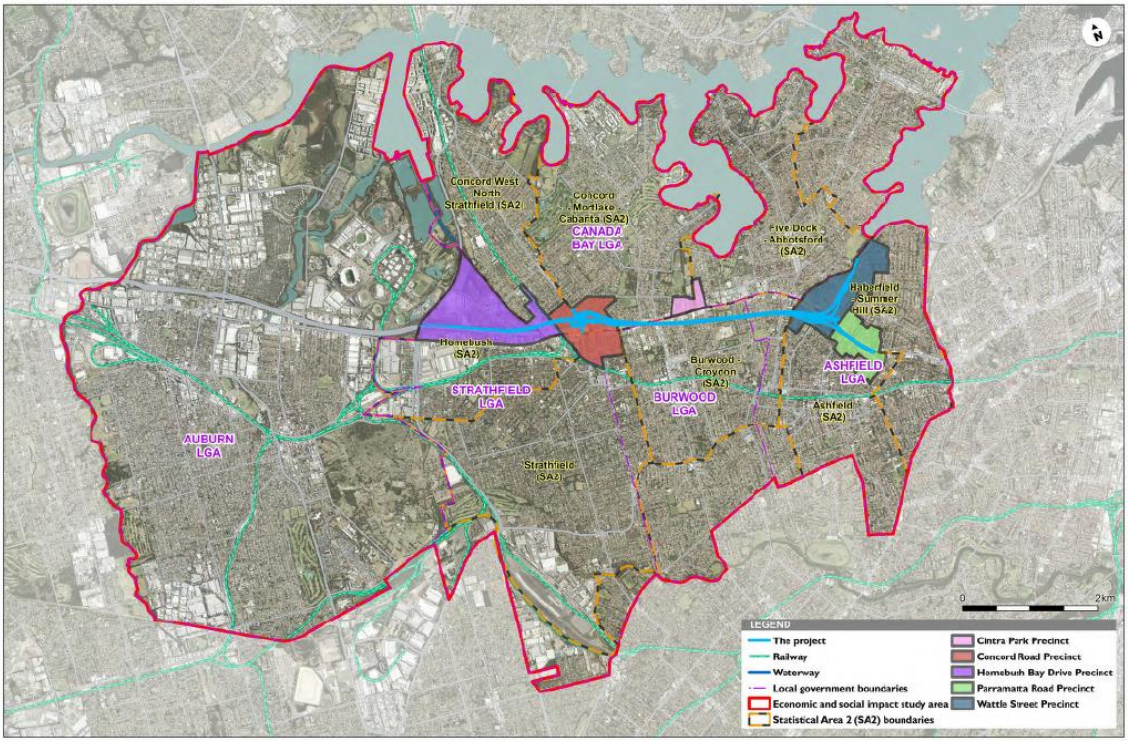
FIGURE 5 CHANGE IN VOLUMES 2026 (STAGE 1 & 2 VS BASE)



Source: Veitch Lister Consulting

It should be noted that the area impacted by the increase in traffic flows shown in the previous maps is outside of the study area for socio-economic impacts. This is despite the M4 East EIS stating that dealing with access to Sydney Airport and Port Botany, population growth and transport demand in Western Sydney is a key reason for the M4 East project.

FIGURE 6 M4 EAST EIS ECONOMIC & SOCIAL IMPACT ASSESSMENT STUDY AREA



Source: M4 East EIS

The forecasted peak traffic patterns appear to be counter intuitive

The M4 East EIS itself acknowledges that the forecasted peak traffic patterns appear to be counter intuitive. That is, westbound in the morning peak and eastbound in the afternoon peak. When compared to recent traffic trends in Sydney this outcome is hard to comprehend.

The following four reasons are provided on page 4-7 of Appendix G explaining why forecast traffic flows are higher in the off-peak direction than in the peak direction.

1. *The foundation of the future year traffic forecasts are the base matrices. These have been calibrated against existing traffic flows. However, on highly constrained transport corridors such as Parramatta Road, the flow across the stopline in the peak direction is actually lower than the counter peak, not because of lower demand, but because of road network constraints. Therefore the counter peak demand is accurately captured in the counter peak direction but flow rather than demand is captured in the peak direction*
2. *As these base matrices form the foundation of future demands, as population growth is factored in the counter intuitive peaks are retained*
3. *The induced demand method utilised is elasticity based and the magnitude is directly related to the original forecast demands which further skews the volumes in favour of the counter peak direction*
4. *The counter peak direction draws more traffic from parallel routes than the peak direction.*

The explanations provided in these bullet points are not coherent. The first bullet point argues that in highly congested road networks, flows across the stopline in the peak direction are lower because of road network restrictions. These road network restrictions are not identified.

In any case, it is difficult to understand why a lower demand in the peak direction is not captured correctly, when a higher demand in the off-peak period is captured correctly. This would impact the base year count, and therefore cause errors in the traffic origin destination matrix estimation. To know and

acknowledge that there are errors in the counts that distort the matrix estimation but not take actions to correct them seems highly inappropriate.

The second bullet point attributes the counter-intuitive direction demands to unbalanced base year counts, exacerbated by growth rates over 20 years to the forecast horizon. That is, the M4 East EIS appears to be suggesting that there is an error in the current traffic data which only grows into the future.

The third bullet point argues that the number of induced vehicles is proportional to the original traffic demand and is therefore higher in the counter-peak direction. This may be so at a trivial level (10 per cent of a big number is bigger than 10 per cent of a small number) but our understanding of the modelling procedure is that the induced trips were only applied to the project cases, not the base case, which is apparently being discussed here.

In any case, determination of induced traffic is the travel time elasticity of demand and so the elasticity should be dependent on the change in travel times, which are presumably lower for the more highly trafficked counter-peak direction than the peak direction.

The fourth bullet point argues that the counter-peak direction draws more traffic from parallel routes than the peak direction. This argument is not consistent with the fact that the counter-peak traffic flow is higher than the peak, therefore offering lower travel speeds than in the peak direction.

The arguments presented in the four bullet points are contrived and complicated. It is a much more likely and simple explanation that the traffic flows are the result of erroneous matrix estimation, the demographic growth patterns contained in the model or both.

In addition, the asymmetric tolling regime on the Harbour crossings and on the Eastern Distributor has reasonably far-flung ramifications on the road network. The ANZAC Bridge, for example, carries 10,000 vehicles per day more in the eastbound direction (into the CBD) than the westbound direction, a direct result of those who can avoiding the southbound toll on the Harbour Bridge and Tunnel but using the toll-free northbound direction on the return trip. The M4 corridor was similarly affected, at least on its eastern sections.

Without a great deal of further investigation, it is difficult to assess whether the toll regime does, in fact affect the directional flow in the M4 East corridor.

The origin and destination of the users of the M4 East is not explained in any detail

The origin and destination of the users of the M4 East is not explained in any detail within the M4 East EIS. Without this it is difficult to understand the impacts on the broad road network in eastern or western Sydney.

For example, Figure 7 shows the WestConnex volumes and trip origins in the M4 East (Stage 1) and New M5 (Stage 2). Within the figures the bandwidths show the expected routes of WestConnex users, from where their trip originates to their final destination.

The size of the 'pies' is proportional to the number of trips originating in the travel zones that use WestConnex. The slices of the pies are coloured in the same way as the bandwidths. Trips made on WestConnex in a clockwise direction are coloured in shades of blue depending on the WestConnex section they access first; anticlockwise trips are coloured in shades of purple.

The results are:

Clockwise

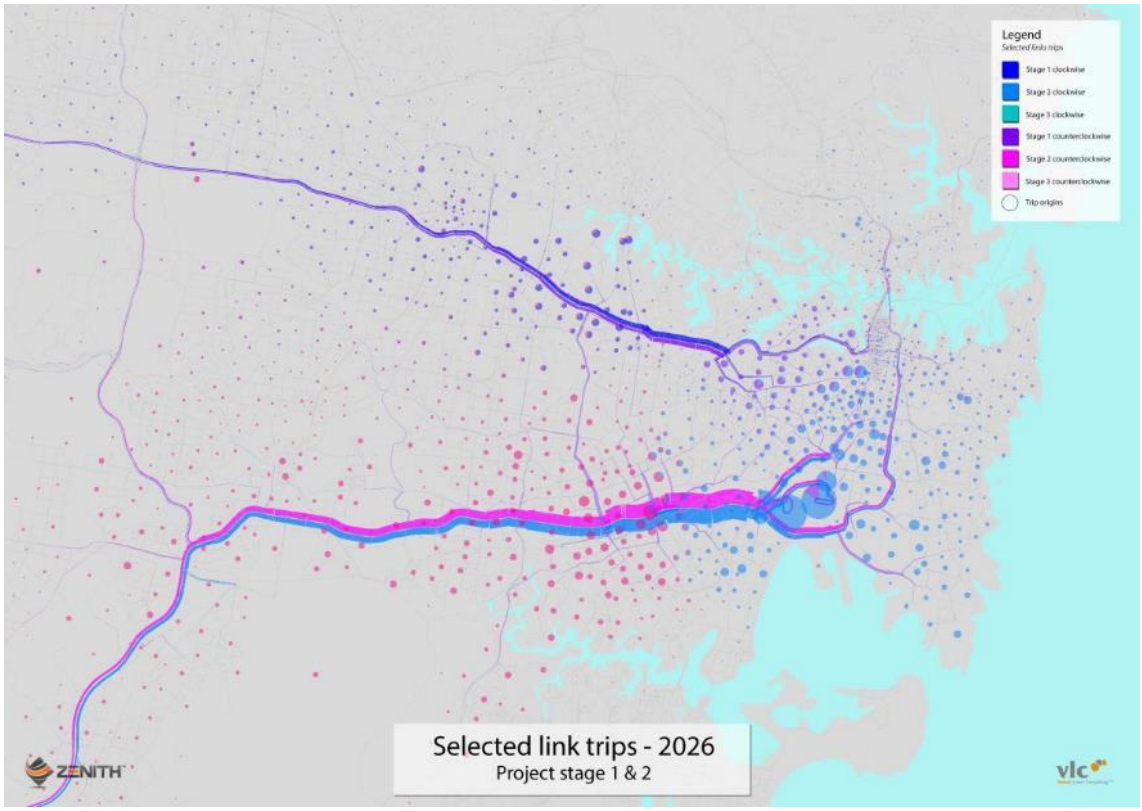
- Trips accessing WestConnex Stage 1 and travelling eastbound are coloured dark blue, even if they keep travelling on Stage 3 and 2,
- Trips accessing WestConnex Stage 2 and travelling westbound are coloured light blue,
- Trips accessing WestConnex Stage 3 and travelling southbound are coloured in a blue in between dark and light, even if they keep travelling on Stage 2.

Anticlockwise

- Trips accessing WestConnex Stage 1 and travelling westbound are coloured dark purple,
- Trips accessing WestConnex Stage 2 and travelling eastbound are coloured light purple, even if they keep travelling on Stage 3 and 1,
- Trips accessing WestConnex Stage 3 and travelling northbound are coloured in a purple in between dark and light, even if they keep travelling on Stage 1.

Figure 7 makes it clear that Stages 1 and 2 serve different markets. Stage 1 provides access to Parramatta and Haberfield, with vehicles at the end of Stage 1 at Frederick Street dispersing across the local network. Stage 2 serves mainly Sydney airport, Green Square and other eastern suburbs.

FIGURE 7 WESTCONNEX CATCHMENT 2026 (PROJECT STAGE 1 & 2)



Source: Veitch Lister Consulting

This analysis highlights that there are risk from the project to other parts of Sydney road network which are not being considered by the EIS.

Toll levels and people's perceptions of tolls are not explained

The M4 East EIS does not explain how toll levels and people's perception of tolls changes into the future. Given the impacts this can have on existing surface roads and the recent toll road failures in Sydney this appears a significant omission. Assumptions around the location, supply and cost of car parking (a key component of travel cost to eastern Sydney) are not explained in the M4 East EIS.

It can only be assumed that the toll levels similar to those reported in the public documents (Table 1) have been used as reference to calculate the toll value on each WestConnex section:

- Stage 1: 55 c/km;
- Stage 2: about 45 c/km;
- Stage 3: about 50 c/km;
- With a toll cap of $7.35.

TABLE 1 WESTCONNEX REFERENCE TOLLING SCENARIO

Stage	Indicative average toll ($2013, incl GST)	Indicative min/max toll ($2013, incl GST)
M4 Widening (Church Street to Homebush Bay Drive)	$3.00	Min: $1.50 Max: $3.90
M4 East (Homebush Bay Drive to Parramatta Road and City West Link)	$2.40	Min: $2.00 Max: $3.60
Stage 2 – M5 East Airport Link (Beverly Hills to St Peters)	$2.70	Min: $1.70 Max: $4.80
Stage 3 – M4 South (Haberfield to St Peters)	$3.00	Min: $1.80 Max: $4.10
WestConnex average toll	**$4.50**	**Min: $1.50 Max: $7.35 (cap)**

Source: WestConnex Delivery Authority

Lack of sensitivity tests

The M4 East EIS documents make no reference to sensitivity tests, nor does the EIS list any results. It should be expected that in a project of this significance, the sensitivity of the model to various assumptions would be tested and potential alternative outcomes be tested in some detail. In particular, the sensitivities to the impacts on the road network of differing toll levels and land use changes along Parramatta Road would be significant.

For example, the East West Link – Eastern Section Business Case (a similar project to the M4 East) produced sensitivities based on the introduction of other potential road and public transport projects, alternative land use outcomes, and differing tolling schemes. These types of sensitivity tests are missing from the M4 East EIS.

Of particular interest is the lack of land use scenarios. The EIS states:

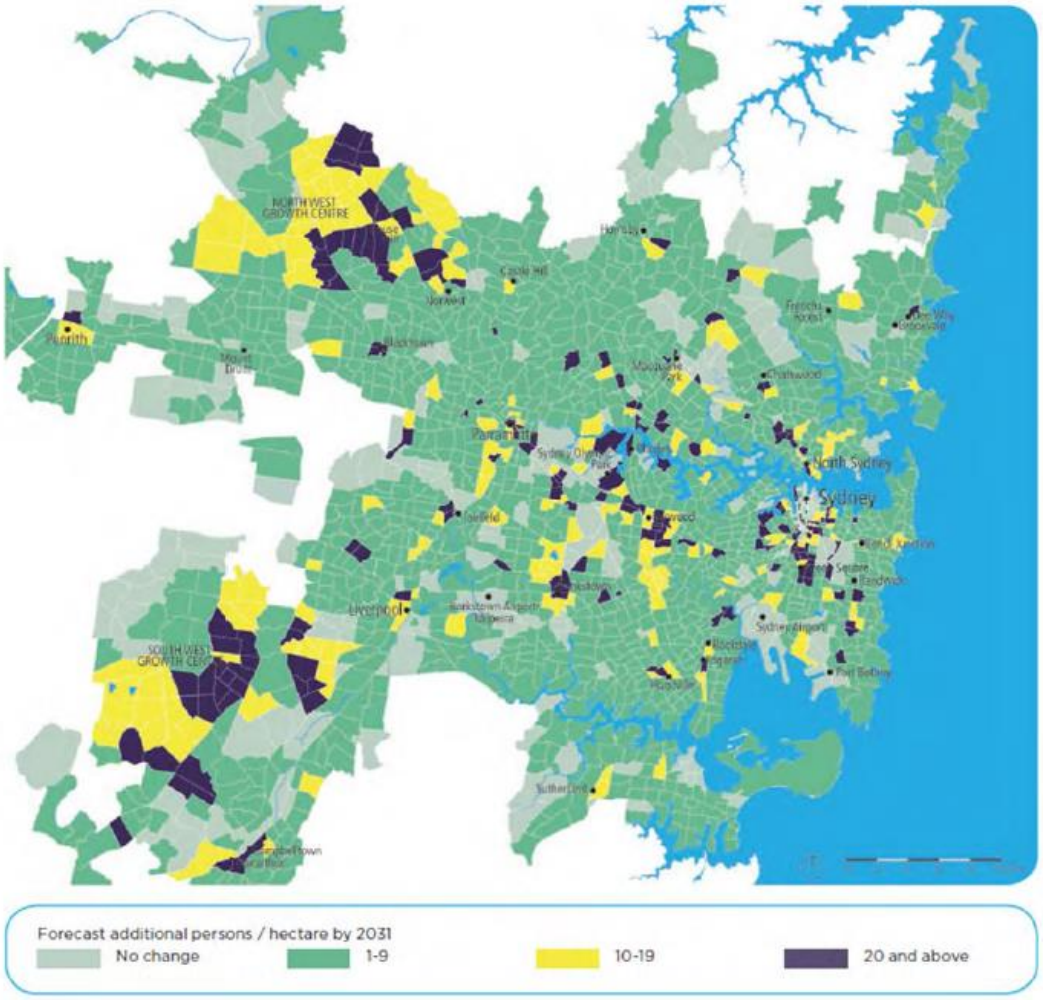
> *The project, as part of WestConnex, would act as a catalyst for urban revitalisation in the Parramatta Road corridor, which has the potential to significantly alter land use*[4].

But the standard land use projections shown in Figure 8 indicate that there would clearly be implications for travel demand along the Parramatta Road Corridor and M4 East if there were an additional 70,000 residents[5] along Parramatta Road. Assessing this project risk should have been part of the M4 EIS.

[4] Volume 1A page X

[5] https://newparrard.com.au/wp-content/uploads/2015/10/150930_DPRUT_Strategy.pdf page 3

FIGURE 8 SYDNEY'S POPULATION GROWTH FORECAST (2011–2031)



Source: Transport Master Plan

Impacts on public transport

The transport model used by the M4 East EIS does not include public transport assignment or even public transport demand forecasting.

The M4 East EIS provides no information about the impact on public transport demand. That is, whether tolls would induce some people to switch to public transport. Due to the lack of a mode split process in the transport modelling, the competing disbenefits of traffic congestion and rail crowding have not been tested for the EIS.

The M4 East EIS inclusion of bus lanes along Parramatta Road, which are explicitly excluded from the project, does reduce road space and surface traffic flows, assuming that traffic does in fact divert into the M4 East tunnel.

The implications of increased bus traffic along Parramatta Road and travelling into the Sydney city centre are not addressed by the M4 East EIS. How the central city road network will deal with increased bus traffic is unknown.

It needs to be noted that text associated with Figure 3.2, page 3-2 of Appendix G of Volume 2-A of the EIS document, implies that public transport will be particularly crowded in the do-nothing case.

In fact, the volume capacity (VC)[6] ratios provided in the figure show that there are no capacity issues with bus services, where the demand for transport will leave between 20 per cent and 50 per cent of the available seats unoccupied.

The train capacities in 2031 look worse than they are at 1.47 for the Macdonaldtown – Redfern link. The VC ratio in Figure 3.2 is based on a seated capacity and Sydney trains can accommodate double their seated capacity as a crush capacity (ie. up to a VC of 2). It should also be noted that the major CBD stations are just beyond Redfern, so that the forecast crowding occurs only for a short distance and travel time.

Because of the lack of a mode split process in the WestConnex modelling, the competing disbenefits of traffic congestion and rail crowding have not been tested by the M4 East EIS.

Longer term assessment

The absence of a long term modelling (for example to 2041) from the M4 East EIS means that any longer term traffic or socioeconomic impacts from the operation of the M4 East are not being identified, mitigated or monitored. As shown in the tables below the traffic along the corridor increase significantly (in most cases around 10,000 additional trips) between 2026 and 2041.

TABLE 2 EASTBOUND DAILY TRAFFIC VOLUMES (CLOCKWISE[7])

Section	2026 base	2026 S123	2026 S123 % diff	2041 S123
M4 Church Street - James Ruse Dr	77,000	69,300	-10%	78,800
M4 James Ruse Dr - Silverwater Road	82,700	79,200	-4%	90,200
M4 Hill Road - Homebush Bay Dr	70,100	73,200	4%	84,400
M4 Homebush Bay Dr - Concord Road	54,300	43,900	-19%	50,600
Concord - Road Frederick Street		55,400		63,900

Source: Veitch Lister Consulting

TABLE 3 WESTBOUND DAILY TRAFFIC VOLUMES (COUNTERCLOCKWISE[8])

Section	2026 base	2026 S123	2026 S123 % diff	2041 S123
M4 Church Street - James Ruse Dr	76,500	71,600	-6%	81,400
M4 James Ruse Dr - Silverwater Road	81,000	82,300	2%	93,400
M4 Hill Road - Homebush Bay Dr	70,900	75,900	7%	87,600
M4 Homebush Bay Dr - Concord Road	54,600	63,400	16%	76,400
Concord - Road Frederick Street		53,300		63,000

Source: Veitch Lister Consulting

Avoided car crash benefits

We draw attention to the fact that the M4 East EIS avoided car crash benefit has been based on total daily vehicle kilometres travelled and average crash severity. However, crashes in the off-peak periods are likely to be much more severe (and therefore more costly) because of higher possible speeds. If more crashes occur along the corridor in the peak period then the car crash benefit could be overstated.

[6] The volume capacity (VC) ratio is a measure that reflects mobility and quality of travel along a transport link. It compares roadway demand (vehicle volumes) with roadway supply (carrying capacity). A VC of 1.00 indicates the roadway facility is operating at its designed carrying capacity. Above 1 is over capacity and below 1 is under capacity.

[7] A journey starting at the western end of the M4 and travelling to the southwestern end of M5 along WestConnex

[8] A journey starting at the southwestern end of M5 and travelling to the western end of the M4 along WestConnex

3 MODEL COMPARISON

In the previous section results from the comprehensive modelling of WestConnex from the Zenith model were used to interpret results from the M4 East EIS traffic model. This section presents a comparison of the various assumptions, inputs and outputs from the two transport models. While there are a range of differences the models appear to be producing a broadly consistent picture of traffic travelling along the M4 East. Before focussing on specific differences, there are some general observations to be made on the EIS processes and the document. These are discussed below.

The Modelling Process

The M4 East EIS Road Traffic modelling has:

a) Extracted a base case road traffic trip matrix from Strategic Travel Model (STM)[9];
b) Refined the trip matrix through matrix estimation;
c) Introduced induced trips into the project case using travel time elasticities of demand for travel by car;
d) Forecast detailed volumes and turning movements by applying growth calculated from the difference in base year and future year to the base year values. The EIS document is not clear on how volumes and turning movements on new roads and intersections are estimated.

The M4 East EIS Road Traffic Model, a purely traffic assignment model, is then used to assign the trip matrix to the road network and to provide more detailed toll choice modelling than can be achieved within the capabilities of the STM.

The M4 East EIS Road Traffic Model process, while acceptable, includes many implicit assumptions, including that provision of significant transport infrastructure will not impact on growth rates of demand.

Zenith is a multi-modal, 4-step model and, in the modelling of WestConnex, has implemented all four steps within a single model. These differences will undoubtedly be the source of some of the differences between the M4 East EIS Road Traffic Model and Zenith forecasts.

Extent of Model

The Zenith Westconnex Model (ZWM) includes the Illawarra Region, the Central Coast and the Hunter Region. The STM, which provided the base case trip matrix, has roughly the same coverage as ZWM. The M4 East EIS Road Traffic Model, however, includes the Sydney Metropolitan Area only.

The major issue with the limited coverage is that the M4 East EIS Road Traffic Model has no mechanism to include route shifting between corridors. The most significant of these are the choice of route for travel between:

- Sydney Metropolitan Area and the Illawarra Region, where there is a choice between the Hume Highway and the F6;
- Sydney Metropolitan Area and northern areas of Central Coast and the Hunter Region, where there is the choice between the Princes Highway and the F2.

  However, since these are reasonably remote from the M4 East corridor, it is unlikely that they will have a significant impact on the outputs of the models.

[9] More information on the STM can be found here http://www.bts.nsw.gov.au/Publications/Latest-publications/default.aspx

Differences in the Models

We have identified several differences in the assumptions contained in the two models and the procedures that were used to provide forecasts of traffic demand. These are itemised below.

Network Coding

The alignment of M4 East in the M4 East EIS Road Traffic Model is located south of Parramatta Road. In ZWM it is north of Parramatta Road. This is unlikely to produce significantly different outputs.

The Eastern Portal Interchange: The M4 East EIS Road Traffic Model connects Westconnex to Wattle Street and Parramatta Road via long ramps. In Zenith, Westconnex is linked to the Wattle Street/Ramsay Street Intersection.

There may be minor differences in travel times as a result of this difference, but these should not be significant enough to result in major differences in assigned volumes.

The M4 East EIS states that some changes were made to the surface road network, including some turn bans. However, the changes have not been specifically identified in the document. In ZWM, the surface road network was unaltered.

The M4 East EIS Road Traffic Model includes bus lanes on Parramatta Road (thereby reducing capacity of these links in the model) while Zenith does not.

Mode choice

M4 East EIS Road Traffic Model uses elasticities to calculate induced traffic, which includes the shift from public transport to cars. ZWM contains mode split within the model.

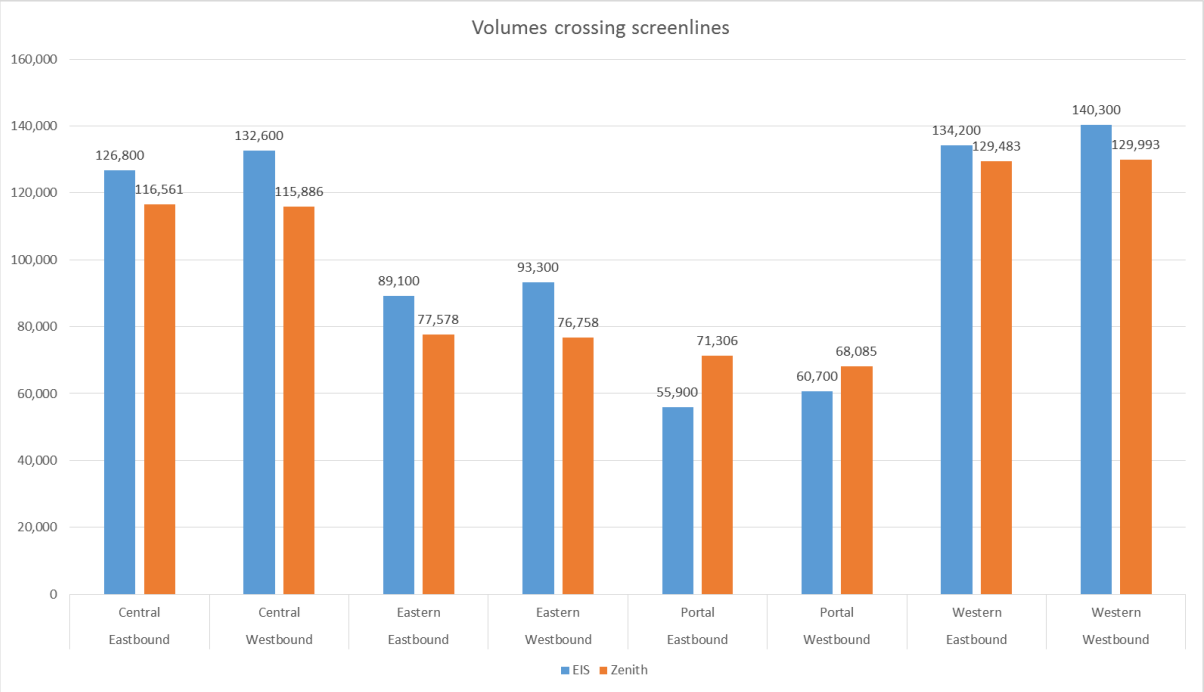
Tolls and Toll Strategy

The M4 East EIS does not explain how tolls and perceptions of them changes into the future (see page 13 for a possible tolling strategy used in the M4 East EIS). We understand from other sources that there is an assumption that income increases in real terms by 1 per cent per year. Zenith does take into account changes in perceptions of tolls and willingness to pay.

Direct Comparisons

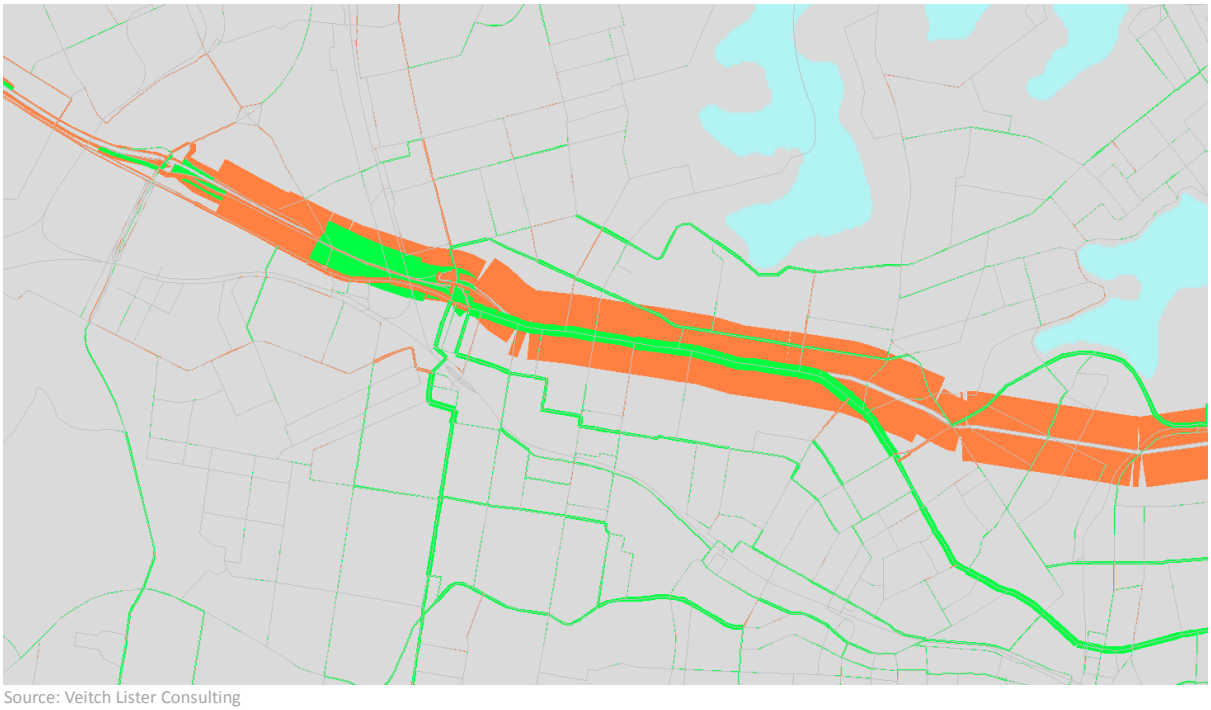
The figure below compares the volumes across the four screenlines out of the two models. The two sets of results are very similar. The figure below can be compared to Figure 8.2 in the EIS document. It shows that the forecasts of diversions to the new road infrastructure are consistent.

FIGURE 9 COMPARISON OF DO NOTHING AND PROJECT CASE FOR 2031



Source: Veitch Lister Consulting and M4 East EIS

FIGURE 10 ZENITH FORECASTS OF DIVERSIONS



Source: Veitch Lister Consulting

FIGURE 11 M4 EAST EIS FORECASTS OF DIVERSIONS

Source: Veitch Lister Consulting

4 CONCLUSION

The purpose of the M4 East EIS is to identify comprehensive mitigation and management measures that would be implemented to avoid, manage, mitigate, offset and/or monitor impacts during construction and operation of the project. A review of the transport and socioeconomic sections of the M4 East EIS has highlighted a number of issues. Of most concern are:

- The M4 East EIS itself acknowledges that the forecasted peak traffic patterns appear to be counter intuitive – westbound in the morning peak and eastbound in the afternoon peak. When compared to recent traffic trends in Sydney this outcome is hard to comprehend. The EIS explanation of this outcome is contrived and complicated is likely due to a miscalculation in the transport modelling.

- Alternatives to the M4 East (public transport and freight rail improvements and demand management policies) are not assessed in any depth. The M4 East EIS merely states that the M4 East is the best solution to the challenges facing the corridor.

- The M4 East EIS has assumed that all sections of WestConnex listed above are completed by 2031. If all sections are not completed simultaneously, the traffic flowing from the M4 East will have adverse impacts on the inner west and central Sydney. The M4 East EIS has not addressed the risks in terms of the traffic and socioeconomic impact of the project.

- The M4 East EIS does not explain how toll levels and people's perception of tolls changes into the future. Given the impacts this can have on existing surface roads and the recent toll road failures in Sydney this appears a significant omission. Assumptions around the location, supply and cost of car parking (a key component of travel cost to eastern Sydney) is not explained by the M4 East EIS.

- The M4 East EIS documents make no reference to sensitivity tests. It should be expected that a project of this significance, the sensitivity of the model to various assumptions and potential alternative outcomes would be tested in detail. In particular, the sensitivities to the impacts on the road network of differing toll levels and land use changes would be significant.

- The transport model used by the M4 East EIS does not include public transport assignment or even public transport demand forecasting. Due to the lack of a mode split process in the transport modelling, the competing disbenefits of traffic congestion and rail crowding has not been tested for the EIS.

- The implications of increased bus traffic along Parramatta Road into the central city are not addressed by the M4 East EIS. How the central city road network will deal with increased bus traffic is unknown.

- The absence of long term modelling (for example to 2041) in the M4 East EIS means that any longer term traffic or socioeconomic impacts are not being identified, mitigated or monitored.

The information contained in the EIS does not reduce any of the concerns around the adverse impacts previously raised in the Strategic Review and Transport Modelling of WestConnex prepared by SGS Economics & Planning and Veitch Lister Consulting. That is, WestConnex will not address the transport challenges being faced by Sydney in the future.

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