



**MOOREBANK
INTERMODAL**

BETTER OPTIONS

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Front Cover
Proposed site for the Moorebank Intermodal



Synopsis

This report reviews documents relating to Moorebank Intermodal. These documents bring to light the science which points out the fact that building the Intermodal at Moorebank will be a huge mistake for any government. The proposed Southern Intermodal Terminal at Badgerys Creek and Eastern Creek would most likely prove to be far more viable options. The proposed Moorebank Intermodal has 135,000 residents living within five kilometres of the site.

Freight Location

This report reveals that when actual destinations of truck imports and exports to and from Port Botany are examined Moorebank would be a poor choice of location. Current intermodals and the future Eastern Creek Intermodal are better located to service this existing market. The reason for the lack of existing importing and exporting industries being close to Moorebank is most likely due to the traffic congestion in the area.

The report also shows that future freight markets would be better serviced from the proposed intermodal at Badgerys Creek and the Southern Intermodal. These Intermodal terminals are within the Broader Western Sydney Employment Area, and much closer to the future South West and North West Growth Centres. The Southern Intermodal is planned to be close to, or within the Commonwealth Land at Badgerys Creek.

Limited Rail Capacity

Reports also reveal that there is a theoretical limit to the capacity of the freight that can be moved by rail through Sydney. This limited rail capacity restricts the number of intermodals that can serviced by rail from Port Botany. This means that either Eastern Creek or Moorebank intermodal could be serviced by rail not both. Therefore it is important that the planners get their locations right. Eastern Creek would service the current and future markets more efficiently than Moorebank.

Building the Intermodal at Badgerys Creek would also service the future market more efficiently than Moorebank. As well, in the future this Badgerys Creek location would allow freight to be brought from Port Kembla rather than through Port Botany.

Moorebank Precinct Traffic Congestion

Altogether there are a possible 34 infrastructure upgrades considered necessary for the intermodal to operate around the Moorebank precinct. This list includes grade separated intersections and a possible, alternate Hume Highway bypass. None of which have been costed.

These upgrades are identified from reports including Liverpool, Campbelltown and Bankstown Councils as well as Transport for NSW, SIMTA and the Moorebank Intermodal Company. The list clearly shows that the existing traffic congestion in the Moorebank/Liverpool area is in desperate need of attention. This condition will become worse over time from natural growth. To add the traffic from the proposed



Moorebank Intermodal to this traffic would further exasperate the situation. Therefore the cost of upgrading the roads is enormous.

It simply doesn't make sense to build an intermodal on an island that requires bridges to access and regress it. There are also the added traffic issues related to rat-running through the Liverpool CBD cutting off a major regional teaching hospital from priority emergency care. Further rat-running of traffic would also occur on Governor Macquarie drive, Henry Lawson's Drive and Anzac Parade which are residential areas.

As well as this, traffic would also be generated from available surrounding locations that will be taken up by industries that are symbiotic with the proposed Moorebank Intermodal. This will further frustrate the already unacceptable congestion around the Moorebank district. Unfortunately this induced traffic has not been modelled by the proponents.

Future Freight Predictions Too High

Predictions on growth in freight movements (that will be coming through Port Botany) have been much higher than actual growth in freight movements. The current growth in freight movements has changed very little in the last four years, and is almost equal to 2009. Even though the recorded growth in freight movements has been nearly zero the Moorebank Intermodal proponents are still claiming a 7% yearly growth in freight.

These optimistic higher predictions of 7% growth indicated the necessity to build intermodals quickly. However, a closer look at the actual freight coming to Port Botany shows that the urgency to build Intermodal capacity for these future freight movements is not there. Therefore, there is time for proper planned, fully costed solutions to be determined.

Economic Disbenefits of Moorebank

The projected \$2.4 billion (present day terms) in benefits is believed to be overestimated when the one billion dollars for moving the school of military engineering and costs for upgrading the road infrastructure are taken into account. It also needs to be recognised that the economic modelling was flawed by making the assumption that 3,300 trucks are currently coming to Moorebank. In fact the trucks go from Port Botany to locations mainly at Wetherill Park and all over Sydney, not to Moorebank. It is not understood why the modellers claimed that the trucks are already coming to Moorebank except perhaps to make the benefits appear higher.

Moorebank Intermodal Land - Prime Real Estate

The land on which the Moorebank Intermodal is proposed to be built, is prime real estate. It is less than five kilometres from the Liverpool CBD and has river frontage. It could be sold lucratively to developers that have vision for Liverpool as a solid, thriving cornerstone for the provision of the new South West Growth Centre.

Conclusion

Therefore it is the opinion of the authors that progress on the Moorebank intermodal should be halted immediately. Further detailed study and acceptable solutions need



to be developed and fully costed. It is recommended that the Badgerys Creek and Eastern Creek Intermodals should be compared with the Moorebank Intermodal taking into account the freight destinations, realistic consideration of traffic congestion, economic, social and environmental issues for a successful implementation of the winner.

This report shows that the Moorebank Intermodal does not service either the existing or future freight markets well and its implementation costs are enormous. The real estate for the proposed Intermodal could be used for the greater benefit of society.



Executive Summary

Mr Craig Kelly MP, Member for Hughes, New South Wales, commissioned Transport Modelling to undertake an investigation to consider if the Moorebank Intermodal Terminal is the best location for servicing present and future freight needs, and if this was not the case, investigate possible other alternative locations.

This work, and the earlier work “Moorebank Intermodals, Key assumptions require deeper scrutiny” by Narelle van den Bos, a Director of Transport Modelling, have all been undertaken pro bono publico. Narelle’s earlier work ⁽³⁵⁾ showed that once the facts were considered, the rationality of the project should be questioned. This report builds on that earlier work and examines better alternatives.

When the initial planning was carried out for the Moorebank Intermodal there was a buffer zone around the site. There was no housing nearby. ‘A Current Affair’ program broadcasted late last year stated that 135,000 people live within 5 km from the Moorebank Intermodal Precinct. ⁽¹⁾ Now, the nearest house is less than 500 metres from the SIMTA site. Pollution (reports on health issues around intermodals are worrying indeed), noise and traffic congestion become huge issues for these residents and indeed the State and Federal governments.

The Eastern Creek Intermodal Terminal would service the current freight markets more efficiently. Current understanding is that there is a limit to the rail capacity dictating that either Eastern Creek or another intermodal could be serviced by rail, not both intermodals. As will be shown in this report, Moorebank is far from an ideal location.

Major assumptions made by the Moorebank Intermodal proponents are flawed. There are not 3,300 trucks that currently carry containers between Port Botany and Moorebank on the M5. Intermodal trucks do have direct access to the M5 and M7 Motorways, however, extremely expensive additional road infrastructure is required to implement that access. There are many more infrastructure upgrades required than just Moorebank Avenue in 2029/2030. In summary, the Project is very unlikely to yield \$2.3 billion of economic benefits in present value terms, the Project is even less attractive if the Moorebank School of Military Engineering Unit relocation was factored in to the costs.

Moorebank does not serve the freight market well

Existing freight market located away from Moorebank

Figure ES1 shows the destinations of the truck movements from Port Botany on a typical day in 2011. The tall bars represent the volume of truck movements. The red bars represent the articulated trucks, the blue bars represent the rigid trucks, and the yellow bars represent the vans and utilities. When these freight destinations are examined more closely for the nearest Intermodal service it is clear that the proposed

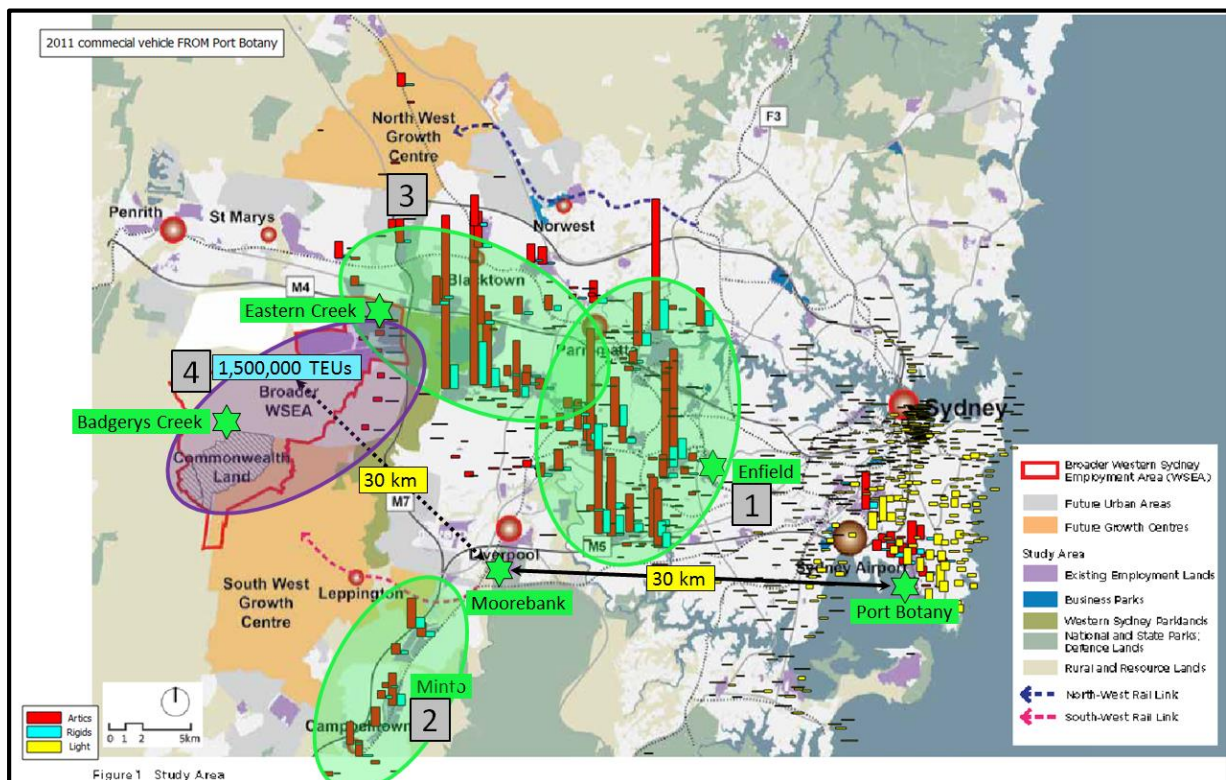


Moorebank Intermodal is a poor choice, because it is not close to the centres of the freight destinations.

Since 2011, there have been new intermodal developments. The green oval shapes represent the possible existing market that could be captured by these developments.

- Green oval 1: The Enfield intermodal is not yet operational, but is expected to open soon. This plot clearly shows that Enfield may capture a very significant market share.
- Green oval 2: The Minto intermodal capacity has recently been improved and there are further plans to increase its capacity to 200,000 twenty-foot equivalent units (TEUs). It is possible therefore, for Minto to capture a larger market share.
- Green oval 3: The freight market is very concentrated around the Wetherill Park industrial area. Geographically, Wetherill Park is about equidistant from the Moorebank and Enfield intermodals. Wetherill Park is very close to the proposed Eastern Creek intermodal. This makes Eastern Creek a more desirable location than Moorebank for these markets.

Figure ES 1 Destination of Truck Movements from Port Botany



Future freight market located a long distance from Moorebank

The NSW Government is planning for the North West and South West Growth Centres (shown in orange in the above figure), which together, could have a population almost half the size of the City of Brisbane. When the future population of the Growth Centres



is combined with the natural growth in the surrounding area, the total population is expected to be over 2.2 million people, that is, about twice the size of Brisbane.

The Broader Western Sydney Employment Area, which is in-between these Growth Centres, has an ultimate capacity of 212,000 jobs. Planners would agree in principle, that the sooner employment in the Broader WSEA can be encouraged, the better off society will be. Firstly, the employment would be located closer to existing and future residential areas, and that will greatly reduce the average journey-to-work travel times. This will yield positive impacts in every area of economics, health, social and the environment as well as to the individuals who work there. Secondly, Sydney's journey-to-work travel pattern will change, Instead of the bulk of the workers travelling in the Sydney CBD direction, some of the trips will now be towards the Broader WSEA bound direction. This traffic will travel in the contra-flow direction during peak hours and therefore make greater use of the existing transport infrastructure.

The expected future freight market is split into natural growth within the existing market and the new freight market created by the Broader Western Sydney Employment Area (Broader WSEA). The Broader WSEA freight market is expected to be approximately three quarters of the current Port Botany freight volume.

If Moorebank Intermodal was planned to service this Broader WSEA, Figure ES 1 above shows that it is 30km from the centre of the freight market. See Purple Oval 4. Effectively, the Moorebank Intermodal Terminal adds another leg in the supply chain leading to increased cost for freight.

The draft Broader WSEA structure plan has identified two potential intermodals: Eastern Creek and the Southern Intermodal. The Southern Intermodal Terminal is planned to be located near or in the Commonwealth Land, known as Badgerys Creek.

Both the Eastern Creek and Southern Intermodal would be in a better location to serve the new market more efficiently than the Moorebank Intermodal could. See: Green Ovals 3 and Purple 4.

Limited rail capacity – Eastern Creek or another intermodal not both

Greg Cameron frequently writes articles about freight, and he argues “the flaw in the government’s plan is that railing containers to an intermodal terminal at Moorebank will prevent containers being railed to an intermodal terminal at Eastern Creek, due to insufficient rail capacity”.⁽²⁾

In other words, there is only sufficient rail capacity for one additional intermodal, either Moorebank or Eastern Creek, but not both terminals.

If this is correct, the NSW and Federal Government must choose the correct one. The Figure ES 1 above shows that the Moorebank location is less than optimal for servicing the current and future freight needs.



Economic Analysis

The Federal Department of Finance's Detailed Business Case for the Moorebank Intermodal (Detailed Business Case) ⁽³⁾ stated that the Moorebank Intermodal project would generate \$10 billion of economic benefits over the 30-year evaluation period or \$2.3 billion in present value terms.

Firstly, it must be noted that the cost of relocating the School of Military Engineering, almost \$1 billion. This cost was not included in the economic calculations.

It will also be clear to the readers that once the road infrastructure necessary to allow the intermodal to run its trucks efficiently is included in the costings the economic benefits would be further considerably diminished.

The supposed economic benefits were believed to originate from predicted reduced freight costs due to reduced traffic congestion, reduced traffic accidents and improved productivity. All these economic benefits were derived purely from shifting the container movements from truck to rail. The flawed assumption is that 3 300 container movements are currently coming to Moorebank. In fact the trucks go from Port Botany to locations mainly at Wetherill Park and all over Sydney, not to Moorebank. It is not understood why the modellers claimed that the trucks are already coming to Moorebank except perhaps to make the benefits appear higher (Refer to Chapter 2 for a detailed outline).

Figure ES 1 shows that if Moorebank Intermodal Terminal were to be constructed there would be extra traffic congestion, increased traffic accidents, increased pollution because now trucks will have to carry the containers from Moorebank to the Broader Western Sydney Employment Area and Wetherill Park. This is a considerable distance from the proposed Moorebank Terminal.

In his talk about the Moorebank Intermodal Hub, Professor Michael Bell, Professor of Ports and Maritime Logistics at the University at Sydney stated: "If you are just introducing another leg into the Supply chain so that you still have the truck leg at the end with the container, then you've got the tricky business of trying to argue that you are actually going to make some savings." ⁽⁴⁾

The Draft Broader Western Sydney Employment Area Structure Plan shows rail connections to both the Eastern Creek and Southern Intermodal Terminals. Given that the Southern Intermodal Terminal is planned to be located at or near the Federal Government Land, it makes intuitive sense, to re-allocate the Moorebank Intermodal Terminal funds to building the Southern Intermodal Terminal, because the freight can be delivered much closer to its destination by rail.

Traffic Congestion around Liverpool/Moorebank

Figure ES 1 above shows that the import-export market chose not to locate itself in Liverpool, where there is some 1,250 ha of industrial land available within the area. There are many reasons for the import-export industry not to choose Liverpool. One of the key factors is traffic congestion.



For many years, Liverpool has been a very safe Labor seat, and sadly, attracted little infrastructure investment. Over time, Liverpool's traffic congestion has increased.

The NSW Freight and Ports Strategy ⁽⁵⁾, Case Study 16, Supporting the development of the Moorebank Intermodal Precinct, states that "By 2026 growth in background traffic will result in peak spreading and traffic conditions similar to the existing peak period in the Liverpool area and on the M5, persisting for most of the day." In simple words, if nothing is done by 2026, the natural growth will result in the peak hour traffic flow conditions lasting most of the day.

In their response to the earlier SIMTA EIS, TfNSW indicated that the SIMTA modellers under-estimated their truck generation numbers by a factor of ten for the Moorebank intermodal. ⁽⁶⁾ The TfNSW roughly estimate translates to Moorebank having three times the current Port Botany truck movements.

If Port Botany has issues with trucks currently, then if Liverpool, with its congested network, has to cope with such a large increase of trucks on the roads, severe traffic congestion will certainly result.

SIMTA's modelling also showed that about 27% of its trucks ⁽⁷⁾ would travel through Australia's third highest accident hot spot, just 800 metre outside the SIMTA study area.

Huge Economic Investment Necessary for Road Infrastructure to support the Intermodal

The site chosen for the Moorebank Intermodal is "landlocked" (Refer to Chapter 3 Traffic Issues with the Moorebank Intermodal) which means that every time a truck goes to or from the intermodal it must pass over at least one bridge.

The M5 Bridge over the Georges River, is expected to reach capacity before 2016. ⁽⁵⁾ The bridge on Cambridge Av over the Georges River, is very prone to flooding. The Hume Highway is generally a 6-lane highway, but the bridges over Cabramatta Creek and Prospect Creek are 4-lane bridges. Given that bridge upgrades are very expensive, it simply does not make economic sense to put something that creates as much truck traffic as an intermodal port on an island!

The Detailed Business Case included the road upgrade of Moorebank Av as the only infrastructure required for this project: "Moorebank Av is to be upgraded from a two-lane to a 4-lane road in 2029/2030". This assumption is clearly not correct.

Table ES1 below lists the infrastructure upgrades required to cope with the anticipated intermodal traffic. This list has been compiled from the literature in the public domain. The authors have added two items to the list, based on local knowledge.



Table ES1 Summary Table of Moorebank Intermodal Road Works Implementation Costs

Sites Requiring Upgrade	Identifying agent	Cost
Bridges – not in any order		
(1) Newbridge Rd Bridge over the Georges Rd needs to be upgraded by 2016	TfNSW ⁽⁵⁾	Unknown
(2) Cambridge Av Bridge over Georges River See Figure A4 1 in Appendix 4	Campbelltown City Council ⁽⁸⁾	\$29-\$39 million (2008) ⁽⁹⁾
(3) Hume Highway Bridge over Cabramatta Creek: Hume Highway is a 6-lane highway and the bridge is 4-lanes. See Figure A4 12 in Appendix 4	Google Maps	Unknown
(4) Hume Highway Bridge over Prospect Creek: Hume Highway is a 6-lane highway and the bridge is 4-lanes. See Figure A4 13 in Appendix 4	Google Maps	Unknown
Road links – not in any order		
(5) Moorebank Av upgrade to 4 lanes	Federal Government Department of Finance ⁽³⁾	Cost brought forward 15 years
(6) Improved M5 access	SIMTA ⁽¹⁰⁾ - MIC ⁽¹¹⁾	Unknown
(7) Weaving issue on M5 Georges River Bridge See Figure A4 14 in Appendix 4	SIMTA ⁽¹⁰⁾ - MIC ⁽¹¹⁾	Unknown
(8) New Glenfield Rd overpass See Figure A4 15 in Appendix 4	MIC ⁽¹¹⁾	Unknown
(9) New Liverpool CBD bypass See Figure A4 16 in Appendix 4	MIC ⁽¹¹⁾	Unknown
(10) Dealing with Australia's 3rd worst accident hot spot	AAMI ⁽¹²⁾	Unknown
(11) Dealing with Macquarie St (Terminus St) which carries the regional east-west traffic through the Liverpool CBD. Travel speed 18km/hr, sign-posted speed 60km/hr (Survey 2010) See Figure A4 17 in Appendix 4	M5 Widening ⁽¹³⁾	Unknown
(12) Dealing with Bigge St – Terminus St, which is likely to experience an increase of rat-running traffic because of the additional congestion on the Hume Highway (Copeland St). Other streets such as Bathurst St may similarly be impacted. See Figure A4 18 in Appendix 4	Authors of this report	Unknown
(13) Governor Macquarie Dr is likely to experience an increase of both truck and car traffic because of rat-running due to the congestion of the Hume Highway. See Figure A4 19 in Appendix 4	Authors of this report	Unknown
(14) Henry Lawson Dr between Milperra Rd and Hume Highway needs upgrading. See Figure A4 110 in Appendix 4	Bankstown City Council ⁽¹⁴⁾ - M5 Widening ⁽¹³⁾	Unknown



Sites Requiring Upgrade	Identifying agent	Cost
(15) Nuwarra Rd – between Heathcote Rd and Newbridge Rd See Figure A4 111 in Appendix 4	Community	Unknown
(16) Glenfield to M5 Motorway link - trucks may block this path. See Figure A4 112 in Appendix 4	Campbelltown City Council ⁽¹⁵⁾	Unknown
(17) Traffic on Anzac Pde has recently increased very significantly. It is a parallel path to the congested M5. See Figure A4 113 in Appendix 4	Community	Unknown
Intersections – not in any order		
(18) Intersection: Hume Highway – Hoxton Park Rd – Macquarie St. See Figure A4 14 in Appendix 4	Liverpool ⁽¹⁷⁾ – M5 Widening ⁽¹³⁾ – SIMTA ⁽¹⁶⁾	Unknown
(19) Intersection: Hume Highway – Henry Lawson Dr – Woodville Rd. See Figure A4 15 in Appendix 4	Bankstown City Council ⁽¹⁴⁾	Unknown
(20) Intersection: Newbridge Rd – Henry Lawson Dr See Figure A4 16 in Appendix 4	Bankstown City Council ⁽¹⁴⁾	Unknown
(21) Intersection: Newbridge Rd – Moorebank Av See Figure A4 17, and Figure A7 18 in Appendix 4	Liverpool ⁽¹⁷⁾ – SIMTA ⁽¹⁶⁾ – M5 Widening ⁽¹³⁾	Unknown
(22) Intersection: Moorebank Av – Heathcote Rd See Figure A4 17, and Figure A7 18 in Appendix 4	Liverpool ⁽¹⁷⁾ – SIMTA ⁽¹⁶⁾ – M5 Widening ⁽¹³⁾	Unknown
(23) Intersection: Newbridge Rd – Nuwarra Rd See Figure A4 18 in Appendix 4	SIMTA ⁽¹⁶⁾ – M5 Widening ⁽¹³⁾	Unknown
(24) Intersection: M5 access – Heathcote Rd	SIMTA ⁽¹⁶⁾	Unknown
(25) Intersection: Hume Highway – Camden Valley Way	SIMTA ⁽¹⁶⁾	Unknown
(26) Intersection: Hume Highway – Kurrajong Rd	SIMTA ⁽¹⁶⁾	Unknown
(27) Intersection: Hume Highway – De Meyrick Av	SIMTA ⁽¹⁶⁾	Unknown
(28) Intersection: Hume Highway – Elizabeth Dr	Liverpool ⁽¹⁷⁾ – M5 Widening ⁽¹³⁾	Unknown
(29) Intersection: Hume Highway – Cumberland Highway	Liverpool ⁽¹⁷⁾	Unknown
(30) Intersection: Hume Highway – Governor Macquarie Dr	Liverpool ⁽¹⁷⁾	Unknown
(31) Intersection: Newbridge Rd – Speed St	SIMTA ⁽¹⁶⁾	Unknown
(32) Intersection: Moorebank Av – Anzac Rd	SIMTA ⁽¹⁶⁾	Unknown
(33) Intersection: Nuwarra Rd – Heathcote Rd	SIMTA ⁽¹⁶⁾ – M5 Widening ⁽¹³⁾	Unknown
(34) Intersection: Newbridge Rd – Governor Macquarie Dr	M5 Widening ⁽¹³⁾	Unknown

Abbreviations:

Liverpool = Liverpool City Council

M5 Widening = M5 West Widening Traffic Report

MIC = Moorebank Intermodal Company – “under consideration”

SIMTA = SIMTA EIS

TfNSW = Transport for NSW – Freight and Ports Strategy



A more detailed description of the traffic issues can be found in Appendix 4. The proponents will argue that this list consists of two components: the 'catch up' investment and additional investment for the Moorebank Intermodal. It could also be equally argued, that if private industry will be making substantial profit, then the taxpayer should not have to subsidise their development. It is clear that these upgrades would be a huge financial burden on any government.

Further Traffic Issues

SIMTA – Used an extremely small study area

The authors are concerned that SIMTA modelling used an extremely small study area. Transferring the equivalent of about three fold increase (derived from TfNSW estimate) of the current Port Botany truck movements to Moorebank Avenue, located about 5km from the Liverpool CBD, and studying only 13 intersections begs serious questions regarding professional ethics at the senior management levels both in private industry and governments. Are there really only 13 intersections that could possibly be impacted by such a huge volume of truck traffic in the Liverpool area?

Australia's third highest accident hot-spot is 800m north, outside the SIMTA study area, and 27% of the Intermodal traffic will travel through it. Strangely, this was excluded from the study area. Why? Is it ethical to eliminate such an important safety issue, when this was highlighted in Narelle's earlier work?

Given that this is a Federal Government initiative and the Federal Government would fund the implementation of the intermodal, it may have been convenient not to examine the wider impacts **at this stage** as this would expose the need for the massive additional infrastructure funding. Perhaps, it is hoped that these infrastructure costs could be hidden until after the implementation of the intermodal and then different governments would be in place to sort out the required infrastructure funding.

SIMTA – Modellers unable to fit traffic onto the model network

The authors are also concerned that SIMTA modelling could not fit the traffic onto their network. For the Base 2011 PM scenario, the SIMTA modellers could not load all the trips onto their network. In fact, 757 vehicles could not be loaded onto their model, because their modelled network was too congested.

If the network did not have the capacity in the 2011 Base Case, then the following questions need to be asked:

- How did the modellers manage the modelling when the future growth of the traffic was added to this scenario? This scenario would be known as the Future Base Case.



- How did the modellers manage the modelling when the future growth of the traffic plus the SIMTA traffic was added to the scenario? This scenario would be known as the Future SIMTA Case.

The modelling results should include the network capacity upgrades and estimated costs. These network capacity upgrades were not found in any of the EIS reports.

Instead, we find that: “The future base year trip tables in 2031 (without SIMTA) **were adjusted** in Paramics” ⁽¹⁶⁾

Disturbingly, we also learn from the model auditor how this was done: no background traffic was considered, and only half of the SIMTA traffic was used in the modelling work. ⁽¹⁸⁾

Even with this underestimated traffic load, the modelled results that were revealed showed extremely depressing values for average vehicle delays – up to 6 minutes for an intersection.

SIMTA – Traffic modelling did not include induced traffic

Sadly, the proponents ignored any induced traffic from such a very large Intermodal port. Induced traffic is traffic that would be generated from symbiotic industries that would mushroom up near the terminal. This involves truck trips from warehousing to and from the intermodal as well as trips between the outside related industries. The warehousing industries would produce huge volumes of truck traffic due to the nature of warehousing where containers are being stuffed and destuffed. The traffic from the symbiotic industries would be additional traffic.

This is a major oversight when it is considered that perhaps it could produce as much or more traffic than the intermodal itself. It should at least be studied.

MIC – traffic report not available

MIC ⁽¹¹⁾ states that it will contribute “a little less than 4% of the traffic already on the M5”. This sounds miniscule. However, from Figure 23 in Appendix 2, the impact on the delay is very significant as this 4% is added to roads that have reached or are very close to their limit. MIC conveniently ignores to state the resulting delays, for obvious reasons – it would scare even the most hardened politician.

Existing intermodals are a good guide to traffic estimates and indicate that the traffic generated from Moorebank Intermodal can be assumed to be very significant. Refer to “Moorebank Intermodals, Key assumptions require deeper scrutiny” by Narelle van den Bos, a Director of Transport Modelling. ⁽³⁵⁾

Rat-runs - impairing regional hospital access

All over the world, driver behaviour continues to be studied. At this stage, the knowledge dictates that if heavy traffic congestion regularly appears on a driver’s favourite route, drivers who have a choice will choose a different path to avoid the



congestion. In other words, it is known that drivers are selfish, and they will choose what they think is the “shortest” or “least cost” path.

These alternative paths are referred to as “rat-runs”. Often the rat-run is longer, and can traverse minor streets, which are not designed for through trips. It sometimes means that the driver has a longer journey time. The longer distance causes more pollution, more congestion on the chosen new route, and results in the higher probability of accidents.

None of the studies examined reflect any additional costs of rat-running.

It is expected that the Hume Highway, which bypasses the Liverpool CBD will be congested. As a result rat-running will occur along Bigge St (Refer to Chapter 3). This will impact the access to:

- Liverpool Hospital (a regional teaching hospital),
- Sydney South West Private Hospital,
- TAFE NSW Western Sydney Institute,
- Liverpool Primary School,
- All Saints Catholic Boys College and
- Liverpool Boys High school

All these institutions will have access severely impaired. This is very significant when it is considered that emergency vehicles need fast access to Liverpool Hospital.

Other rat-runs include Governor Macquarie drive, Henry Lawson Drive and Anzac Parade.

In Summary: Road Infrastructure Costs are Prohibitive

It is the opinion of the authors that the true cost of the infrastructure necessary to cater for the Moorebank intermodal should be determined before further planning continues. This includes the additional time-lost due to congestion, higher fuel consumption, additional pollution, and greater propensity for accidents.

The total cost of updating the road network needs to be considered in the benefit / costs ratio calculations, and compared to the alternatives – such as Eastern Creek and the Southern Intermodal in the Broader Western Sydney Employment Area.

In short, there is an extremely high infrastructure cost required for Moorebank Intermodal to function efficiently and the probability of capturing a significant proportion of the existing market is slim. See Figure ES1.



Georges River - Prime City Real Estate with River Frontage

From a land-use planning point of view, the real estate of such a prime site, on the edge of a river, about 5km from the CBD must be commercially attractive. If a footbridge over the Georges River were to be constructed, it would form a direct link between the site and the Casula railway station, which is just one stop away from Liverpool Station.

Such real estate could be developed into many uses, the low lying flood prone land could be retained for native bush and parkland, while other sections which are on higher ground, further away from the Georges River, could be rezoned. That section could be developed to maximise the commercial aspects or recreational activities near the Georges River.

Moorebank International Technology Park

In June 6, 2003, Liverpool City Council developed a plan for the Moorebank International Technology Park on the Amiens, Yulong and Dnsdc sites. ⁽¹⁹⁾ The plan was accepted at the three levels of Government.

The International Technology Park would have provided a ten-fold increase in employment, when compared to the current Moorebank Intermodal concept plan.

If the Moorebank International Technology Park Plan were to be revisited it may be possible to redevelop the site into the cornerstone of the new Liverpool. The rezoned land would become the Technology Park precinct containing restaurants, hotels and retail activities supporting the main business.

In short, an alternative land use for the Commonwealth Land at Moorebank, could transform the site into a very prestigious, highly sort after block of land for lucrative commercial developments. The proceeds of the sale of such a land could be used in the development of another Intermodal Terminal.

Using the land for a lower priced activity such as an intermodal/warehousing facility seems to be poor economics.

No panic - time for detailed scientific planning

The Freight Infrastructure Advisory Board ⁽²⁰⁾ and Bureau of Transport and Regional Economics' ⁽²¹⁾ made growth estimates for future freight movements at Port Botany. The current movements are a little below these estimates. Given the long range forecasts and the current economic climate, the estimated numbers are very accurate.

The Sydney Ports estimates of container movements through Port Botany, on the other hand are extremely optimistic. The current container movements are about two



years behind the Low Growth scenario, two years after releasing the report. (Refer to Chapter 5 – Better Options).

Based on the fact that the current container movements are about two-years behind the Low Growth scenario, two years after the release of the report, we can be confident, that the proponent's belief of a 7% growth in Port Botany's container movements, is at best extremely optimistic. There has been virtually no growth in container movements since 2009. This also means that the urgency in building another inland container port is not actually so urgent. In short, there is time for detailed scientific planning.

Conclusion

Therefore, the authors recommend that the best way forward is to halt the implementation of the Moorebank Intermodal immediately, and re-examine all the primary issues that need to be solved, not just for now, but for the long term.

It is also recommended that Eastern Creek and Southern Intermodal Terminal locations be compared with the Moorebank Intermodal taking into account the freight destinations, realistic consideration of traffic congestion, economic, social and environmental issues for a successful implementation of the resulting winner.

Structure of this report

Chapter 1 covers the history for choosing Moorebank as the Intermodal site. Chapter 2 examines the assumptions made in the Detailed Business Case for Moorebank, and the financial issues of implementing the Moorebank Intermodal. The existing and future freight markets are examined and it becomes clear that the location of the Moorebank Intermodal terminal is less than optimal.

Chapter 3 examines the existing traffic conditions, and looks at some of the modelled results producing startling conclusions about traffic congestion issues. Chapter 4 questions what the Moorebank Intermodal attempts to solve. Chapter 5 offers alternatives, and Chapter 6 describes the better land use option for the Commonwealth land at Moorebank.



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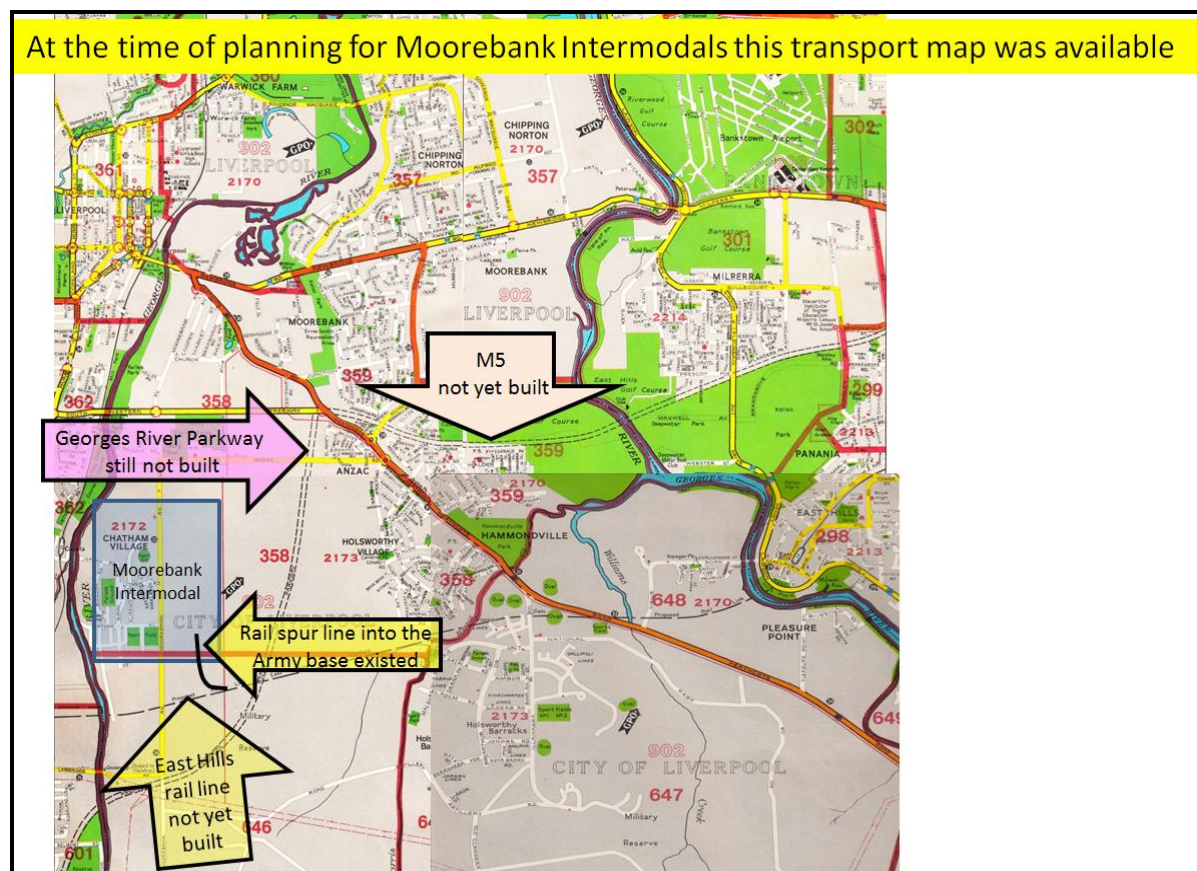
1.0 Background

It is undisputed that as much as possible, freight should be carried by rail, provided that the rail pollution is controlled.

At the time of the initial planning for the Moorebank Intermodal, the site had some ideal characteristics. These characteristics included

- the site being far away from residential areas. The nearest residents were linked to the Army base of Holsworthy.
- the planned Georges River Parkway being near the eastern edge. This Georges River Parkway has not been built.
- having a rail spur line, left over from the days when rail served the Army base. When the rail tracks were removed in 1977, this section was left as it was near the proposed East Hills rail line. Clearly, there was some forethought to connect the Intermodal to the planned East Hills Line. The East Hills rail line has been built and the eastern section is now quadrupled.
- having the planned Freeway near the northern edge, known as the M5 Motorway which is currently being widened.

Figure 1 Transport map available at the time of planning for the Moorebank Intermodal Terminal





Since this initial planning the area has not been preserved for the intermodal. Instead

- the plan to build the Georges River Parkway was abandoned, land was released for residential development and
- late last year the 'A Current Affair' program stated that 135,000 people live within 5 km from the Moorebank Intermodal Precinct.⁽¹⁾ The nearest house is less than 500 metres from the SIMTA site.

It is clearly too late to build an intermodal at this site. Transport Modelling is convinced that most of the key advocates for the Moorebank Intermodal precinct have not visited the site, let alone the surrounding area the Moorebank Intermodal is meant to serve. If they had, they would be far less enthusiastic about the concept.



2.0 Flawed Assumptions of the Detailed Business Case

The Department of Finance and Deregulation published the Detailed Business Case for the Moorebank Intermodal Terminal ⁽⁵⁾. Much of this document was redacted but it was still possible to work backwards and derive the basic assumptions. Many of these assumptions have been verified by carefully reading the SIMTA EIS.

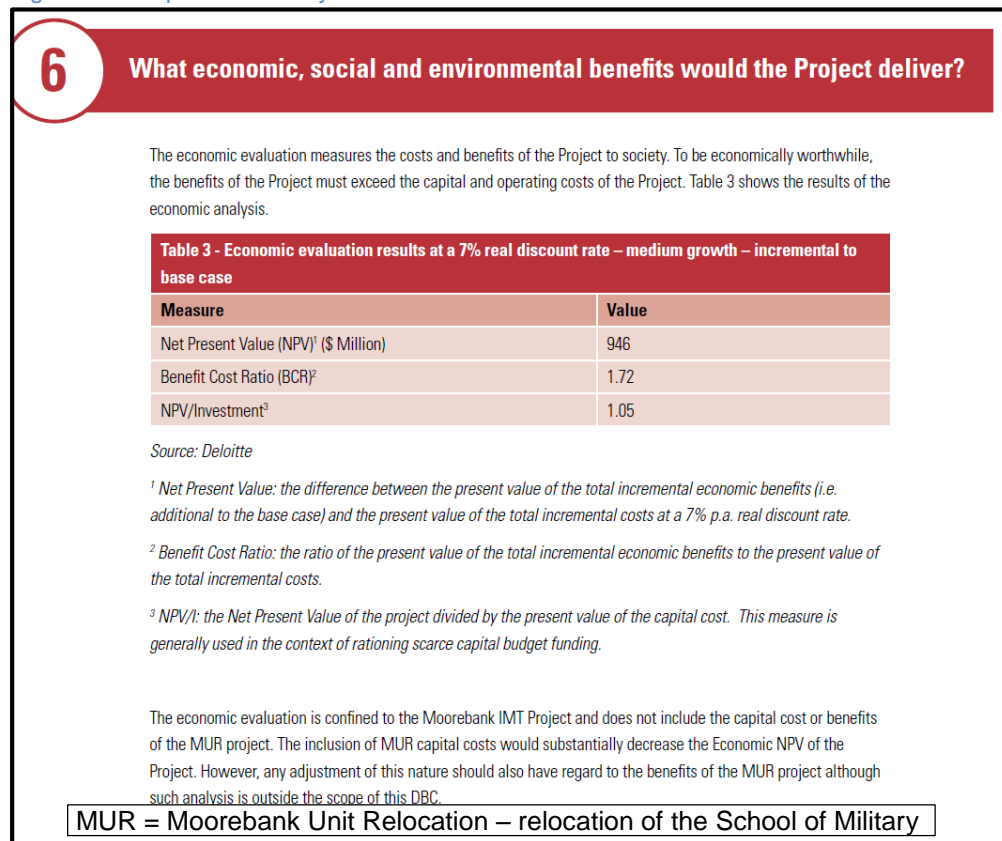
In the Detailed Business Case the Department made the following assumptions:

- The Project will yield \$10 billion of economic benefits over a 30-year project period;
- 3,300 trucks carry containers between Port Botany and Moorebank;
- Intermodal trucks have direct access to the M5 and M7 Motorways;
- The only infrastructure upgrade required is a four-lane road along Moorebank in 2029/2030;

The following documentation points out the flaws in these assumptions.

2.1 Statement: \$10 billion of economic benefits over the 30-year project

Figure 2 Excerpt for Summary: Detailed Business Case





The benefits are given as \$10 billion dollars over a 30-year period, with a benefit cost ratio of 1.72. (In other words, for every taxpayer dollar spent, the taxpayer receives 1.72 dollars' worth of benefits).

The Business Case acknowledges that if the Moorebank School of Military Engineering Unit relocation was factored in, the benefits would not have been as high. The cost of relocation is now running at about \$1 billion.

2.2 Statement: 3,300 trucks taken off the M5 between Port Botany and Moorebank

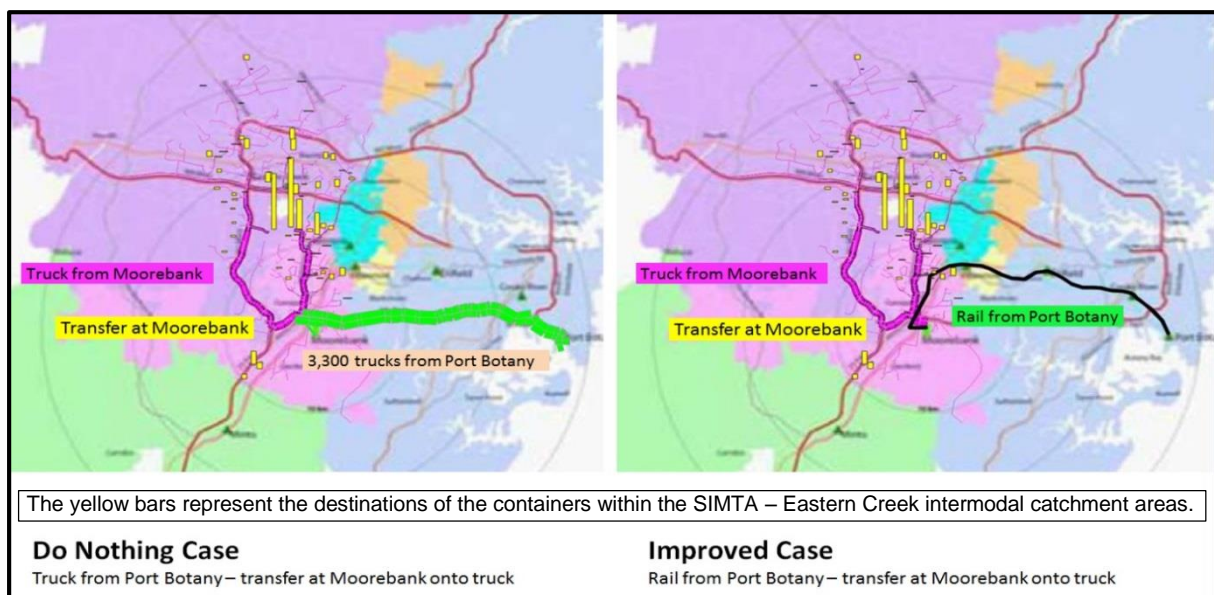
At first, this is a difficult concept to understand but once fully comprehended it is really shocking to think the reasoning was so flawed!

2.2.1 Defective Assumption in the Detailed Business Case

The Detailed Business Case for the Moorebank Intermodal Terminal ⁽⁵⁾ falsely assumes that 3,300 trucks per day carry containers from Port Botany to Moorebank over the M5 Motorway. It further assumes that at Moorebank, these containers are transferred and carried on other trucks to their destination. See Figure 3 below, left hand side.

The Detailed Business Case argues that if the rail connection across the Georges River, between the Southern Freight Line and Moorebank Intermodal were to be built, then the mode-shift from truck to rail can occur. In other words, with a new rail bridge, rail can be used instead of trucks, to carry the containers between Port Botany and Moorebank. See Figure 3 below, right hand side.

Figure 3 Flawed reasoning used in the economic analyses for the Moorebank Intermodal Terminal





Because of this shift from truck to rail the Federal Government states that it will take the 3,300 trucks off the M5 Motorway, reduce traffic accidents, reduce pollution etc., and improve amenity especially in the Wattle Grove area, because the containers now arrive by rail, rather than trucks.

If this can occur, the residents in Wattle Grove will be better off, because the 3,300 trucks are not travelling through their area.

The only change that happens in Moorebank is that the containers now arrive by train instead of truck. The minor change is that the container transfers will be between train and truck, rather than truck and truck.

All the \$10 billion are attributed to the economic benefits from this truck-to-rail mode shift.

In his talk about the Moorebank Intermodal Hub, Professor Michael Bell, Professor of Ports and Maritime Logistics at the University at Sydney stated: "If you are just introducing another leg into the Supply chain so that you still have the truck leg at the end with the container, then you've got the tricky business of trying to argue that you are actually going to make some savings."⁽⁴⁾

In this case, the distance of the truck leg is in the range of 20-30km.

How is the 3,300 trucks figure calculated?

The Federal Intermodal Terminal is planned to process 1,200,000 Twenty Foot Equivalent (TEUs) per year.

Since there are 365 days in a year, a simple calculation gives the number of TEUs per day that will be processed at Moorebank daily:

$$1,200,000 \text{ TEUs} / 365 \text{ days} = 3,287.7 \text{ TEUs/per day}$$

If the assumption is made that a truck carries 1 TEU, it is possible to estimate the number of trucks required to carry the containers to Moorebank:

$$3,287.7 \text{ TEUs} / 1 \text{ trucks} = 3,287.7 \text{ trucks}$$

In other words, the 1,200,000 TEUs in the year can be carried by 3,287.7 trucks / day.

This number of 3,287.7 trucks/day is rounded off to 3,300 trucks/day.

"Yes, Minister, if these containers are carried by rail instead, then 3,300 trucks can be taken off the road".

SIMTA used the similar calculation: $1,000,000 / 365 = 2739.7$ trucks/day, rounded off to 2,700 trucks per day.

Industry uses a far more complex calculation that includes back-loading, and proportions of 40-foot and 20-foot containers, and articulated and rigid trucks. In some cases, the calculations are done only using the container movements. These calculations involve



loaded trucks moving containers. These calculations ignore the “dead-running”, in which a truck drives without a load to the pick-up point. Dead-running applies after the containers have been dropped off, and trucks return empty to their depots.

2.2.2 What is wrong with this assumption?

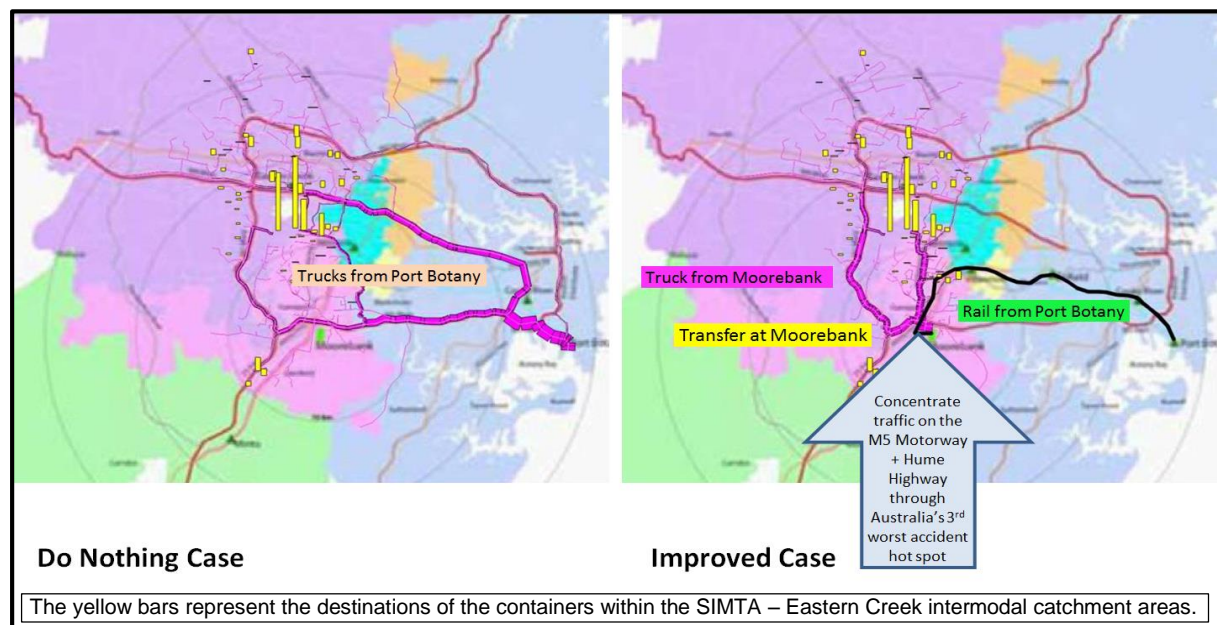
The assumption that Moorebank Intermodal is already operating satisfactory is incorrect; remember the Business Case states that only Moorebank Av needs to be upgraded in 2029/30, so it must be really working well!

Moorebank Intermodal does not exist. The only trucks currently going to Moorebank are for the Army’s National Distribution Centre.

In the “Do Nothing Case”, trucks travel from Port Botany to locations all over Sydney. This is schematically illustrated in Figure 4, left hand side.

In the “Improved Case”, Moorebank would exist, and rail would transfer the containers to Moorebank. This is schematically illustrated in Figure 4, right hand side.

Figure 4 True situation with introducing the Moorebank Intermodal Terminal



In the “Improved Case”, the containers would be transferred from rail to trucks at Moorebank. The trucks then travel to the final destinations all over Sydney.

Moorebank now has to cope with all the trucks that were leaving from Port Botany. Now Port Botany trucks start from Moorebank.

Moorebank did not have these 3,300 trucks before the Intermodal. If Port Botany “has a truck problem”, imagine what will happen in Liverpool, if the trucks were to start from Moorebank Avenue!



In Figure 4, the Improved Case (Intermodal) shows that a large volume of extra traffic proposed from the intermodal must traverse Australia's third highest accident hot spot.

2.3 Statement: Moorebank has access to the M5 and M7

The Detailed Business Case describes, "the Moorebank Intermodal Precinct is ideally located close to the M5 and M7 with direct access to the M5 Motorway".

The implementation of this direct access connection to the M5 is proving to be complex and expensive. The SIMTA proposal examined this in detail ⁽²⁰⁾. The SIMTA EIS devotes a complete technical report to this issue. Moorebank Intermodal Company (MIC) is also considering this issue seriously. ⁽¹¹⁾

Once the M5 has been accessed there are the weaving issues briefly outlined below.

2.3.1 Weaving Issues

Once on the M5, there is a weaving issue on the M5 Georges River Bridge. See Figure A4 4, in Appendix 4.

- This weaving issue occurs on an 8-lane bridge.
- Transport for NSW ⁽⁵⁾ has identified that the M5 Motorway Bridge over the Georges River needs to be expanded before 2016.
- This weaving issue has been acknowledged in both the SIMTA EIS and MIC Feedback Report to the Community Sessions. ⁽¹¹⁾
- From a traffic-engineering point of view, the available distance for the weaving movement is too short.
- At this stage, no economical engineering solutions have been found.

MIC Investigations

These investigations include

- "a possible southern road access route to the terminal via Cambridge Avenue and an associated upgrade of Cambridge Avenue;
- a possible new road in the corridor to the M5 and M7 Motorways (an initiative recommended by some community participants at the information sessions);
- measures to address the 'weave' issue on the M5 Motorway section where traffic entering the motorway from Moorebank Avenue crosses paths with traffic exiting to the Hume Highway;" ⁽¹¹⁾

Obviously, MIC anticipates that this southern access will split the traffic over two paths and this may resolve the weaving issue. However, this is an expensive option:

- upgrading the existing low-lying bridge over the Georges River, on Cambridge Av, with a 4-lane 1-in-100 year flood bridge was estimated to cost between \$29 - \$39 million in 2008 ⁽⁹⁾ ;
- the new corridor translates to a new rail overpass connecting Glenfield Rd to Cambridge Av. The existing Glenfield Rd rail overpass makes a 270 degree turn on a slope that will be extremely difficult to negotiate with a loaded B-



double or B-triple. This “new corridor” means the design for the rail overpass should allow for much gentler slopes for the loaded B-triples. Such a large structure may possibly require land acquisitions. See Figure A4 5 in Appendix 4.

2.4 Not just upgrading of Moorebank Av in 2029/30 for the intermodal to operate effectively

Both SIMTA and MIC have shown concept plans that has Moorebank Av upgraded to a four-lane road at the time of construction.

However, the Detailed Business Case ⁽³⁾ considered that upgrading Moorebank Av will not be necessary until 2029/30. The Detailed Business Case in their cost/benefit calculation needs to bring the upgrading costs forward some 15 years. While this issue alone is trivial in the scheme of building the Moorebank Intermodal, the whole traffic issue has not been addressed in the Detailed Business Case.

The Detailed Business Case is correct in stating that Moorebank has direct connections to the M5 and M7, but the implied statement that it is cost-free, is far from the truth. Indeed, the whole traffic issue is far more complex.

The following Chapter contains the collated traffic issues raised by Liverpool City Council, Bankstown City Council, Campbelltown City Council, the SIMTA EIS, and the authors’ own local knowledge.



3.0 Traffic issues with Moorebank Intermodal

Liverpool has been a very strong and safe Labor seat for a very long time. Neither the Liberal nor Labor Parties have invested in the transport infrastructure for many years. The result is that the transport infrastructure lacks capacity.

For the Moorebank Intermodal to work successfully, the truck traffic must be able to move relatively freely, once outside the Intermodal Terminal.

This requires a massive road infrastructure upgrade. Financing such an enormous program is obviously complex, especially in this case because the upgrade is split into two components:

- Improving the road network to “catch up” on years of neglect so that Liverpool can cope with its current and future traffic (without an intermodal terminal), and
- Catering for the Intermodal traffic

Allocating costs will be complex, because the M5 is privately owned, Hume Highway is a Federal road others are State roads, and some are local council roads belonging to Liverpool Council, Campbelltown City Council and Bankstown Council.

This complexity is well illustrated by the following statement: "We've seen so much cost-shifting from state and federal governments, for us to fund this ourselves is impossible," Cr Matheson said. "We've already had to put a levy on our ratepayers for an on-ramp at Ingleburn to access the Hume Highway heading south." ⁽²¹⁾

A summary of the road infrastructure deficiencies as listed by the different organisations is outlined below. These have also been shown graphically in Figure 6. A summary of the infrastructure issues to be addressed are outlined in Table 1 and a more detail description in Appendix 4.

3.1 Documented road infrastructure issues related to background traffic.

3.1.1 Liverpool City Council – identified deficiencies in the road network

On the 11th May 2012, Liverpool City Council wrote to Ms Carolyn McNally, Deputy Director General, Planning and Programs, Transport for NSW ⁽¹⁵⁾. Part of this letter listed the anticipated deficiencies in the arterial road network as a result of the anticipated background traffic. Identified as green in Figure 6.

3.1.2 Campbelltown City Council – identified deficiencies in the road network

Campbelltown City Council ⁽¹⁵⁾ has identified deficiencies in the road network. Regarding the link between Glenfield and the M5. “Responsibility for the road is spread across the three levels of government, with the Commonwealth Department



of Defence owning the land on the Moorebank side and Campbelltown Council owning the Glenfield side. This link requires the upgrading of the low-lying bridge on Cambridge Av. ⁽⁹⁾

In their response to the latest SIMTA EIS, Campbelltown City Council ⁽²⁰⁾ expressed concern that Moorebank Av will only be used by the Intermodal and if this were the case, then it would affect the Glenfield to the M5 link, which is used by many people in Glenfield and other suburbs in Campbelltown. Campbelltown Council's issues are marked in Blue in Figure 6.

3.1.3 Transport for NSW states all day congestion by 2026

Transport for NSW ⁽⁵⁾ in their NSW Freight and Ports Strategy, outlining Case Study 16: Supporting the development of the Moorebank Intermodal precinct, state that

“By 2026 growth in background traffic will result in peak spreading and traffic conditions similar to the existing peak period in the Liverpool area and on the M5, persisting for most of the day. Key intersections providing access to the Moorebank intermodal precinct will exceed capacity with volumes, especially of turning vehicles, resulting in extensive delays with queuing sufficient to disrupt through movement”.

These issues are shown as soft-pink ovals in Figure 6.

3.1.4 Transport for NSW - Georges River Bridge on the M5 needs to be upgraded by 2016

Transport for NSW ⁽⁵⁾ expects that travel demand on the section of the M5 Motorway between the Hume Highway at Casula and Moorebank Ave is expected to exceed capacity as early as 2016.

This is shown as a red line in Figure 6.

3.1.5 AAMI car insurance – Australia's third highest accident hot spot

The AAMI ⁽²³⁾ car insurance company has reported that the section of the Hume Highway between Elizabeth Drive and the Cumberland Highway as the third highest accident hot spot in Australia. In 2012, AAMI ranked this section as Sydney's highest accident hot spot ⁽¹²⁾ .

Transport for NSW has estimated that the truck generation rate is ten times higher than estimated by SIMTA. The SIMTA EIS showed that 27% of SIMTA's traffic would use the Hume Highway. If both estimates are correct, it equates to over 80% of the current Port Botany truck traffic travelling through this section of the Hume Highway, Australia's third highest accident hot spot!

This section of the Hume Highway is shown in dark blue in Figure 6.



3.1.6 Bankstown City Council identifies intersections likely to need grade-separation
In their response to the latest SIMTA EIS, Bankstown City Council ⁽¹⁴⁾ identified the following:

- Southbound peak hour traffic on Henry Lawson Drive already extends for kilometres because of the low level of service at the Milperra Road intersection.
- The level of service at the “meccano set” intersection (the Hume Highway and Henry Lawson Drive) results in congestion in all four directions.
- The only solution to further deterioration in service at both of these intersections is considered to be grade separation.
- The RMS will need to bring forward the upgrading of Henry Lawson Drive and the intersection with Milperra Rd.

This is shown as white arrows in Figure 6.

3.1.7 M5 West Widening Project – identified issues

The intersections identified in the M5 West Widening Project are coloured in bright pink in Figure 6.

3.2 Issues with SIMTA EIS

3.2.1 SIMTA’s EIS – 10 of 13 intersections level of service “F”

The SIMTA EIS examined 13 intersections in the “background-only” and “Background + SIMTA” cases. With the future background-only, the SIMTA modellers expect that ten of these intersections will function at Level of Service “F” (Refer to Appendix 2 and 3 for more details on definitions of the Level of Service) in the AM peak and/or PM peak.

When the background traffic alone causes ten of the 13 intersections to have a Level of Service F, it illustrates the severe lack of infrastructure capacity in the local network.

It is probable that if a larger study area was examined then many more intersections would also fall into the Level of Service “F” category.

3.2.2 TfNSW predicts 10x more truck trips than SIMTA’s EIS

In their response to the earlier SIMTA EIS, Transport for NSW ⁽²⁴⁾ (TfNSW) has estimated a truck generation figure that is ten times higher than the SIMTA EIS estimates.

This TfNSW figure is approximately three times the current heavy truck movements in Port Botany. The fact that Port Botany has a “truck movement issue” is universally acknowledged. If this three-fold increase of heavy truck movements are imposed onto Liverpool, which has a lack of road infrastructure capacity, very serious “truck movement issues” would occur.



Even if both estimates are wrong, and Liverpool “only” receives the equivalent of twice the existing Port Botany truck movements, the same conclusion would be reached – the Intermodal will result in very serious traffic issues in Liverpool.

3.2.3 SIMTA traffic on Hume Highway's accident hot spot

The NSW Director General's Requirements for the study area for such a grand development can be considered extremely limited, given that the NSW Government was well aware of the limited capacity on the Hume Highway, and Australia's third highest accident hot spot on the Hume Highway. Clearly, the Director General's Requirements were developed for particular purposes.

If the proponents had a wider concern for the safety and welfare of the community, they would have included that section of the Hume Highway. Sadly, professional ethics by the proponents was not shown in this matter.

SIMTA EIS modelling showed that 27% of the intermodal traffic will use the Hume Highway north of the M5 Motorway – Hume Highway interchange. Almost all this traffic will traverse Australia's third highest accident hot spot.

If the TfNSW and the SIMTA estimates are correct, it means that about 80% of the current Port Botany's traffic will be added to the existing traffic passing through Australia's third worst accident hot spot. The impacts of this were not modelled.

3.2.4 SIMTA does not consider induced traffic

Given that the proposed Moorebank Intermodal is such a large inland Intermodal Port it would be natural for symbiotic industries to mushroom up, and those industries would generate traffic.

This induced traffic has not been considered by SIMTA, and from what we gather will not be considered by MIC either.

This is very significant when it is possible that the induced traffic could be as much or more than the traffic generated by the port itself. Interestingly these industries are currently limited in the Moorebank region most likely due to the traffic congestion in the area. Refer to 3.7 “Potential Warehousing Around Liverpool” for more details.

3.3 MIC current considerations

3.3.1 New road in the corridor to the M5 and M7

MIC is investigating “a possible new road in the corridor to the M5 and M7 Motorways (an initiative recommended by some community participants at the information sessions. ⁽¹¹⁾ This translates to replacing the 270 degree turn that the traffic currently makes to travel over the railway overpass which crosses the Macarthur line and Southern Freight line. The new rail overpass would connect Cambridge Av and Glenfield Rd. The new rail overpass bypass will need to be designed for loaded B-triples and therefore require gentle slopes and wide curvatures. Consequently, the structure will be large and may require land resumption, and would be very expensive.



See Figure A4 5 in Appendix 4 for a schematic representation of this scheme.

The new corridor initiative will also require upgrading the low-lying bridge over the Georges River, which is very flood prone. See Figure A4 1 in Appendix 4.

These issues are shown in a short brown line in Figure 6.

3.3.2 Rat-running

MIC is investigating “measures to prevent other traffic impacts, like ‘rat-running’”.⁽¹¹⁾ This translates to a Liverpool CBD bypass along Brickmakers Creek that would bypass Australia’s third highest accident hot spot.

The CBD bypass will need to be designed for loaded B-triples and therefore require gentle slopes and wide curvatures. Consequently, these structures will be large and may require land resumption, and would be very expensive.

See Figure A4 6 in Appendix 4 for a schematic illustration of this route, the Brown dotted line in Figure 6. Also refer to Section 3.5 ‘Future over-congestion leading to rat-running’.

3.3.3 MIC traffic 4% could cause long delays

MIC⁽¹¹⁾ states that it will contribute “a little less than 4% of the traffic already on the M5”. This sounds miniscule, and is clearly designed to give the impression that the Intermodal traffic has extremely little impact. After all only 4%. However, given that this was written by technical traffic and transportation experts, it is very odd.

Professional modellers normally present statistics such as:

- Travel demand without intrazonal trips. This will clearly show the background demand and the background + Intermodal demand. (Trips within a zone are referred to as intrazonal trips. These trips are short trips, and use fuel, cause pollution and accidents etc. Intrazonal trips stay within a zone, and do not appear on the road network, and so these should not be reported.)
- Vehicle Kilometres Travelled (VKT) and Vehicle Hours Travelled (VHT) by different class of vehicle. This will show the impact of the Intermodal traffic.
- The network speeds which will give a crude network-wide impact of the intermodal traffic. This statistic can then be used to do a rudimentary analysis of pollution and accidents.

From Figure 23 (Delays and traffic intensity diagram) in Appendix 2, it can be derived that the impact of this 4% on the delay is very significant as the Level of Service in the Moorebank Intermodal precinct is already so bad (in the future base case, ten out of the 13 intersections have a Level of Service F). This 4% additional traffic brings the total volumes closer to the intersection’s capacity limit.

MIC conveniently does not state the resulting delay, for obvious reasons – it would scare even the most hardened politician.



It would therefore be ethical and professional for MIC, to complete the sentence, “a little less than 4% of the existing traffic already on the M5” by adding something along the lines of, “this translates to

- an increase of x minutes to an average trip,
- an increase of y km to the average trip length,
- an increase in z pollutants and
- an expected increase of aa accidents”.

Existing intermodals are a good guide to traffic estimates and indicate that the traffic generated from Moorebank Intermodal can be assumed to be very significant. Refer to “Moorebank Intermodals, Key assumptions require deeper scrutiny” by Narelle van den Bos, a Director of Transport Modelling. ⁽³⁵⁾

3.4 Visual Summary of documented traffic issues

Figure 6 below summarises the information gathered from

- Liverpool Council (the roads with issues are identified in green),
- Bankstown Council grade-separated intersections at
 - (1) Hume Highway – Woodville Rd- Henry Lawson Dr, and
 - (2) Newbridge Rd – Milperra Rd – Henry Lawson Dr
 are shown as white arrows,
- Campbelltown City Council are indicated by light blue,
- TfNSW road exceed capacity all day by 2026, M5 bridge needs to be widened before 2016 (pink shaded ovals),
- RMS M5 widening study, intersections with issues (pink circles),
- Issues from the SIMTA EIS (the intersection capacity issues identified in the EIS technical reports are marked with yellow circles),
- Moorebank Av – M5 Motorway access (red circle) and
- Issues from MIC initial considerations (brown lines).

Final EIS Report 19 shows enhanced M5 Access – not costed

Deficiencies of the Existing Arterial Road Network – Liverpool City Council

M5 Widening identified issues

MIC – new CBD bypass

TfNSW – by 2026 roads will at peak hour conditions all day

TfNSW – M5 Bridge needs to be widened before 2016

MIC – new rail overpass

**Campbelltown City Council – SIMTA EIS response
Glenfield to M5 connection**

**Campbelltown City Council – SIMTA EIS response
Upgrade culvert of Georges River**

**Bankstown City Council – SIMTA EIS response
grade separate intersection**

Pinch point: 6-lane highway – 4-lane bridge

**Bankstown City Council – SIMTA EIS response
upgrade Henry Lawson Dr**

**AAMI (2013) – Australia's 3rd highest accident hot spot
AAMI (2012) – Sydney's highest accident hot spot**

**Bankstown City Council – SIMTA EIS response
grade separate intersection**

**SIMTA EIS – Intersections with Level of Service F
with background traffic only**

**Moorebank Av Upgrade in 2029/2030
only road infrastructure cost in
Detailed Business Case**

MIC – new bridge over Georges River

3.5 Future over-congestion leading to rat-running

All over the world, driver behaviour continues to be studied. At this stage, the knowledge dictates that if heavy traffic congestion regularly appears on a driver's favourite route, drivers who have a choice will choose a different path to avoid the congestion. In other words, it is known that drivers are selfish, and they take what they think is the "shortest" or "least cost" path.

These alternative paths are often referred to as “rat-runs”. Often the rat-run is longer, and sometimes traverses minor streets, which are not designed for through trips. This usually means that the driver has a longer journey time. The longer journey distance causes more pollution, more congestion on the chosen new route, and results in the higher probability of accidents.



If many drivers choose to rat-run, those routes become congested, and the drivers on those routes, will choose to rat-run. This is sometimes referred to as the “wave affect”.

A road hierarchy exists to ensure that the main roads are used for through trips, and the minor streets are used for local trips.

Sometimes these “rat-runs” use local streets. That is highly undesirable as rate payers in Local Councils will then have to bear the cost of maintaining those streets.

There are four obvious rat-runs: Liverpool CBD, Governor Macquarie Dr, Henry Lawson Dr and Anzac Parade. This does not include the “wave effect”, which requires a higher level of analyses.

These issues are summarised in Figure 7, and shown in more detail in Appendix 4. A brief description of each is outlined below.

3.5.1 Liverpool CBD rat-run

The original Hume Highway went through Liverpool CBD (along Bigge Street). This route is now sign posted at 50 km/hr. The Hume Highway Liverpool CBD bypass (Copland St) was implemented to take the “through trips” out of the CBD. This bypass is sign posted as 70km/hr.

While the bypass is a longer route, it should be more attractive to those who travel around Liverpool. In practise, there is so much traffic on the bypass, and the many traffic lights closely spaced, that the speed limit of 70km/hr can normally not be reached during most of the day.

This is shown in Figure A4 8, in Appendix 4.

Reduced hospital, TAFE and school accessibility

If Transport for NSW’s future traffic congestion on the Hume Highway are realised, the bypass will become even less attractive compared to the rat-run through the Liverpool CBD.

Unless the travel speed on the bypass can be maintained the rat-run through Liverpool will increase significantly, and that will have detrimental impacts on accessibility to

- Liverpool Hospital (a regional teaching hospital),
- Sydney South West Private Hospital,
- TAFE NSW Western Sydney Institute,
- Liverpool Primary School (on the path),
- All Saints Catholic Boys College (one block away from the path),
- Liverpool Boys High School (one block away from the path) and
- Liverpool Railway Station will have access severely impaired.



This is critical when it is considered that emergency vehicles need priority access to Liverpool Hospital.

This is shown in Figure A4 8, in Appendix 4.

AAMI accident hot spot

Regional traffic enters the Liverpool CBD from Orange Grove Rd and Elizabeth Drive. This traffic must cross the Hume Highway Liverpool CBD bypass. The section between Elizabeth Dr and Orange Grove Rd is ranked as Australia's third highest accident hot spot.

The speed limit on this section of the Hume Highway was reduced to 60km/hr to decrease the number of accidents. While the speed reduction appeared to work because the number of accidents were reduced (*last year it was ranked as the highest accident hot spot in Sydney and now it is Australia's third highest accident hot-spot*), the speed reduction has also made the bypass less attractive compared to the Bigge St route.

In fact, in the afternoon, this is blatantly obvious, as many drivers now use this CBD 'rat-run' (Bigge St route) in the southbound direction. Recently one of the authors was on a bus with 64 school children at 3:15pm when the driver chose to use the Bigge St northbound path rather than the Hume highway CBD bypass.

3.5.2 Governor Macquarie Drive rat-run

There are two paths to take traffic to and from the Intermodal at Moorebank Av to the Hume Highway at Warwick Farm: (1) along the Hume Highway and (2) along the Governor Macquarie Dr through the Chipping Norton route.

This is shown in Figure A4 9, in Appendix 4, and Figure 7.

The path along Governor Macquarie Dr has seven fewer signalised intersections. Even for the trips that need to go to go to the Cumberland Highway, the Governor Macquarie Dr/Chipping Norton route will have fewer signals. This rat-run provides enormous advantages for a loaded B-double or B-triple as there is less likelihood of having to stop at traffic lights.

The Governor Macquarie Drive rat-run travels through the residential area of Moorebank and Chipping Norton, and Australia's premier horse racing stabling and exercise yards. The path uses a 2-lane bridge over the Georges River, near Warwick Farm.

The local development applications, which examined the short section between the Georges River Bridge near Warwick Farm and the Hume Highway, indicated the serious road capacity issues along this section of Governor Macquarie Drive. This section is currently used by local manufacturing industries in the Warwick Farm industrial area.

Liverpool City Council has advised Transport for NSW of the predicted issues with the Hume Highway – Governor Macquarie Dr intersection as it is a major



thoroughfare that will be impacted by the anticipated development of the South West Growth Centre.

3.5.3 Henry Lawson Drive rat-run

There are two paths between the Intermodal at Moorebank Av to the Hume Highway/Woodville Rd intersection: (1) along the Hume Highway and (2) along Henry Lawson Drive. The Henry Lawson Dr path has 12 fewer signalised intersections.

This is shown in Figure A4 10, in Appendix 4, and Figure 7.

The Hume Highway is designed to carry trucks. However, when such an attractive alternative is available, truck drivers would naturally choose Henry Lawson Drive path over the Hume Highway.

The Governor Macquarie Drive rat-run travels through the residential area of Moorebank and Chipping Norton.

3.5.4 Anzac Parade rat-run

Anzac Parade runs parallel to the M5 Motorway. Anzac Parade traverses through mainly residential areas, and is shorter than the M5 and avoids the congestion on the M5 on-ramp/off-ramps.

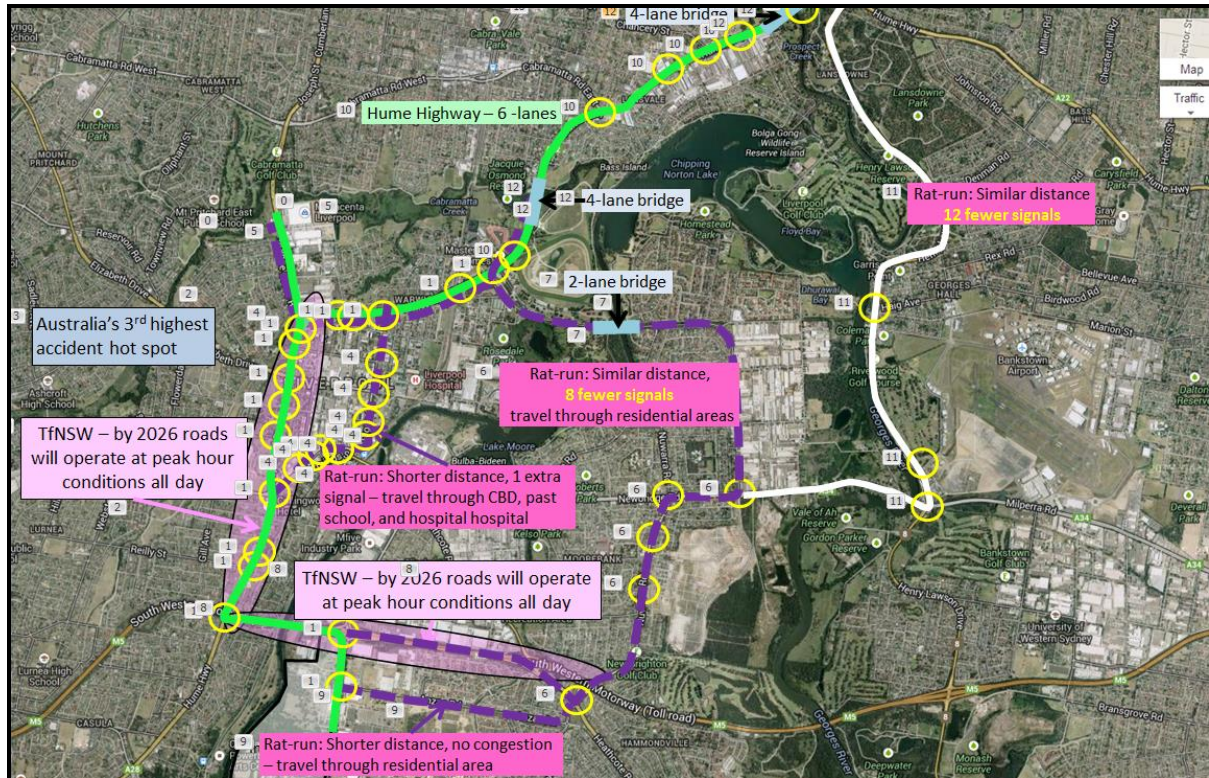
This is shown in Figure 7, and Figure A4 13 in Appendix 4.

For a loaded B-double or B-triple, being able to avoid the on-ramps and off-ramps and the weaving and merging movements of a high speed M5 Motorway is very significant. Measures must be put in place to ensure that trucks do not use this path.

However, the same principle applies to cars. If the Transport for NSW estimates are correct, and the M5 will be congested for most of the day, then the Anzac Parade path must be very attractive to cars. That is clearly undesirable for a local residential street. Ensuring that the car “through” trips do not use this residential street, may be far more complex and will require a great deal of community consultation.



Figure 7 Over-congestion leading to rat-running



3.5.5 Brickmakers Creek bypass - likely EIS approval problems

As a result of the traffic congestion around Liverpool MIC ⁽¹¹⁾ is investigating a possible option to the Liverpool CBD bypass, known as Brickmakers Creek. This option is shown as a brown dotted schematic line in Figure 6 and more clearly in Figure A4 6, in Appendix 4.

The records show, that the cost of road building in the Sydney area is very expensive and a lengthy process. Building the Brickmakers Creek bypass requires a heavy road structure in or near a creek bed, and/or the parkland surrounding the creek. Gathering the finances and EIS approval for such a project would be very challenging.

3.5.5 Dynameq plot of 2011 pm peak

Plot1 below is a screen dump showing the queues on a typical day in 2011 at about 17:15. The plot is generated from the author's Dynameq model.

Since 2011, there have been network changes:

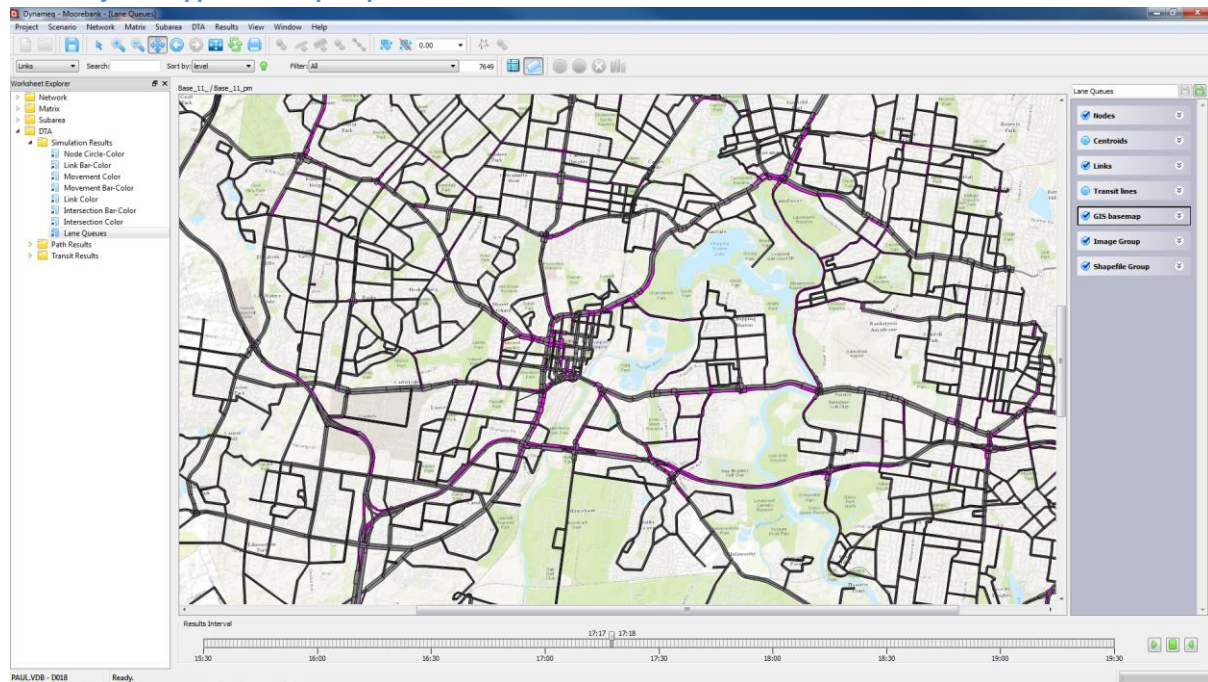
- the process of the M5 Motorway widening has drastic impacts on the road infrastructure. During the construction period, the speed limit on the M5 Motorway has been reduced to 80 km/hr and that has made the path less attractive, and has resulted in shifting traffic onto other roads.
- The RMS has made network improvements through their Pinch Point program.



Despite these changes, the plot shows the queues around Liverpool CBD, Nuwarra Rd, Newbridge Rd, Henry Lawson Drive, and the intersection of Hume Highway and Henry Lawson Drive – Woodville Road.

A close examination will identify almost all the issues identified in the table above. This plot also shows potential issues, further afield.

Plot 1 Dynameq plot: 2011 pm queues



3.6 Table of traffic costs associated with intermodal – not covered in Detailed Base Case

The authors understand that Transport for NSW has prepared infrastructure cost estimates for some of the implementation issues of the Moorebank Intermodal, and that this information has been passed onto the Federal Government. This document is not available to the public so the authors cannot be sure if the rat-running, and all the other issues have been included in the costs.

It is likely that the total road infrastructure costs will be several orders of magnitude greater than the expected cost in the Detailed Business Case, which required that only Moorebank Av needed to be upgraded in 2029/30.

Table 1 Summary of Traffic issues

Sites Requiring Upgrade	Identifying agent	Cost
Bridges – not in any order		
(1) Newbridge Rd Bridge over the Georges Rd needs to be upgraded by 2016	TfNSW ⁽⁵⁾	Unknown
(2) Cambridge Av Bridge over Georges River See Figure A4 1 in Appendix 4	Campbelltown City Council ⁽⁸⁾	\$29-\$39 million (2008) ⁽⁹⁾



Sites Requiring Upgrade	Identifying agent	Cost
(3) Hume Highway Bridge over Cabramatta Creek: Hume Highway is a 6-lane highway and the bridge is 4-lanes. See Figure A4 12 in Appendix 4	Google Maps	Unknown
(4) Hume Highway Bridge over Prospect Creek: Hume Highway is a 6-lane highway and the bridge is 4-lanes. See Figure A4 13 in Appendix 4	Google Maps	Unknown
Road links – not in any order		
(5) Moorebank Av upgrade to 4 lanes	Federal Government Department of Finance ⁽³⁾	Cost brought forward 15 years
(6) Improved M5 access	SIMTA ⁽¹⁰⁾ - MIC ⁽¹¹⁾	Unknown
(7) Weaving issue on M5 Georges River Bridge See Figure A4 14 in Appendix 4	SIMTA ⁽¹⁰⁾ - MIC ⁽¹¹⁾	Unknown
(8) New Glenfield Rd overpass See Figure A4 15 in Appendix 4	MIC ⁽¹¹⁾	Unknown
(9) New Liverpool CBD bypass See Figure A4 15 in Appendix 4	MIC ⁽¹¹⁾	Unknown
(10) Dealing with Australia's 3rd worst accident hot spot	AAMI ⁽¹²⁾	Unknown
(11) Dealing with Macquarie St (Terminus St) which carries the regional east-west traffic through the Liverpool CBD. Travel speed 18km/hr, sign-posted speed 60km/hr (Survey 2010) See Figure A4 17 in Appendix 4	M5 Widening ⁽¹³⁾	Unknown
(12) Dealing with Bigge St – Terminus St, which is likely to experience an increase of rat-running traffic because of the additional congestion on the Hume Highway (Copeland St). Other streets such as Bathurst St may similarly be impacted. See Figure A4 18 in Appendix 4	Authors of this report	Unknown
(13) Governor Macquarie Dr is likely to experience an increase of both truck and car traffic because of rat-running due to the congestion of the Hume Highway. See Figure A4 19 in Appendix 4	Authors of this report	Unknown
(14) Henry Lawson Dr between Milperra Rd and Hume Highway needs upgrading. See Figure A4 110 in Appendix 4	Bankstown City Council ⁽¹⁴⁾ - M5 Widening ⁽¹³⁾	Unknown
(15) Nuwarra Rd – between Heathcote Rd and Newbridge Rd See Figure A4 111 in Appendix 4	Community	Unknown
(16) Glenfield to M5 Motorway link - trucks may block this path. See Figure A4 112 in Appendix 4	Campbelltown City Council ⁽¹⁵⁾	Unknown



Sites Requiring Upgrade	Identifying agent	Cost
(17) Traffic on Anzac Pde has recently increased very significantly. It is a parallel path to the congested M5. See Figure A4 113 in Appendix 4	Community	Unknown
Intersections – not in any order		
(18) Intersection: Hume Highway – Hoxton Park Rd – Macquarie St. See Figure A4 14 in Appendix 4	Liverpool ⁽¹⁷⁾ – M5 Widening ⁽¹³⁾ – SIMTA ⁽¹⁶⁾	Unknown
(19) Intersection: Hume Highway – Henry Lawson Dr – Woodville Rd. See Figure A4 15 in Appendix 4	Bankstown City Council ⁽¹⁴⁾	Unknown
(20) Intersection: Newbridge Rd – Henry Lawson Dr See Figure A4 16 in Appendix 4	Bankstown City Council ⁽¹⁴⁾	Unknown
(21) Intersection: Newbridge Rd – Moorebank Av See Figure A4 17, and Figure A7 18 in Appendix 4	Liverpool ⁽¹⁷⁾ – SIMTA ⁽¹⁶⁾ – M5 Widening ⁽¹³⁾	Unknown
(22) Intersection: Moorebank Av – Heathcote Rd See Figure A4 17, and Figure A7 18 in Appendix 4	Liverpool ⁽¹⁷⁾ – SIMTA ⁽¹⁶⁾ – M5 Widening ⁽¹³⁾	Unknown
(23) Intersection: Newbridge Rd – Nuwarra Rd See Figure A4 18 in Appendix 4	SIMTA ⁽¹⁶⁾ – M5 Widening ⁽¹³⁾	Unknown
(24) Intersection: M5 access – Heathcote Rd	SIMTA ⁽¹⁶⁾	Unknown
(25) Intersection: Hume Highway – Camden Valley Way	SIMTA ⁽¹⁶⁾	Unknown
(26) Intersection: Hume Highway – Kurrajong Rd	SIMTA ⁽¹⁶⁾	Unknown
(27) Intersection: Hume Highway – De Meyrick Av	SIMTA ⁽¹⁶⁾	Unknown
(28) Intersection: Hume Highway – Elizabeth Dr	Liverpool ⁽¹⁷⁾ – M5 Widening ⁽¹³⁾	Unknown
(29) Intersection: Hume Highway – Cumberland Highway	Liverpool ⁽¹⁷⁾	Unknown
(30) Intersection: Hume Highway – Governor Macquarie Dr	Liverpool ⁽¹⁷⁾	Unknown
(31) Intersection: Newbridge Rd – Speed St	SIMTA ⁽¹⁶⁾	Unknown
(32) Intersection: Moorebank Av – Anzac Rd	SIMTA ⁽¹⁶⁾	Unknown
(33) Intersection: Nuwarra Rd – Heathcote Rd	SIMTA ⁽¹⁶⁾ – M5 Widening ⁽¹³⁾	Unknown
(34) Intersection: Newbridge Rd – Governor Macquarie Dr	M5 Widening ⁽¹³⁾	Unknown

Abbreviations:

Liverpool = Liverpool City Council

M5 Widening = M5 West Widening Traffic Report

MIC = Moorebank Intermodal Company – “under consideration”

SIMTA = SIMTA EIS

TfNSW = Transport for NSW – Freight and Ports Strategy



It is given that any infrastructure upgrade must be able to cope with loaded B-triples, and that most of the road construction needs to be carried out outside peak hours. Therefore the cost of road infrastructure can be expected to be very significant.

Local traffic engineers have raised many of the traffic issues listed above. These traffic engineers are trained to examine local conditions and make recommendations to have these issues resolved. Unfortunately, most of the local Council traffic engineers are not extensively trained in transport modelling to enable them to examine the whole transport network and its operational characteristics such as alternative paths. This means that the rat-running issues have not been properly examined. Fixing of these issues also needs to be costed.

A more detailed description of the traffic issues is found in Appendix 4.

3.7 Moorebank Intermodal site is on an inland island

The site chosen for the Moorebank Intermodal is on an inland island in other words it is “landlocked” which means that every time a truck goes to or from the intermodal it must pass over at least one bridge, in many cases, two and three bridges need to be crossed.

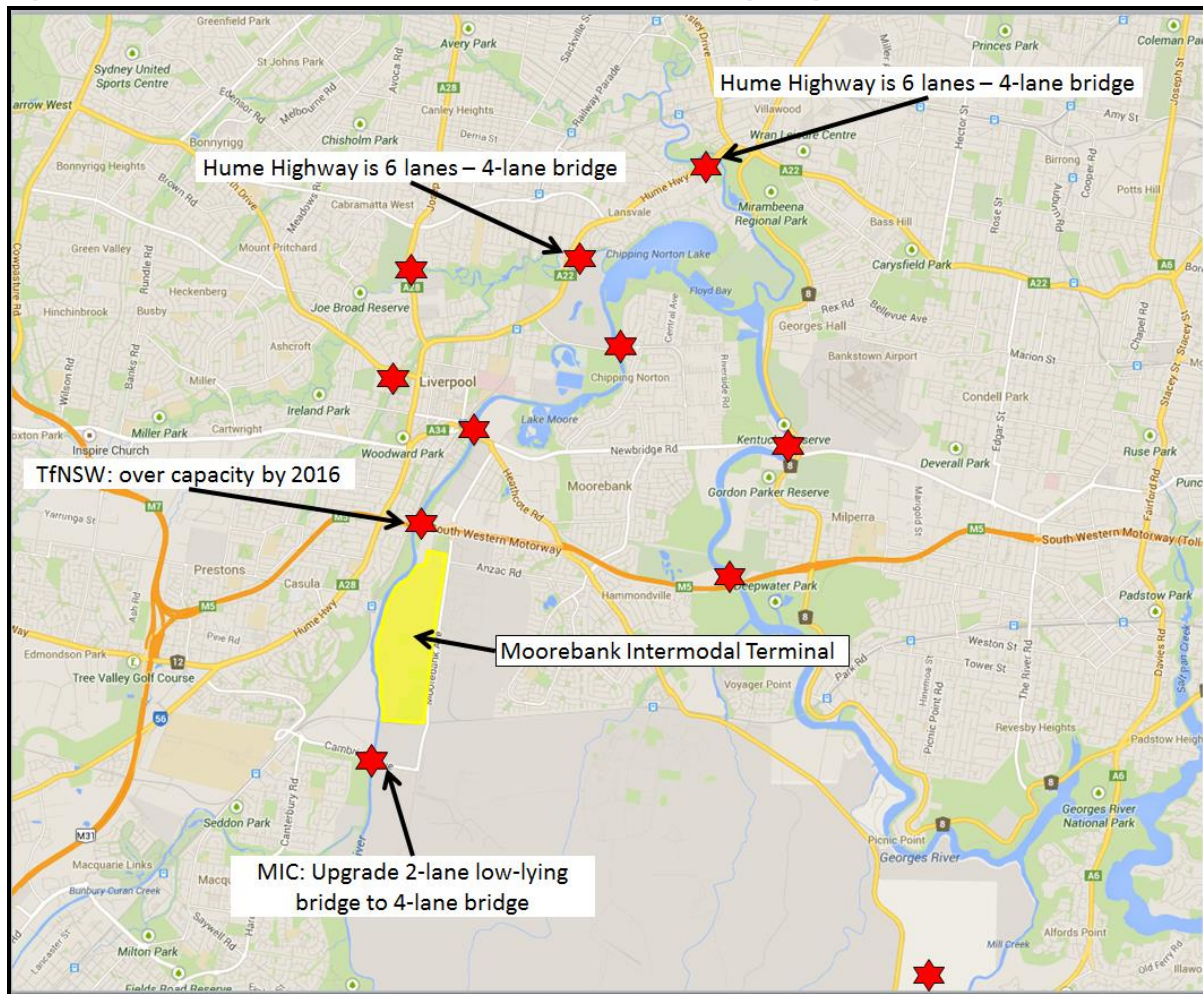
One of the main bridges, on the M5 over the Georges River, is expected to reach capacity before 2016. ⁽⁵⁾ It also has a very complex weaving issue for which there are no obvious economic engineering solutions. Another bridge on Cambridge Av over the Georges River, is very prone to flooding. In total, there are six bridges on the surrounding network that cross the Georges River, and another five bridges that cross the Georges River tributaries. The Hume Highway is generally a 6-lane highway, but the bridges over Cabramatta Creek and Prospect Creek are 4-lane bridges.

Given that bridge upgrades are very expensive, it is counter intuitive to put something that creates as much truck traffic as an intermodal port on an inland island!

A little closer examination shows that the proposed Moorebank Intermodal Precinct is in the middle of a Georges River loop. The approximate locations of these bridges are shown as red stars in Figure 5 below.



Figure 5 Moorebank Intermodal Terminal is on an inland requiring bridges to access it



3.8 Potential Warehousing Around Liverpool

As well as the consideration of traffic coming directly from the intermodal consideration needs to be given to the resulting warehousing that may populate available surrounding industrial lands. On 14th November 2012, Robin Renwick, First Assistant Secretary, Moorebank Project Office, Department of Finance and Deregulation, in his speech at the Liverpool Chamber of Commerce, stated that some 1250 ha of potential warehousing around Liverpool was available to support the Moorebank Intermodal. He encouraged the Chamber to take up the challenge and support the Intermodal for the good of the local community by developing these lands as warehousing.

Obviously, warehousing attracts symbiotic industries. Having such a large warehousing area and corresponding symbiotic industries will generate even more traffic. The traffic would be in three parts:

- between the 1250 ha of warehousing and the Intermodal,
- between the warehouses, and
- traffic of the symbiotic industries themselves including employees, servicemen etc.



SIMTA did not model such a scenario. The MIC is being challenged to generate and model this potential warehousing symbiotic traffic, as it is a scenario that Mr Renwick has encouraged. The warehousing and symbiotic industries traffic would be an indirect, or induced traffic, as an expected consequence of the intermodal development. Therefore, this additional traffic should be included in the government considerations before allowing such a development to proceed.

It needs to be reiterated here that the available land for the Import-Export industry has not been taken up, and the most likely reason is the current traffic congestion issues that exist in Liverpool.

3.9 Small study area does not reveal true traffic situation

The NSW Director General Requirements specified that SIMTA and MIC specified that the proponents only focus their investigation on the immediate surrounding road network.

This may be related to the NSW Government finding that, “by 2026 growth in background traffic will result in peak spreading and traffic conditions similar to the existing peak period in the Liverpool area and on the M5, persisting for most of the day”, and the knowledge that 27% of the intermodal traffic will traverse Australia’s third highest accident hot spot.

Given that this is a Federal Government initiative and the Federal Government would fund the implementation of the intermodal, it may have been convenient not to examine the wider impacts **at this stage** as this would expose the need for massive additional infrastructure funding. Perhaps, it is hoped that these infrastructure costs could be hidden until after the implementation of the intermodal and then different governments would be in place to sort out the required infrastructure funding.

For example, the authors understand that MIC is investigating measures to prevent other traffic impacts such as ‘rat-running’. These measures may include building a Liverpool CBD bypass to avoid travelling through Australia’s third highest accident hot spot. This in itself would swallow a very large part of the funding the Federal Government has promised the NSW Government. However, is the Federal Government aware of this need? Remember, according to the Detailed Business Case, only Moorebank Av was required to be upgraded, in 2029/30!

Given that there are two toll-road companies in Sydney and two toll-road companies in Brisbane facing challenges in court relating to the traffic modelled numbers, it may be wise for both the NSW and Federal Governments to be cautious of the modelling work done for the Intermodals.

The SIMTA auditors highlighted the Auditor’s findings of the non-professional approach in the modelling work undertaken by SIMTA. The SIMTA modellers did not use the future background traffic numbers and only used half the truck numbers.



Building major roads, such as the possible Liverpool CBD bypass will be expensive. Both Governments will have to take up a higher share of the financial risk. This invariably means large sums of taxpayers' money will be involved with this type of traffic solution.



4.0 Back to basics: What problem is Moorebank Intermodal Terminal trying to solve?

The Detailed Business Case proposes the Moorebank Intermodal as a solution to a problem; however, the actual problem has not been clearly defined.

4.1 What is the Problem to be solved?

- Solve the expected growth of freight movements at and around Port Botany
- Solve existing and/or future road network issues
- Serve the existing freight market better
- Serve the future freight market
- Making best use of the existing Federal Government site
- Create employment

Federal and State Governments are keen to build Moorebank

The authors of this document attempted to discover the main reasons behind the NSW and Federal Governments' strong desire to build the Moorebank Intermodal and it was found that:

- Much of the Detailed Business Case is redacted, so it is easy to read and does not contain anything that can be challenged.
- Many documents in the public domain state the NSW and Federal Governments' desire to implement the Moorebank Intermodal precinct.
- The press is full of opinions expressed by industry leaders who advocate and support the Intermodal and whose opinions the press supports.
- Several private web sites have dedicated their views against the proposed Intermodal.
- Liverpool City Council is using ratepayers' money to fight the Intermodal.

It was not immediately obvious to the authors as to why the NSW and Federal Governments are so keen to implement the scheme.

4.2 Moorebank is not a good location

The Federal and State Governments believe that Moorebank is a good location for the intermodal, "It (Moorebank Intermodal Terminal) is a sufficient distance from Port Botany to make rail a commercially viable alternative to road for movements from/to the port."

However Infrastructure New South Wales ⁽²⁵⁾ states: "Infrastructure NSW recommends that State public funding for additional intermodal terminal capacity in Sydney (including in relation to supporting infrastructure) be minimised until there is greater clarity on whether the short-haul rail freight is viable." See page 124.

4.2.1 Short Rail Haul may not be "commercially viable"

Common sense dictates that the



- truck mode is suitable for the “short” haul, and
- rail mode is appropriate for the “long” haul (“sufficient distance”).

There is a difference between “short”, “sufficient distance” and “long” distances, however, there is no easy way to enumerate the definitions of “short” and “long”, and the “sufficient” distances, hence Infrastructure New South Wales’ statement.

In reality, other factors need to be considered:

- Both the truck mode and the rail mode do not pay for their full costs. Therefore both modes are effectively subsidised by the taxpayer;
- The truck mode has fixed and variable costs. The variable cost depends on the distance;
- The rail mode contains three parts: (a) the train part, (b) the additional time and financial cost of the transfer of containers from the rail onto trucks, and (c) the truck part for the final section. Each of these components has fixed costs and variable costs.
- If all the costs are known, it is possible to estimate the “commercially viable” catchment area for an intermodal.
- The area outside the catchment area is monopolised by the truck mode, even though the distance may be “sufficiently long” or just “long”.

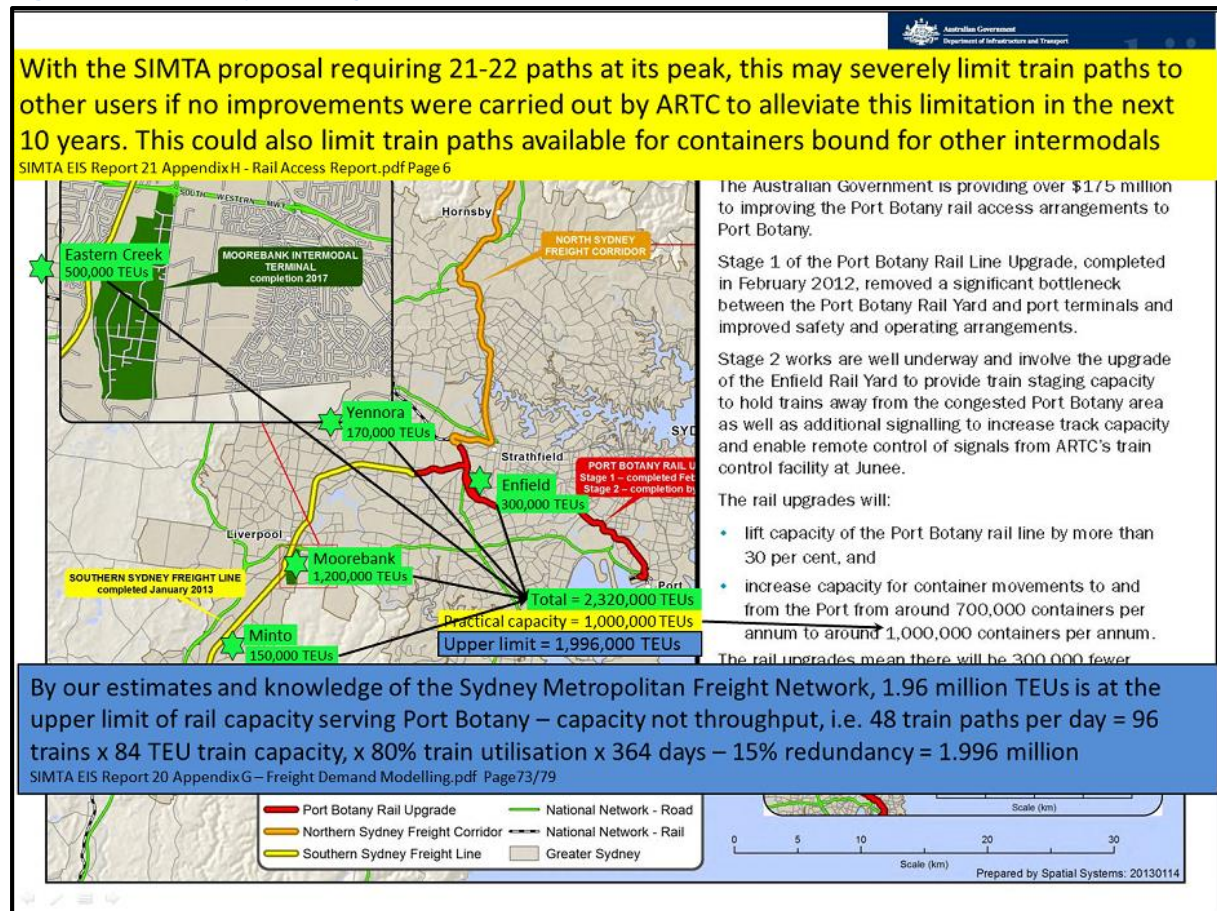
It is therefore unclear how, in this case, the rail mode is “commercially viable”, or “economically viable” without solid facts, including the taxpayer subsidies.

4.2.2 Limited Freight Rail Network Capacity – cannot service all intermodals

The freight rail network has a capacity of 1,000,000 TEUs. Figure 8 below shows the schematic rail network and the potential demand for TEUs at the Sydney Intermodals.



Figure 8 Rail capacity currently 1,000,000 TEU's



If all the intermodals are built, and rail carries all the freight to the Intermodals, the freight rail network has to carry 2,320,000 TEUs. However, the capacity of the freight rail network is currently 1,000,000 TEUs.

In the SIMTA EIS, consultants estimated the theoretical capacity of the freight line at 1.996 million TEUs. The ultimate capacity can only be achieved if the rail line is duplicated. No costs have been found to duplicate the freight rail line.

In every field of engineering there is a vast difference between the theoretical and practical capacities. In every case, the practical capacity is usually much less than the theoretical capacity.

The estimated theoretical capacity is lower than the required capacity. Therefore, either Eastern Creek, or Moorebank can be built but not both. If Moorebank is built then the other Intermodals will not be able to achieve their share of TEUs. See SIMTA's warning in Figure 8 above.

4.3 Moorebank is not close to major current freight markets

The Federal and State Governments believe that, "(Moorebank Intermodal Terminal) is centrally located relative to major freight markets, given that almost two-thirds of port container freight is transported to or from markets in Western Sydney."



The authors analysed the freight movement data with sufficient detail to have a considered view. The plots below are based on this private research. Other researchers are free to contact the authors to discuss the method used in deriving these plots.

Note: Until recently, the NSW Government had made the Freight demand matrixes freely available on their web site. The authors requested and received the travel demand data, and purchased the RMS base auto network. This data was used for private research, and this section reports the analyses. It is understood that a new version of the freight demand matrixes is being developed.

4.3.1 Moorebank Intermodal is not near existing freight markets

Freight Imports – trucks FROM Port Botany

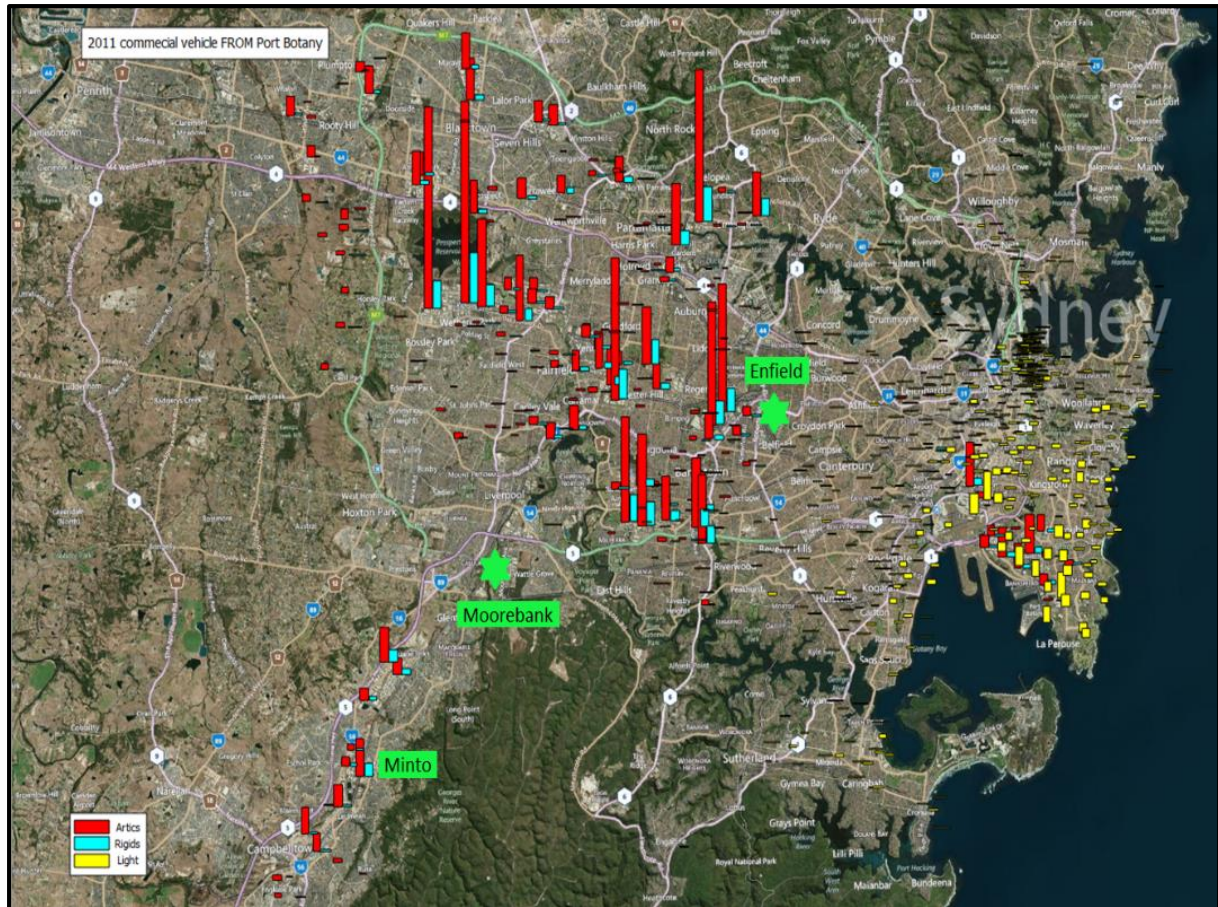
The plot below represents the heavy truck movements from Port Botany to the import industries, on a typical day in 2011. (Author's ref: RMS 2006 network, zone 556, 2011 Freight matrixes).

- The height of the vertical bars indicates the number of truck trips, the base of the column is drawn at the destinations of the trips. The colour indicates the truck type (red for articulated trucks, blue for rigid trucks, and the yellow bar indicates the light commercial vehicles).

It can be seen that Moorebank, or the Liverpool area in general, is not a major import zone.



Figure 9 Destinations of Commercial Vehicles departing Port Botany



This plot clearly supports the reasons for choosing the Enfield Intermodal site. There appears to be a great import market nearby.

Freight Exports – trucks TO Port Botany

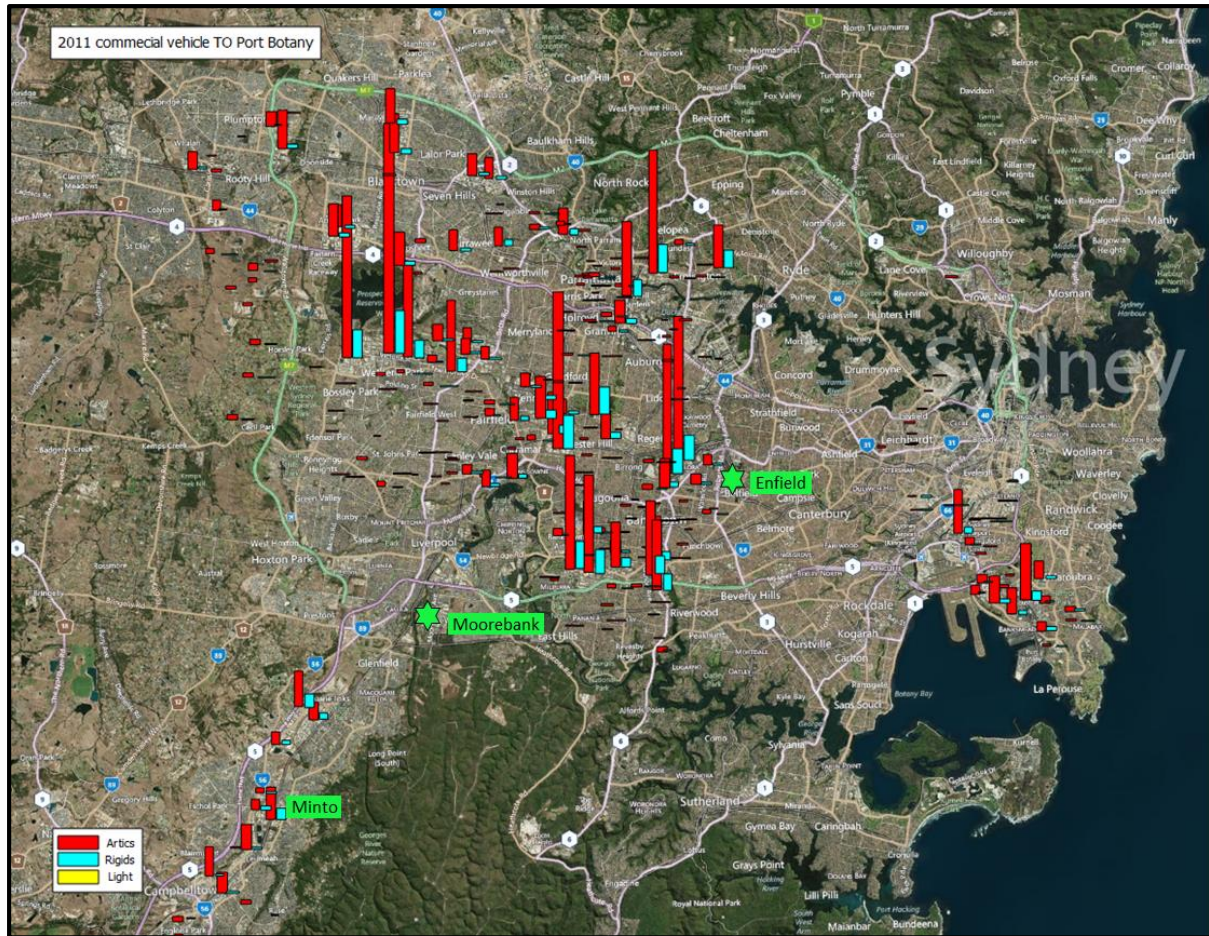
Figure 10 represents the heavy truck movements to Port Botany from the export industries or container storage parks, on a typical day in 2011. (Author's ref: RMS 2006 network, zone 556, 2011 Freight matrixes).

- The height of the vertical bars indicates the number of truck trips, the base of the column is drawn at the origins of the trips. The colour indicates the truck type (red for articulated trucks, blue for rigid trucks, and the yellow bars indicate the light commercial vehicles).

It can be seen that Moorebank, or the Liverpool area in general is not a major export zone.



Figure 10 2011 Origins of Commercial vehicles travelling to Port Botany



While the Detailed Business Case is correct in stating that Moorebank is “adjacent to existing industrial areas”, these plots clearly do not support the implied correlation that those industries depend on the direct container freight from Port Botany.

4.3.2 Rationalising the existing freight market, Moorebank a poor choice!

If the Detailed Business Case implied that the real purpose of building Moorebank is to rationalise the existing market, then the following issues need to be considered:

Milperra and Bankstown market: See Figure 11. Milperra and Bankstown is at the bottom of Green Oval 1.

Travelling to Bankstown and Milperra requires a \$9.30 toll on the M5. See Figure A4 11. In Google Maps, the grey areas represent the roofs of industries.

- The new Enfield Intermodal can serve the Milperra and Bankstown market better as it is closer and has no additional toll.
- Not only does Moorebank rail-mode have to compete with Enfield, it also competes with the truck-only mode. For containers to be delivered to Milperra: Trucks-only mode: trucks drive on the M5 Motorway and turn off at the Henry Lawson Dr off-ramp to reach their destination.



Moorebank / Rail mode: rail to Moorebank then the truck leg includes a back-tracking trip as well as the \$9.30 toll.

The Moorebank – Chipping Norton Market: See Figure 11. Moorebank – Milperra catchment is in the middle of the image. This market is very small compared to the major centres, and hence do not even show up in this Figure.

The Defence National Distribution Centre currently a freight centre is so small that it can barely be seen in Figure 11. It is presently located a few hundred meters down the road from the Moorebank Intermodal Terminal.

- The containers destined for the Defence distribution centre, will need to be off-loaded at the Intermodal and transferred onto a truck for a delivery distance of a few hundred metres.
- For the same distance, the cost and time for the freight movements can be directly compared: truck-only versus rail + truck + transfer handling. On average, the truck-only mode will certainly be quicker and more cost effective, unless the rail is more heavily subsidised.

This situation applies not only to the Defence distribution centre, but also to all the other surrounding freight centres in Moorebank and Chipping Norton, where the last truck-leg is less than a few km. Obviously, these markets are very difficult to capture by the Moorebank Intermodal.

Ingleburn, Minto and Campbelltown market: See Figure 11 Green Oval 2.

The Minto Intermodal has recently been expanded. It now has a 150,000 TEU capacity, and ultimately it may have a 200,000 TEU capacity. Therefore

- The Minto Intermodal would obviously be keen to capture the growth in market share.
- Moorebank Intermodal may find it more difficult to expand into that market.

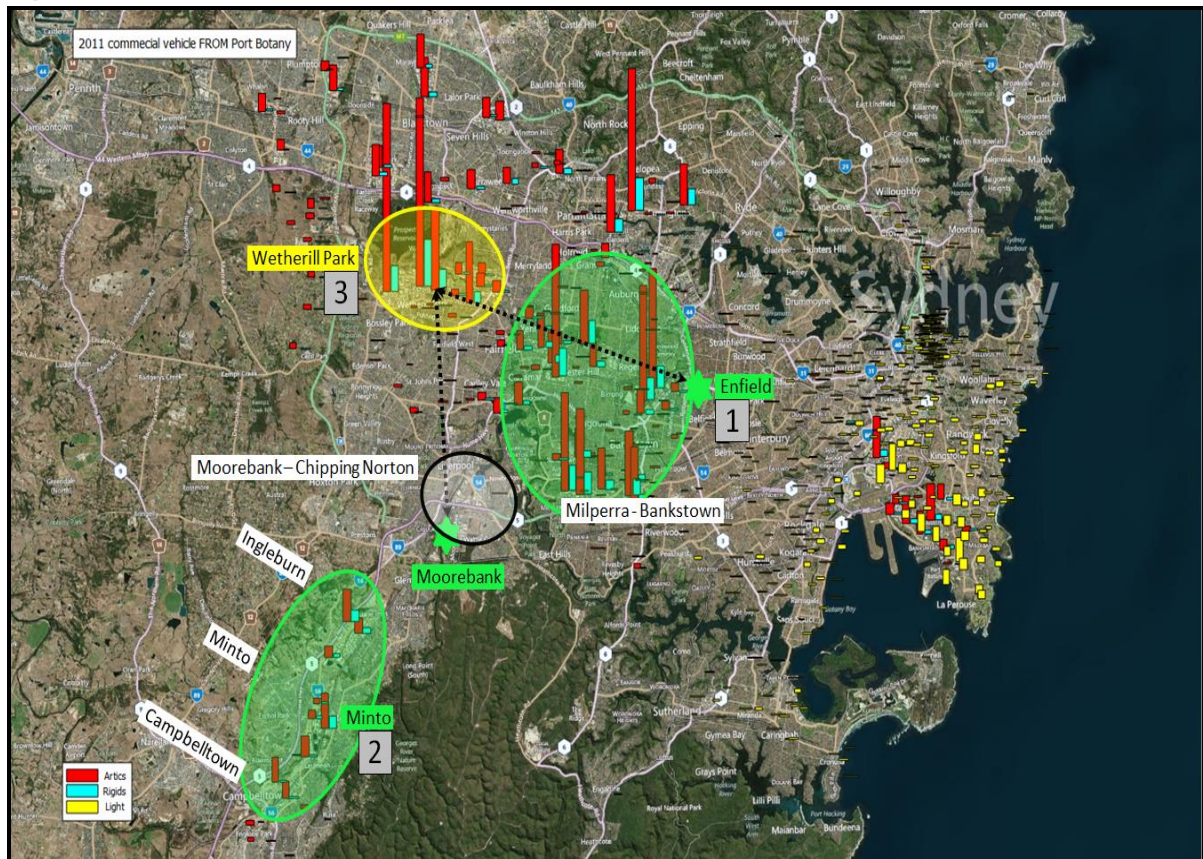
Wetherill Park market: See Figure 11 Yellow Oval 3.

This very dense TEU market is equidistant from the new Enfield Intermodal and the proposed Moorebank Intermodal.

- The Enfield Intermodal is expected to be operating soon, and is obviously keen to capture this market.
- For the Moorebank Intermodal this market may be difficult to capture. The two paths are (1) the shorter through Australia's congested third highest accident hot spot, or (2) the significantly longer M7 route.



Figure 11 2011 Potential catchment areas



The above figure shows the destinations of the truck movements from Port Botany on a typical day in 2011. The tall red bars represent the articulated trucks, the blue bars represent the rigid trucks, and the yellow bars represent the vans and utilities

4.4 Moorebank does not address future freight markets

If the Detailed Business Case attempts to address the future freight market, then there would have been a section comparing the costs of Eastern Creek and Moorebank. If this were the case, it could not be clarified because much of the document is redacted.

At the time of writing the Detailed Business Case, Eastern Creek is the “centre of gravity” for the Growth Centres. Transferring the TEUs from Moorebank to the Eastern Creek/Wetherill Park area, would bring great financial benefits to the M7 toll road operator, but not to the taxpayer, nor consumer. The report referred to the close proximity of the M7, implying that they were aware that the M7 would be heavily used and thus benefit the investors.

In other words, even at the time of writing the report, society would subsidise the truck industry (because the industry does not pay for itself), and also pay for the toll road operator’s profits.



It is not known if in the Detailed Business Case, the Eastern Creek option was analysed in detail. Now the Eastern Creek option appears in the Draft Master Plan for the Broader WSEA.

4.4.1 Broader Western Sydney Employment Area Freight – Moorebank a poor choice

Sydney is expected to grow. The North West and South West Growth Centres combined population is equal to almost half the size of Brisbane. When the existing population immediately surrounding the Growth is added to this growth, the combined population will be almost 2.2 million. This equates to about twice the size of Brisbane.

The Broader Western Sydney Employment Area can ultimately accommodate 212,000 jobs.

The Broader Western Sydney Employment Area - Structure Plan, Transport Planning - Preliminary Analysis Report ⁽²⁶⁾, estimates that 30% of the future freight movements (equivalent to about 1.5 million TEUs or about 75% of the current Port Botany movements) will be required in this area. This is discussed in Chapter 5 refer to Figure 15.

4.4.2 Logical inclusions - Eastern Creek and Badgerys Creek Intermodal Sites

The Draft Structure Plan identified two intermodal sites

- An Intermodal within the Eastern Creek precinct of the Western Sydney Employment Area, and
- An Intermodal located north of Elizabeth Drive and west of Luddenham Road. (Just north of the north-west corner of the planned Badgerys Creek Airport). An alternative location for this terminal could be within the Commonwealth land adjacent to the Northern Road.

Clearly, the NSW Government has considered the Broader Western Sydney Employment Area, and has given much thought to these two Intermodals. The Structure Plan has also given much thought to overcome the rail capacity limitation, and has implied both short-term and long-term solutions. Logically then, it would be very good if the finance committed to the Moorebank Intermodal could be transferred to the intermodal at Badgerys Creek (the Southern) Intermodal because it is on Commonwealth land.



5.0 Better options

The authors believe that there is time to undertake appropriate planning.

5.1 Do not panic – there is time left for good planning

The following documentation points out that the freight predictions have been higher than actual growth. It is interesting to note that the proponents for the Moorebank Intermodal claim that there is a 7% yearly growth in freight movements however in reality growth has remained almost the same since 2009.

The Bureau of Transport and Regional Economics, Working Paper 65⁽²⁷⁾ (BTRE) presents the national and port level forecasts of container and ship movements through Australian ports over the next twenty years, from when the report was published in 2005.

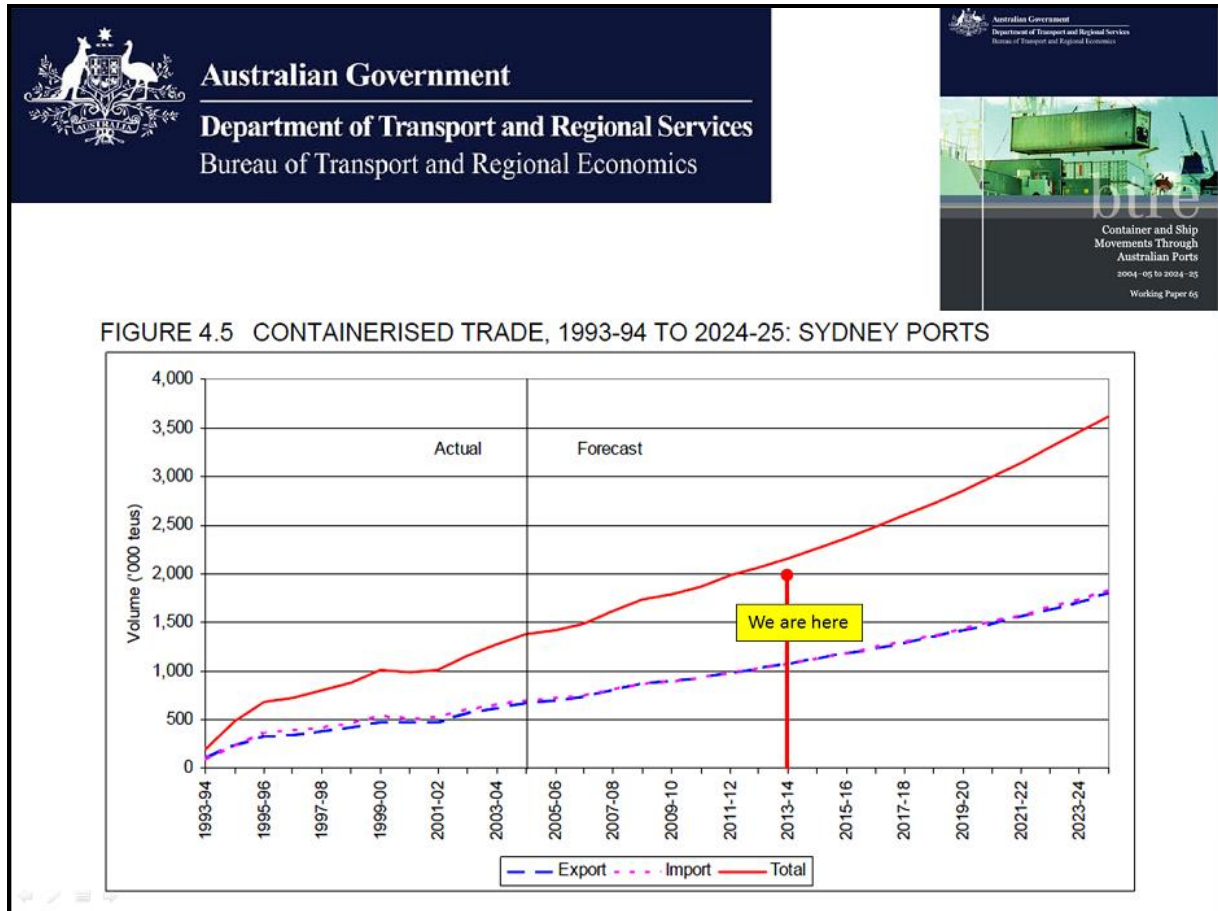
The forecasts had been developed based on econometric models of export and import demand and the most recent economic outlook for Australia and its major trading partners. Australia's five main city ports (Brisbane, Sydney, Melbourne, Adelaide and Fremantle) were included in the development of the port level forecasts.

5.1.1 BTRE freight estimates very accurate – lower than expected

Figure 12 below shows the BTRE estimates for the container movements at Port Botany.



Figure 12 BTRE estimates for Port Botany



Considering that nine years into their forecast years, the current Port Botany activity is about 10% below the BTRE estimates. For a nine-year forward estimate that is amazingly accurate! Given the world economic climate, it is even more amazing that such accurate results could be produced.

5.1.2 Sydney Ports freight estimates very optimistic

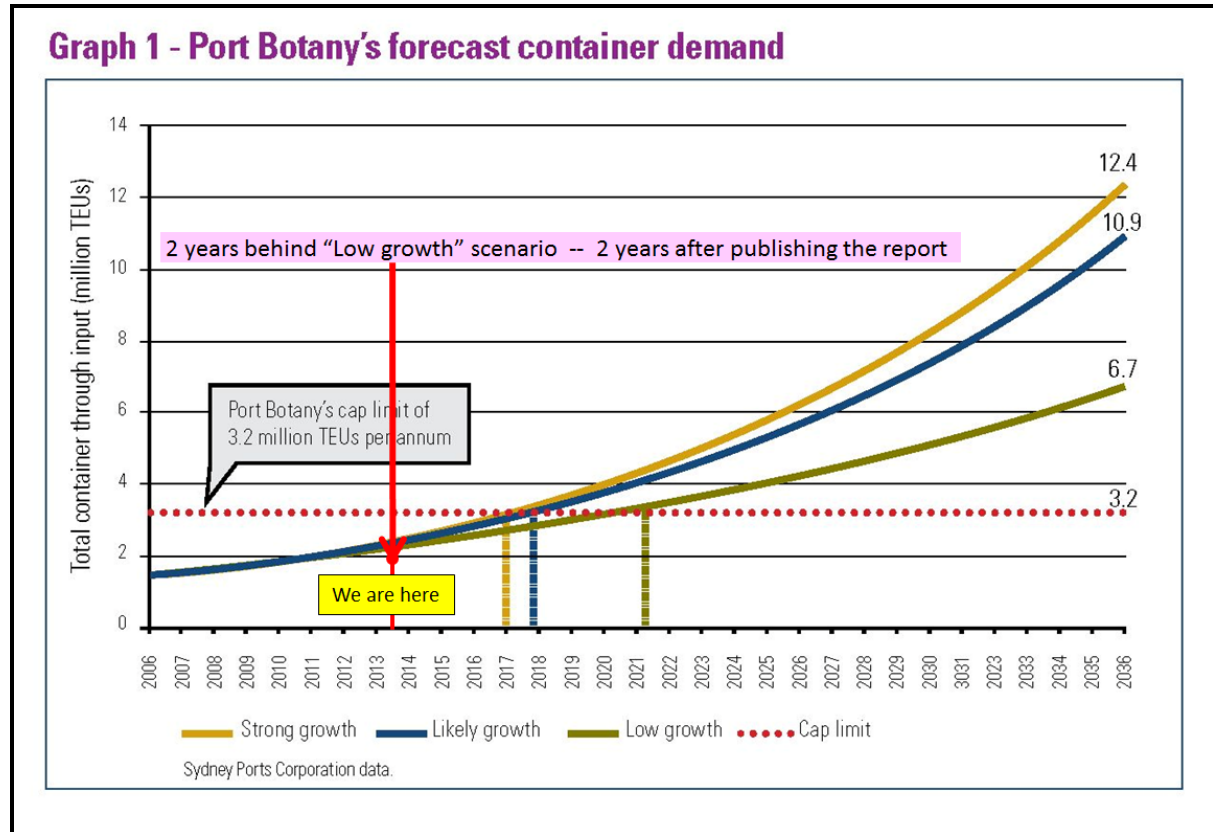
Figure 13 shows Sydney Ports most recent forward estimates. This image was reproduced from the SIMTA EIS. The Sydney Port's estimates are based on eight more years of historic data from Port Botany, that is, a greater historical data set than was available to the BTRE, it should imply a greater level of confidence in the projections.

The "Low Growth" predicted a throughput that is 20%-25% higher than the current throughput. Even with eight more years of historic data, Sydney Ports cannot match the BTRE's estimates for accuracy.

The current activity is about two years behind the "Low Growth" scenario, two years after the report was published.



Figure 13 Sydney Port's forward estimates reproduced from SIMTA EIS



Part of the optimistically high estimates may relate to the potential sale of the Sydney Ports. Other reasons for the optimism may relate to the economic outlook. The sale of Port Botany has now been concluded.

5.1.3 Port Botany estimates (little support for strong growth scenario)

Sydney Ports Corporation had anticipated that the container movements would be significantly higher than the current activity.

Assume that all the containers are “consumed” in the greater metropolis of Sydney (includes Newcastle in the north and Nowra in the south). Based on this assumption, the current consumption of TEUs per capita, is about 0.35. That is, each man woman and child “consumes” the equivalent of 0.35 TEUs per year.

In the year 2036, this consumption is expected to grow to

- 0.88 TEUs per capita for the Low Growth scenario
- 1.63 TEUs per capita for the Strong Growth scenario

It is somewhat difficult to imagine how the **Strong Growth** scenario could possibly eventuate. It implies that in 20 years' time each man, woman and child would consume $1.63/0.35 = 4.7$ times the quantity of imported goods we use today.



Even the Low Growth scenario seems optimistic. It implies a consumption rate of 2.5 times the current rate.

The authors speculate that the Sydney Ports numbers may have been produced simply using extrapolation techniques, rather than strong scientific analyses that the BTRE employed.

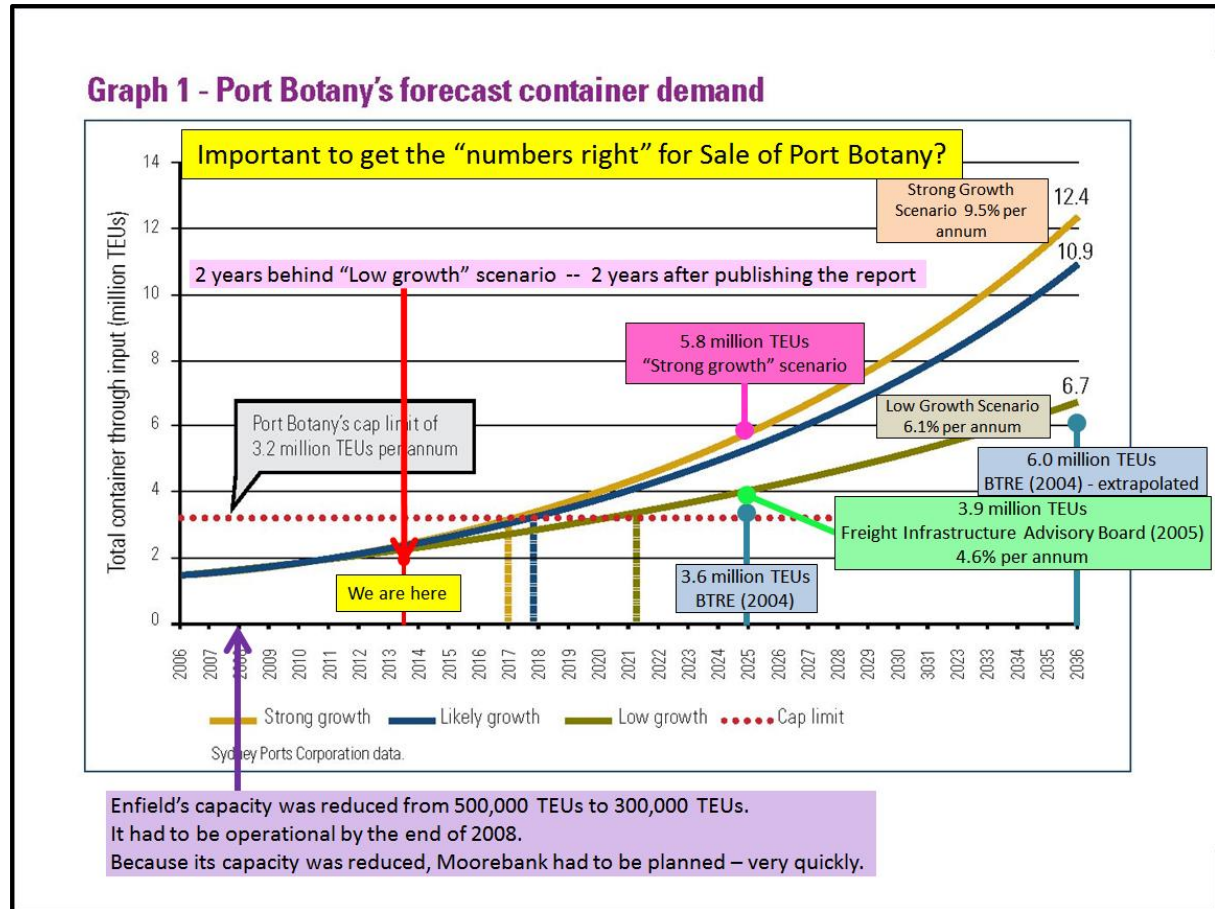
5.1.4 Future estimates BTRE more realistic reducing panic

The current TEUs volumes at Port Botany are just below the estimates made by the BTRE, and Freight Infrastructure Advisory Board in 2005 ⁽²⁸⁾ (FIAB). Given the current world economic climate, the BTRE and FIAB figures may be more realistic than the Sydney Ports numbers.

Figure 14 compares the Sydney Ports forward estimates with other sources. Note that the Low Growth scenario is optimistic compared to the BTRE.



Figure 14 Comparing future growth estimates to other sources



Given the current economic climate, it is very likely that the FIAB and BTRE growth estimates may even be on the high side. Based on these figures, it is probable that the actual container movements may be significantly less than the Sydney Ports estimates.

Interestingly, the MIC publicity machinery continues to advocate that the growth in Port Botany containers is around 7%. The 7% figure is significantly higher than the Low Growth figure of 6.1%, which two years after publishing, is proving to be too high an estimate.

Clearly, the estimates generated by Sydney Ports are very optimistic. If the BTRE estimates are extrapolated the 6 million TEU mark may not be reached until 2035/36. These graphs provide some clarity of what the experts consider to be a likely scenario. It should provide both the NSW and Federal Governments the time to undertake a holistic approach to planning.



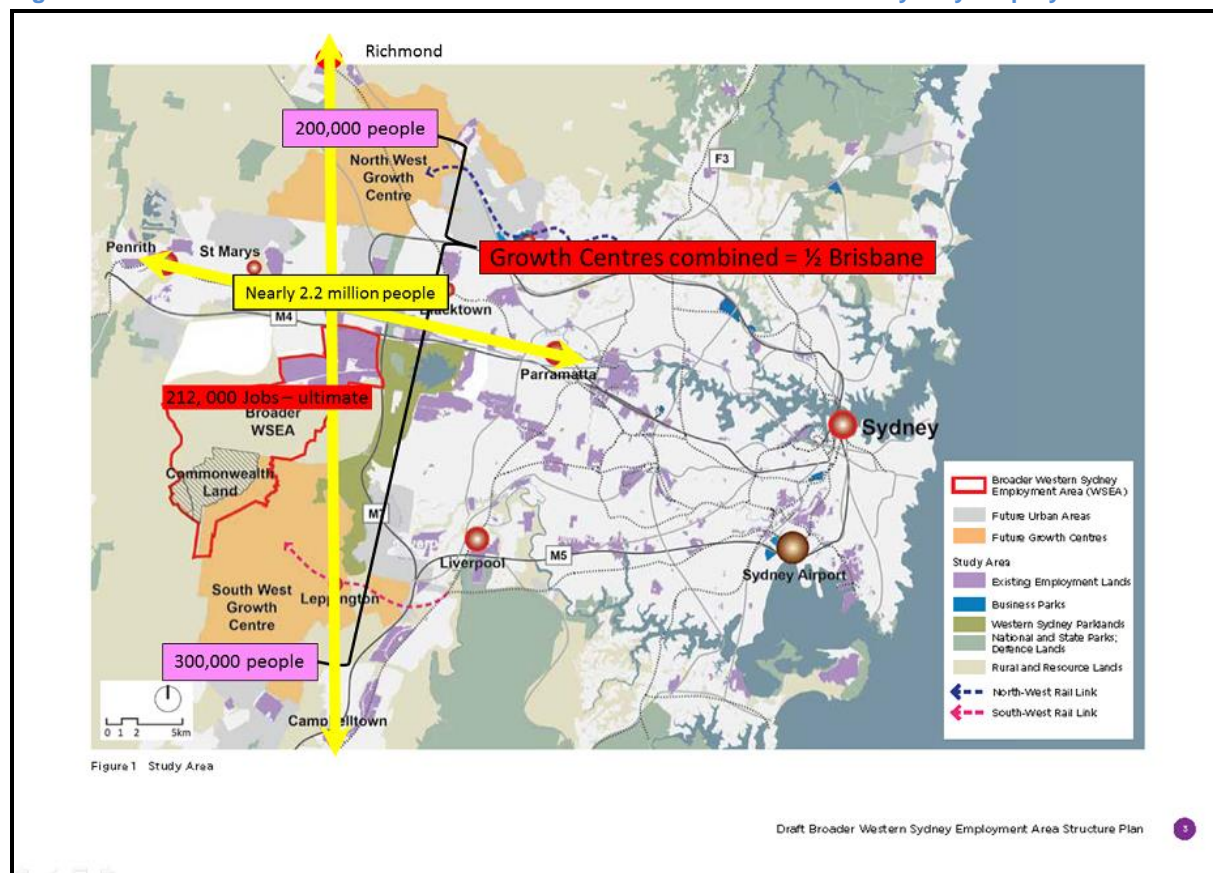
5.2 Future freight market

5.2.1 North West and South West Growth Centres and the Broader Western Sydney Employment Area

The **estimated increase in population** in the North West and South West Growth Centres is equivalent to nearly half of the City of Brisbane. Once completed, if the surrounding area is included, this area will have about 2.2 million people, that is, about twice the size of Brisbane.

The proposed Broader Western Sydney Employment Area is wedged between the North West and South West Growth Centres. This employment area will be accessible to the 2.2 million people. Ultimately, it could have 212,000 jobs.

Figure 15 North West and South West Growth Centres and Broader Western Sydney Employment Area



This new employment area will transform the City of Sydney in almost every area. The current employment area is in east Sydney, Sydney's Employment Arc (the area along the railway line from Chatswood to Redfern) and the Central Industrial Area (the area around the airport and Port Botany).

Infrastructure NSW ⁽²⁵⁾ advocates that 200,000 jobs should be put into the Sydney Global City. The WestConnex would have been a partial solution for such a transport task.



The Broader Western Sydney Employment Area would encourage the journey-to-work to be in the surrounding areas. This would have a major impact on the transport system, and in turn, that affects the wider community with positive attributes.

5.2.2 Staging of the development of the Broader Western Sydney Employment Area

Building Growth Centres which combined are half the size of Brisbane requires a whole of Government approach. In fact, since a large parcel of land belongs to the Federal Government, intuitively, it makes sense that both the NSW and Federal Governments should have a combined approach to developing this area.

This is especially important for the development of the Broader WSEA. If this could be developed, it would create two major employment areas in the Sydney Region: (1) geographically in east Sydney which is already established and (2) a new one in west Sydney.

The Broader Western Sydney Employment Area Draft Infrastructure Plan contains two scenario options for staging the development.

Figure 16 Possible staging options for the Broader Sydney Western Employment Area

5.2 Staging

Detailed planning and land release in Broader WSEA will be contingent on the staging of infrastructure. Staging and sequencing scenarios will be refined as part of the final Structure Plan.

The draft Structure Plan has considered three potential staging scenarios comprising:

- An extension of the Existing WSEA following water and sewer infrastructure. See **Figure 34**.
- Development occurring on two fronts: (i) an extension of the Existing WSEA development; and (ii) from the Commonwealth land should a catalyst development occur. See **Figure 35**.
- An extension of the Existing WSEA plus potential 'out of sequence' development would need to proceed at no cost to Government.

Fragmented out of sequence development patterns propose both challenges and opportunities for the development of the area, acting as both a potential catalyst for development through the provision of infrastructure previously identified for long term delivery; and resulting in implications for the timing and costing of planned infrastructure.

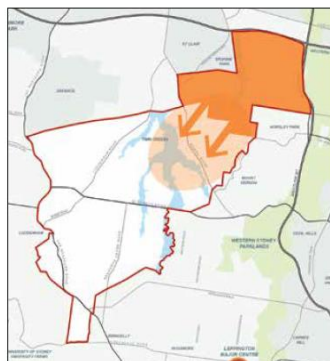


Figure 34 Single front staging scenario

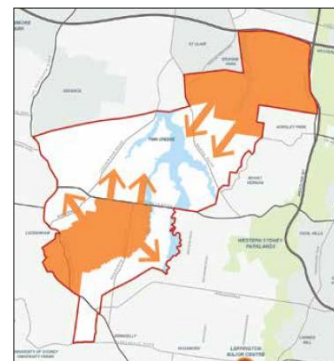


Figure 35 Two front staging scenario

- **Development occurring on two fronts:** (i) an extension of the Existing WSEA development; and (ii) from the Commonwealth land should a catalyst development occur. See **Figure 35**.



There are obvious advantages for the “two front staging scenario”. From a land use point of view, the “two front staging scenario” must be considered seriously.

The two-front staging scenario will quickly create the employment focus in the Broader WSEA. This will completely transform the journey-to-work travel patterns during the peak periods, positively impacting the transport infrastructure.

5.2.3 Future freight market not close to Moorebank

The expected freight market for the Broader Western Sydney Employment area is 1.5 Million TEU's ⁽²⁶⁾. This equates to approximately 75% of the current container movements of Port Botany.

Figure 17 shows the existing truck movements from Port Botany on a typical day in 2011. The underlay of this plot shows the future North West and South West Growth Centres and the Broader WSEA.

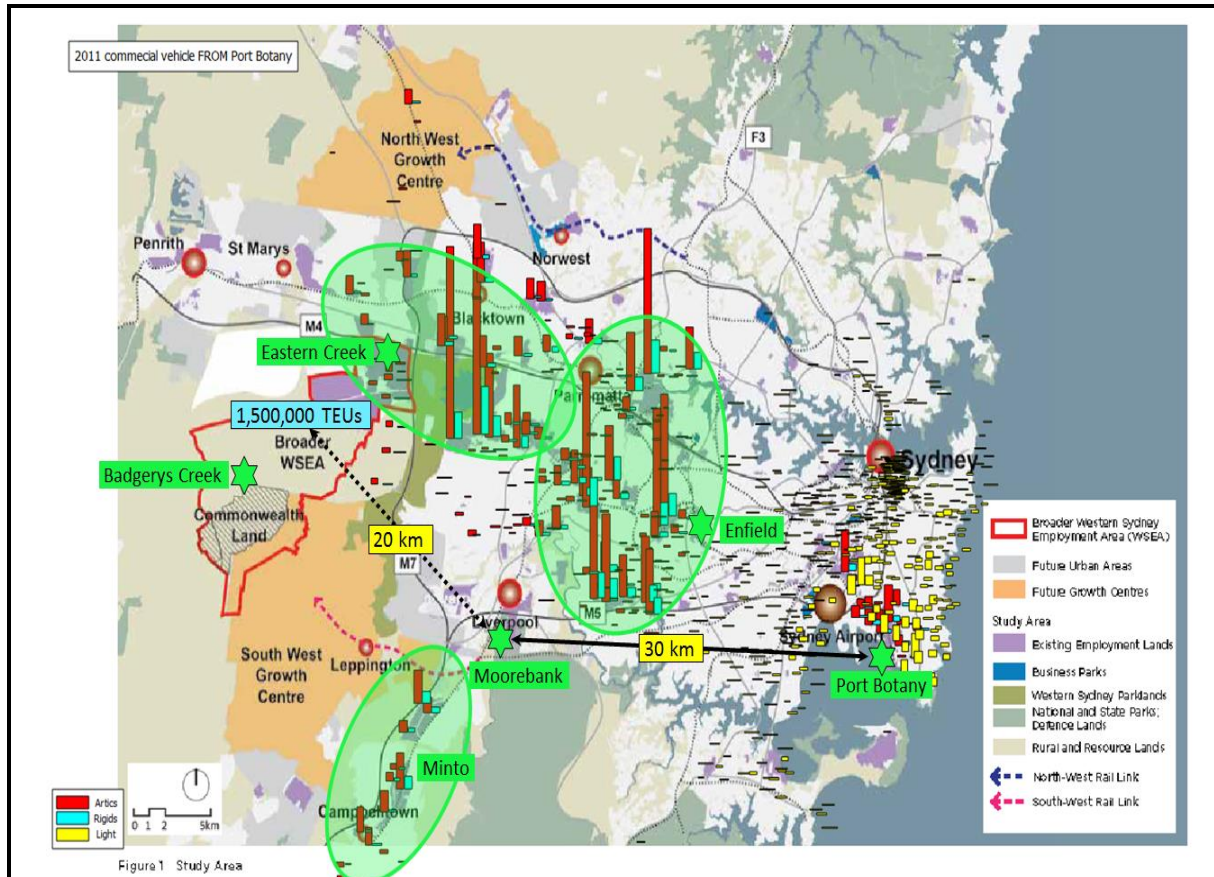
- The height of the vertical bars indicates the number of truck trips, drawn at the destinations of the trips. The colour indicates the truck type (red for articulated trucks, blue for rigid trucks, and the yellow bar indicate the light commercial vehicles).
- The green ovals schematically represents the potential catchment areas of the Enfield Intermodal and the expanded Minto Intermodal.

The vertical bars represent about 85% of the existing Port Botany TEUs the other 15% is outside the plot.

The total future Broader WSEA freight market can be represented by adding all the vertical bars, and placing them within the Broader WSEA.



Figure 17 Future container movements in the Broader Western Sydney Employment Area



The location of the Moorebank Intermodal terminal can clearly be seen as outside the optimum location.

“If you are just introducing another leg into the Supply chain so that you still have the truck leg at the end with the container, then you’ve got the tricky business of trying to argue that you are actually going to make some savings.” ⁽⁴⁾ Professor Bell, Professor of Ports and Maritime Logistics at the University at Sydney.

5.3 Potential locations for Intermodals

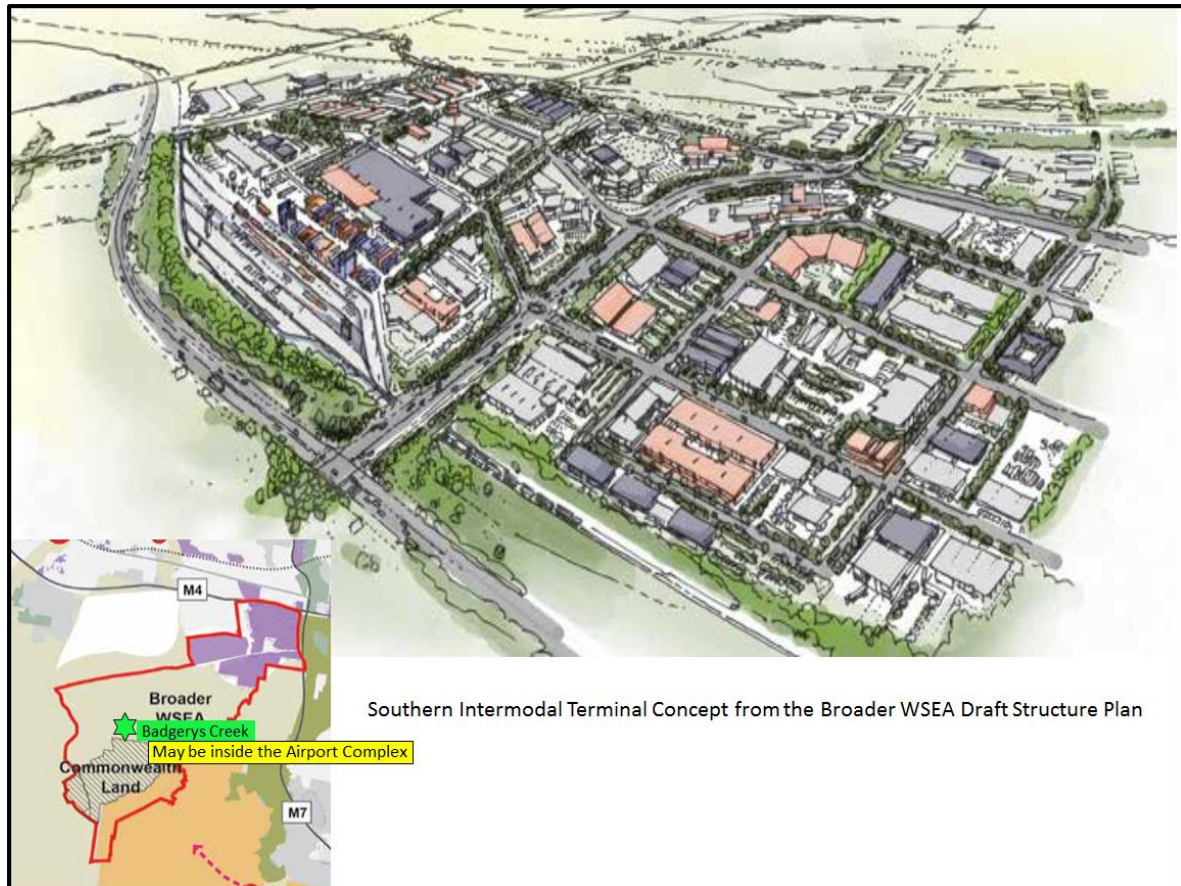
The Structure Plan, identified two potential intermodal terminal locations:

- In the north: a site within the Eastern Creek precinct of the existing Western Sydney Employment Area. This site has been identified in almost all rail freight related studies.
- In the south: a location north of Elizabeth Drive and west of Luddenham Road. An alternative location for this terminal could be within the Commonwealth land adjacent to the Northern Road.

The Broader WSEA Draft Structure Plan includes a concept plan for the intermodal at Badgerys Creek. The report refers to this as the Southern Intermodal Terminal Concept. See Figure 18 below.



Figure 18 Southern Intermodal Terminal concept plan + location



5.3.1 Potential rail connections

The Broader Western Sydney Employment Area Draft Structure Plan also includes the rail connections to Badgerys Creek Intermodal. The images have been reproduced from the Draft Structure Plan.

Eastern Creek

In the short term, the Eastern Creek Intermodal could be connected to the Western Line, and in the long term connected to the Southern Freight Line.

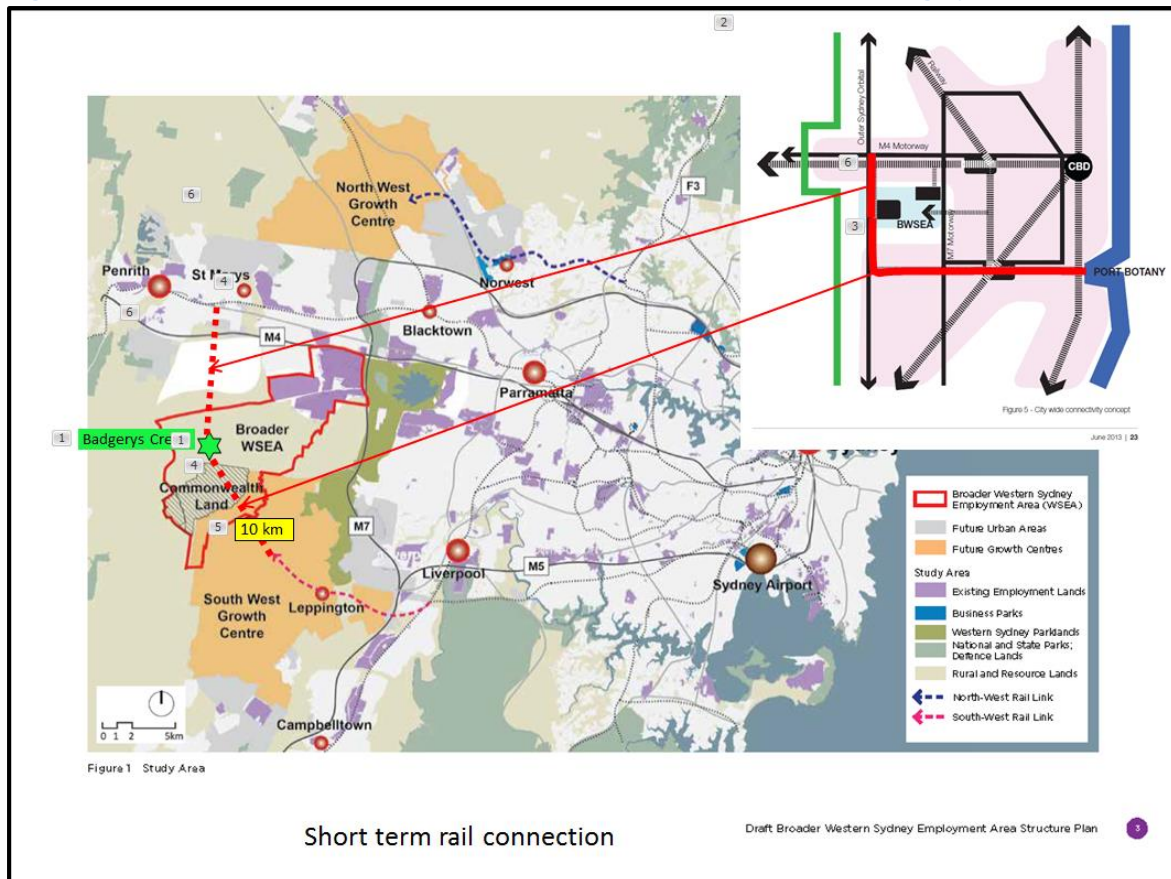
Southern Intermodal

Similarly, in the short term, the Southern Intermodal could be connected to the South West Rail link, and in the longer term to the Maldon-Dombarton rail line.

Figure 19 shows the potential rail connections ⁽²⁶⁾. A dotted line between Leppington and the Intermodal represents the extension to South West Rail Link. The dotted line between the Intermodal and the Western Line could be a shuttle service, connecting the Intermodal to the Southern Freight Line.



Figure 19 Short-term rail connection to the Southern Intermodal Terminal at Badgerys Creek



A possible longer-term solution may include the connection to Port Kembla, using the Maldon-Dombarton Line. See Figure 20.



Figure 20 Long term rail connection to Southern Intermodal Terminal

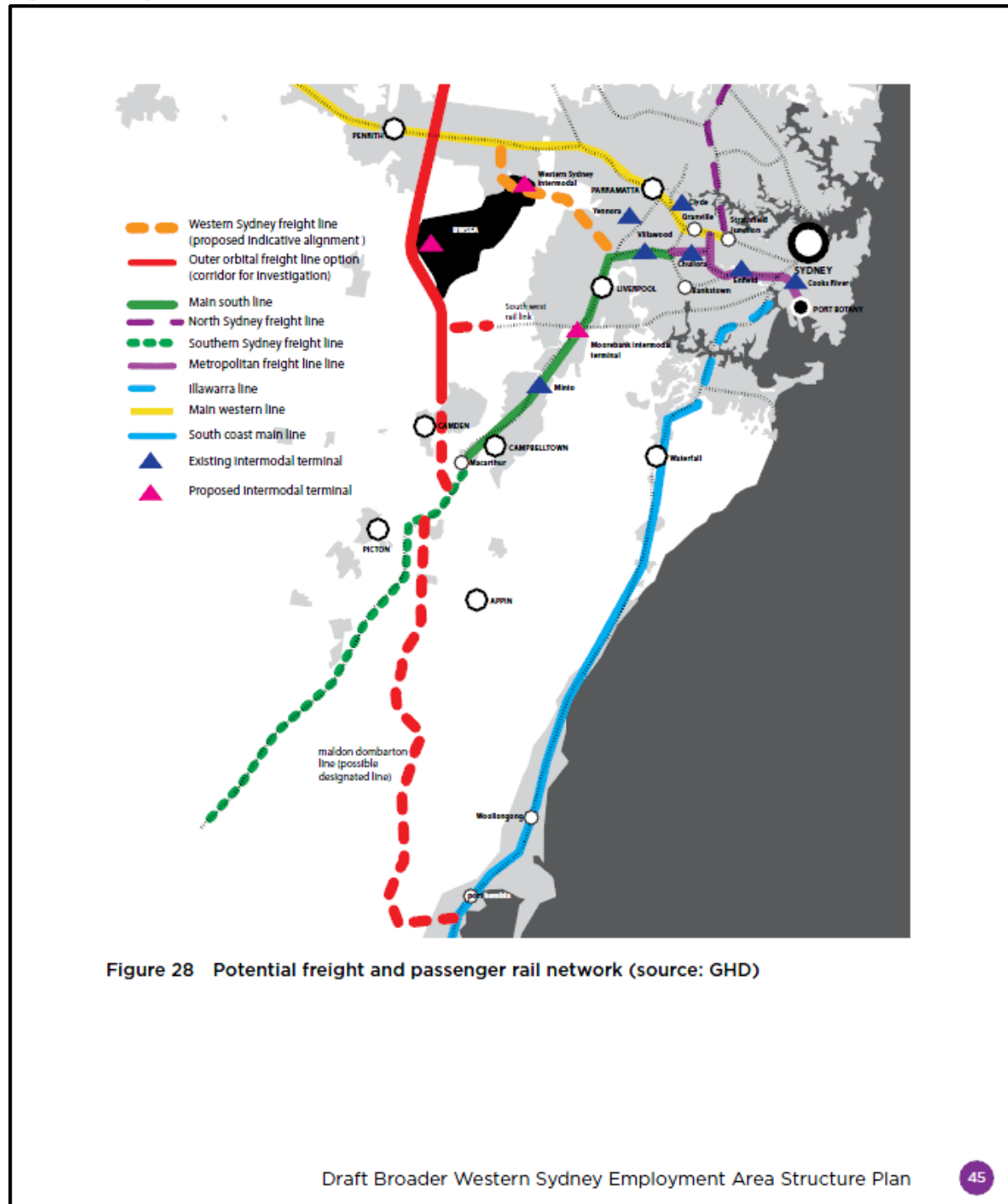


Figure 20 also shows the rail link from Badgerys Creek Intermodal, in the direction of Newcastle.



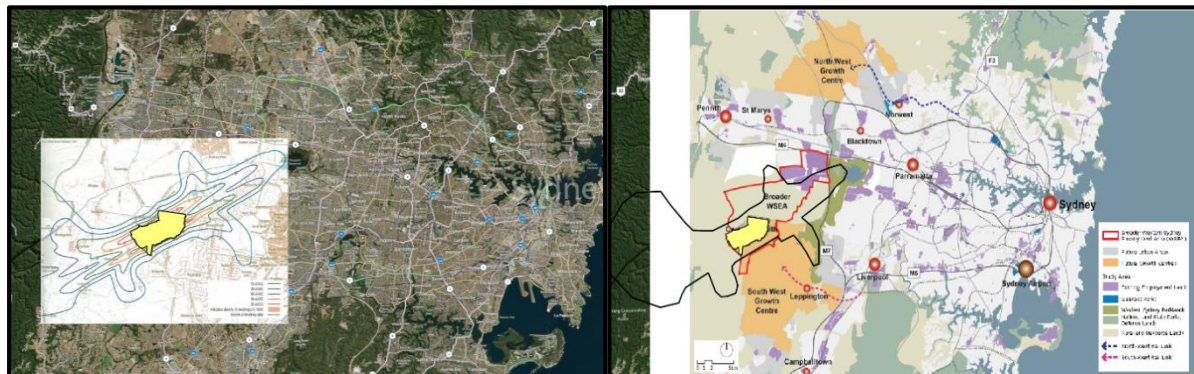
5.4 Badgerys Creek Airport

In 2013 Bob Meyer, planner at Cox Richardson Architects ⁽²⁹⁾, presented a report that said only 2913 homes would be moderately impacted by aircraft noise if Badgerys Creek International Airport goes ahead.

Most of the land surrounding the 17,000 hectare airport site is slated for industrial development, not residential, as part of the Western Sydney Employment Area.

Figure 21 is a noise contour map for Option 1A. (web image: date unknown – reference to 1996 dwellings), uses the Australian Noise Exposure Concept (ANEC).

Figure 21 Airport Noise contours



Population and dwellings underneath the noise contour for Badgerys Creek Airport.

Table 2 Expected population under the airport noise contours

	2011	2021	2031	2041
Dwellings	8,000	11,000	14,000	20,000
Population	26,000	33,000	42,000	58,000

If the Federal Government intends to build the airport, it is important to make that decision sooner rather than later. See paper on the changing house prices near airports ⁽³⁰⁾ is outside the scope of this report, but may be of interest to some readers.



6 Better use of the Moorebank Federal Government land

In the NSW Government's Draft Metropolitan Strategy for Sydney to 2031 ⁽³¹⁾, Liverpool is marked as a regional city. If the North West and South West Growth Centres, together with the Broader Western Sydney Employment Area, were implemented, there would be three regional cities in this area: Penrith, Parramatta and Liverpool. The Moorebank Federal Government land is on the eastern side of the Georges River, about 5km from the Liverpool CBD.

The aim in the Draft Metropolitan Strategy is for Liverpool Regional City to enhance its role as the subregion's main centre for commercial, retail, service and entertainment. The Moorebank Federal Government land could be an ideal starting point to achieve all these objectives, as commercial and retail and entertainment can all be combined on this land so close to the Georges River and the CBD.

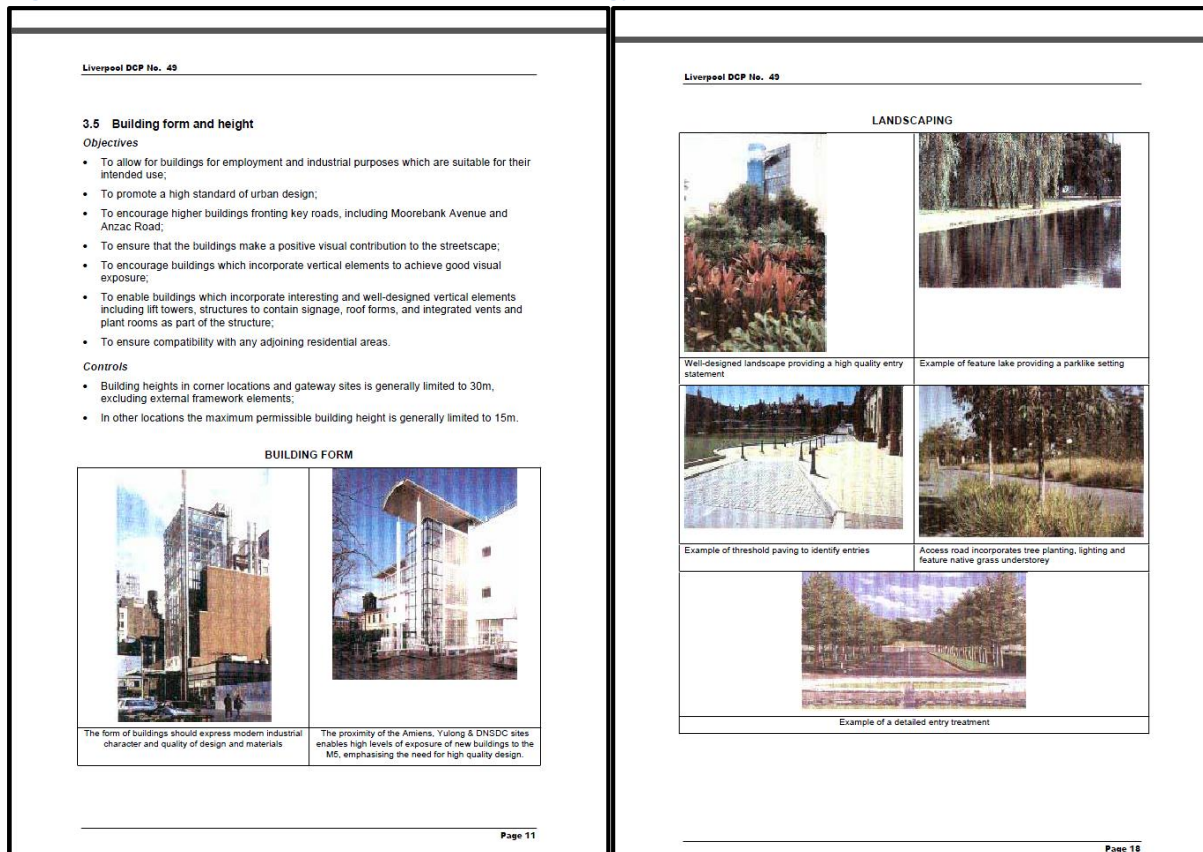
On the 6th of June 2003, Liverpool City Council published the plan for the Moorebank International Park. ⁽¹⁰⁾ This plan received approval at the State and Federal Government levels. Liverpool Council had planned for the Moorebank International Technology Park to have some 15,000 employees.

The authors' own research on the technology parks in the Sydney region, show that the employment number is likely to be significantly higher than 15,000, may be closer to twice that number.

In the modern age of technology parks, it is common to see these technology parks operate on a 24/7/365 basis and a whole precinct develops around the work environment. Such precincts are sometimes referred to as a "campus", implying the academic and social life surrounding technology parks.



Figure 22 Liverpool Council's International Technology Park



If the Liverpool Council were to update its 10-year old plan, the plan would integrate retail, restaurants, medical and recreational facilities. Such an updated plan could be turned into a precinct/campus. The surrounding land use could eventually be rezoned so that the symbiotic industries could be integrated, for example, hotels, conference and entertainment centres could be part of the precinct/campus.

The land is close to the Georges River, and with a possible footbridge, it could be connected to both Casula Railway station and the Powerhouse Cultural Centre. The Casula station is one stop from Liverpool station. The authors could imagine that the Powerhouse Cultural Centre would become part of this precinct.

The land bordering the Georges River is low-lying land and flood prone. This land could be developed as sporting fields with a section returned to native bushland. With foresight, this area could become a tourist attraction, not only for those who come to work in the Technology Park, but also for the wider community.



Appendix

Appendix 1: Alternative site for the 1,800m interstate trains

Menangle - The Freight Infrastructure Advisory Board made the following recommendation 8.

It is recommended that:

Given Menangle's location on the very fringe of Sydney's metropolitan area, the Sydney RailPort Facility's proposal has the potential to provide capacity for the domestic interstate non-bulk freight task and be considered by the Department of Infrastructure, Planning and Natural Resources as an element in the development of a strategy for this market.

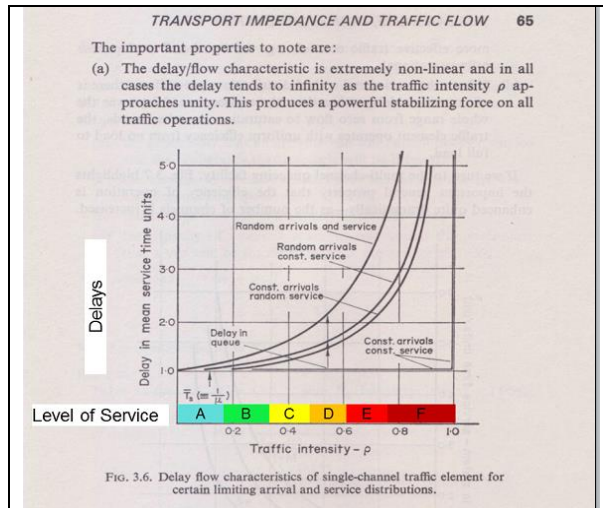


Appendix 2: Understanding traffic issues

Traffic congestion is measured as a “Level of Service”, with an “A” corresponding to minimal delay such as portrayed in car advertisements, and an “F” as the extreme level of congestion – think of an intersection with 1km long queues.

Appendix 3 describes the formal approach to Level of Service on roads. This section describes the Level of Service at intersections.

Figure 23 Traffic intensity vs delay at intersections



This plot shows the relationship between delays and the traffic flow.

Traffic flow is shown along the X axis, and the delay along the Y-axis.

The X-axis stops at the capacity of the intersection. (There are only so many cars that can be pumped through an intersection).

The approximate boundaries of the Level of Service have been shown on the X-axis.

The curves show that at the Level of Service “F”, even small increases in additional traffic flow will result in very large delays.

Sydney’s coordinated traffic signal system (SCATS) will optimise the signal timing, and therefore the “service rate” is “constant”. Traffic engineers assume that the traffic “arrival rate is random”. Therefore, for the purpose of this illustration, use the “random arrivals, constant service” curve. It is the middle of the three curves.

Road Authorities all over the world are concerned when the Level of Service is at the “D” level. The Authorities will certainly take action when the Level of Service reaches the “E” level.

Over the Christmas-New year season, traffic flow reaches the network capacity (the limit of the X-axis). The National News carried articles describing the four and six hour delays on the national highways. This is a practical application of the theory.

2.1 Traffic engineering facts

In the SIMTA EIS, only 13 intersections were analysed. Of these, ten intersections operate at the Level of Service “F”, in the AM peak, and/or PM peak, with only background traffic. This is, before any SIMTA Intermodal traffic is added to the network.



From the graph it can be seen that, for the Level of Service F, even small increases in the traffic flow (that is along the X axis), will have very significant increases in traffic delay.

2.2 Application

When an intersection has large delays, some people will avoid the intersection, sometimes travelling further, this causes the ripple effect. When people travel further, it not only adds to the travel time and travel distance of the trip, but this also adds traffic to other intersections, additional pollution, and increases the probability of accidents.

It is known as “network equilibrium” when the traffic sorts out the most economical paths for all trips.

In the SIMTA EIS, only 13 intersections were examined of which 10 intersections operate at the Level of Service “F” in the AM peak, and/or PM peak. (One of these intersections, has an average delay of 6 minutes and 40 seconds per vehicle, just from the background traffic).

Given the curves above, it seems odd that MIC ⁽¹¹⁾ states that it will contribute “a little less than 4% of the traffic”. This sounds miniscule, and is clearly designed to give the impression that the Intermodal traffic has little impact. After all only 4%.

However, from the graph above, the impact on the delay is very significant as this 4% adds to roads that have reached or are very close to their limit. MIC conveniently ignores to state the resulting delay, for obvious reasons – it would scare even the most hardened politician.

Given that it is universally accepted drivers are greedy, and when an intersection has large delays, drivers who have a choice, will avoid such an intersection and may travel further to do so, and that causes a ripple effect. We then see the network equilibrium concept in action.

When people travel further, it not only adds to the original travel time, but also adds traffic to other intersections, as well as creating additional pollution, and increases the probability of accidents.

It would therefore be ethical and professional for MIC, to “complete the sentence”, by adding something along the lines of,

- “this translates to
 - an increase of x minutes to an average trip,
 - an increase of y km to the average trip length,
 - an increase in z pollutants and
 - an expected increase of aa accidents”.



Appendix 3: Level of Service

3.1 US Highway Capacity Manual Definition

The US Highway Capacity Manual defines Level of Service for links and intersections. For strategic modelling, the 'link' definition is used, and for intersection design, the Level of Service for intersection is used.

The following section pertains to only North American highway LOS standards and it uses the letters A through F, with A being the best, typically seen in car advertisements, and F being the worst traffic conditions.

Level-of-Service A describes free-flow operations. Traffic flows at or above the posted speed limit and all motorists have complete mobility between lanes. The average spacing between vehicles is about 27 car lengths. Motorists have a high level of physical and psychological comfort. The effects of incidents or point breakdowns are easily absorbed. An example of LOS A occurs late at night in urban areas, frequently in rural areas, and generally in car advertisements.

Level-of-Service B describes reasonable free-flow operations. Free-flow (LOS B) speeds are maintained, manoeuvrability within the traffic stream is slightly restricted. The lowest average vehicle spacing is about 16 car lengths. Motorist still have a high level of physical and psychological comfort.

Level-of-Service C describes at or near free-flow operations. Ability to manoeuvre through lanes is noticeably restricted and lane changes require more driver awareness. Minimum vehicle spacing is about 11 car lengths. At LOS C most experienced drivers are comfortable, roads remain safely below but efficiently close to capacity, and posted speed is maintained. Minor incidents may still have no affect but localized service will have noticeable affects and traffic delays will form behind the incident. This is the targeted LOS for some urban and most rural highways.

Level-of-Service D describes decreasing free-flow levels. Speeds slightly decrease as the traffic volume slightly increases. Freedom to manoeuvre within the traffic stream is much more limited and driver comfort levels decrease. Vehicles are spaced about 8 car lengths. Minor incidents are expected to create delays. Example of LOS D is perhaps the level of service of a busy shopping corridor in the middle of a weekday, or a functional urban highway during commuting hours. It is a common goal for urban streets during peak hours, as attaining LOS C would require a prohibitive cost and societal impact in bypass roads and lane additions.

Level-of-Service E describes operations at capacity. Flow becomes irregular and speed varies rapidly because there are virtually no usable gaps to manoeuvre in the traffic stream and speeds rarely reach the posted limit. Vehicle spacing is about 6 car lengths, however speeds are still at or above 80 km/hr on a 100 km/hr link. Any disruption to traffic flow, such as merging ramp traffic or lane changes, will create a shock wave affecting traffic upstream. Any incident will create serious delays. Driver's level of comfort becomes poor. LOS E is a common standard in larger urban areas, where some roadway congestion is inevitable.



Figure 24 Pictures Depicting Level of Service.

From Highway Capacity Manual 2000. Copyright, National Academy of Sciences, Washington, DC., Illustration 13-5 and 13-6, p.13-8; Illustrations 13-7, 13-8, p.13-9, and Illustration 13-10, p. 13-10.

Reproduced with permission of the Transportation Research Board.



Illustration 3-5. LOS A.



Illustration 3-8. LOS D.



Illustration 3-6. LOS B.



Illustration 3-9. LOS E.



Illustration 3-7. LOS C.

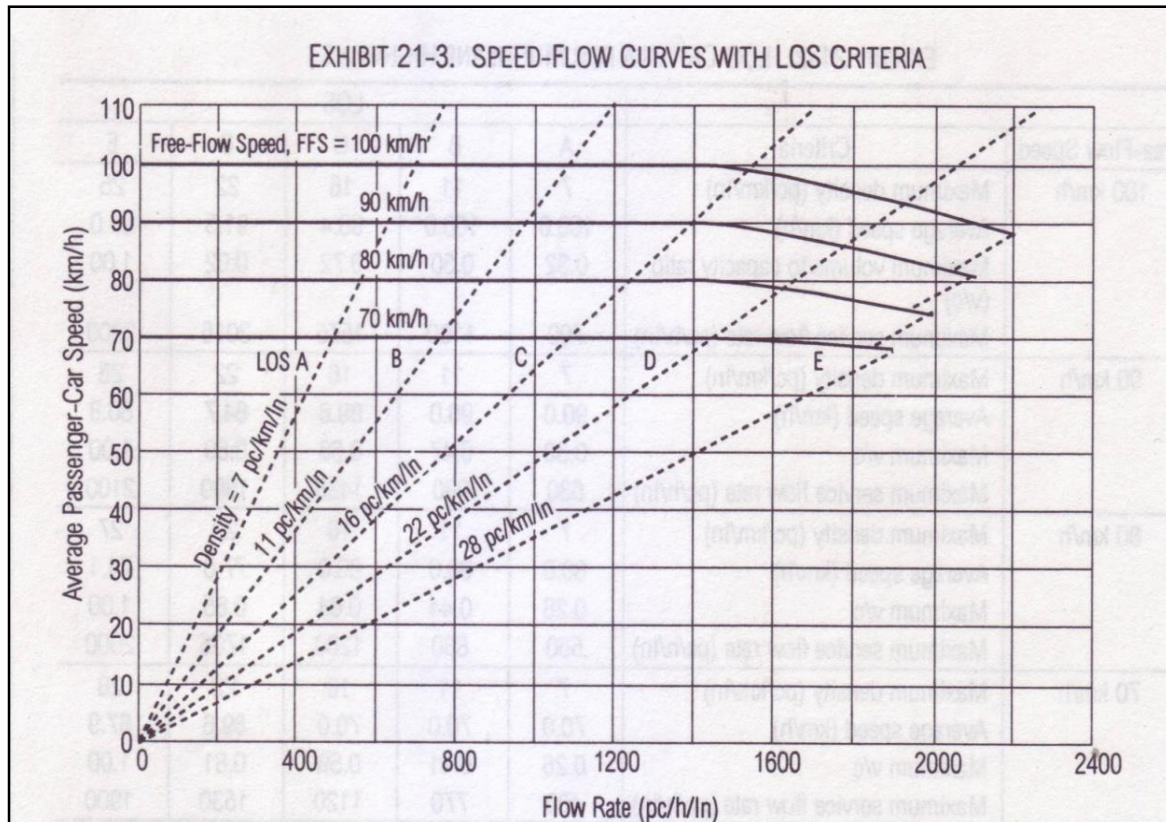


Illustration 3-10. LOS F.



Level-of-Service F describes a breakdown in vehicular flow. Flow is forced; every vehicle moves in lockstep with the vehicle in front of it, with frequent slowing required. Technically, a road in a constant traffic jam would be at LOS F. This is because LOS does not describe an instant state, but rather an average or typical service. For example, a highway might operate at LOS D for the AM peak hour, but have traffic consistent with LOS C some days, LOS E or F others, and come to a halt once every few weeks. However, LOS F describes a road for which the travel time cannot be predicted. Facilities operating at LOS F generally have more demand than capacity.

Figure 25 Speed – Flow Curves with LOS Criteria



The US Highway Capacity Manual and the American Association of State Highway and Transportation Officials' Geometric Design of Highways and Streets list the following levels of service:

- A= Free flow
- B=Reasonably free flow
- C=Stable flow
- D=Approaching unstable flow
- E=Unstable flow
- F=Forced or breakdown flow

Every road organisation in the world has standards that are based on the US Highway Capacity Manual (HCM 2010). These organisations have modified these standards to suit the local conditions.



3.2 Ausroads Level of Service Standards

Austrroads is the association of Australian and New Zealand road transport and traffic authorities. Austrroads also produces a Level of Service, and these are also based (are identical) to the US HCM 2010.

Conceptually, in transport modelling, the average speed is calculated from the link distance and travel time on the link. The travel time is made up of two parts: the travel time at the 'free flow' (sign posted speed) and the delays at the intersections.

Table 3 Speed flows relationship for different road classes

Urban street class	I	II	III	IV
Range of free flow speeds (FFS)	90 to 70 km/h	70 to 55 km/h	55 to 50 km/h	55 to 40 km/h
Typical FFS	80 km/h	65 km/h	55 km/h	45 km/h
LoS	Average travel speed (km/h)			
A	> 72	> 59	> 50	> 41
B	> 56 - 72	> 46 - 59	> 39 - 50	> 32 - 41
C	> 40 - 56	> 33 - 46	> 28 - 39	> 23 - 32
D	> 32 - 40	> 26 - 33	> 22 - 28	> 18 - 23
E	> 26 - 32	> 21 - 26	> 17 - 22	> 14 - 18
F	<= 26	<= 21	<= 17	<= 14

3.3 RMS – NSW Level of Service Standard

In NSW the RTA have their own standard for level of road service modified from the US Highway Capacity Manual.

Table 4 Description of Level of Service

LoS	Description	Hourly flow (vehicles)	
		1 Lane	2 Lanes
A	Free flow - A condition of free flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent.	200	900
B	Stable flow (slight delays) - In the zone of stable flow and drivers still have the reasonable freedom to select their desired speed and to manoeuvre within the traffic stream, although the general level of comfort and convenience is a little less than with LOS A.	380	1,400
C	Stable flow (acceptable delays) - Also in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.	600	1,800
D	Approaching unstable flow (tolerable delays) - Close to the limit of stable flow and is approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor, and small increases in traffic flow will generally cause operational problems.	900	2,200



LoS	Description	Hourly flow (vehicles)	
		1 Lane	2 Lanes
E	Unstable flow (congestion; intolerable delays) - Occurs when traffic volumes are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause break-down.	1,400	2,800
F	Forced flow (jammed)	>1,400	>2,800



Appendix 4: More detailed description of the traffic issues

4.1 M5 Motorway bridge over Georges River

M5 Motorway Bridge over the Georges Rd needs to be upgraded by 2016.

Travel on the section of the M5 Motorway between the Hume Highway at Casula and Moorebank Av is expected to exceed capacity as early as 2016. ⁽⁵⁾

In other words, the 8-lane bridge over the Georges River needs to be upgraded soon.

4.2 Flood prone bridge over Georges River on Cambridge Av

The existing low-lying bridge over the Georges River is very flood prone and therefore needs to be upgraded. ⁽¹⁵⁾ This means upgrading the 2-lane bridge to a 4-lane for a 1 in 100 year flood bridge, suitable for loaded B-triples.

Figure A4 1 Bridge over Georges River on Cambridge Av





4.3 Hume Highway is a 6-lane highway, with 4-lane bridges over Creeks

The Hume Highway Bridge over Cabramatta Creek and Prospect Creek are 4-lanes, but the Hume Highway is generally a six lane road.

Figure A4 2 4-lane Bridge over Cabramatta Creek



Figure A4 3 2-lane bridges over Prospect Creek



Currently during every peak period, there are very long queues at the approaches of these two bridges.



4.4 Cost of upgrading Moorebank Av brought forward 15 years

Moorebank Av upgrade from a two-lane to a four-lane road.

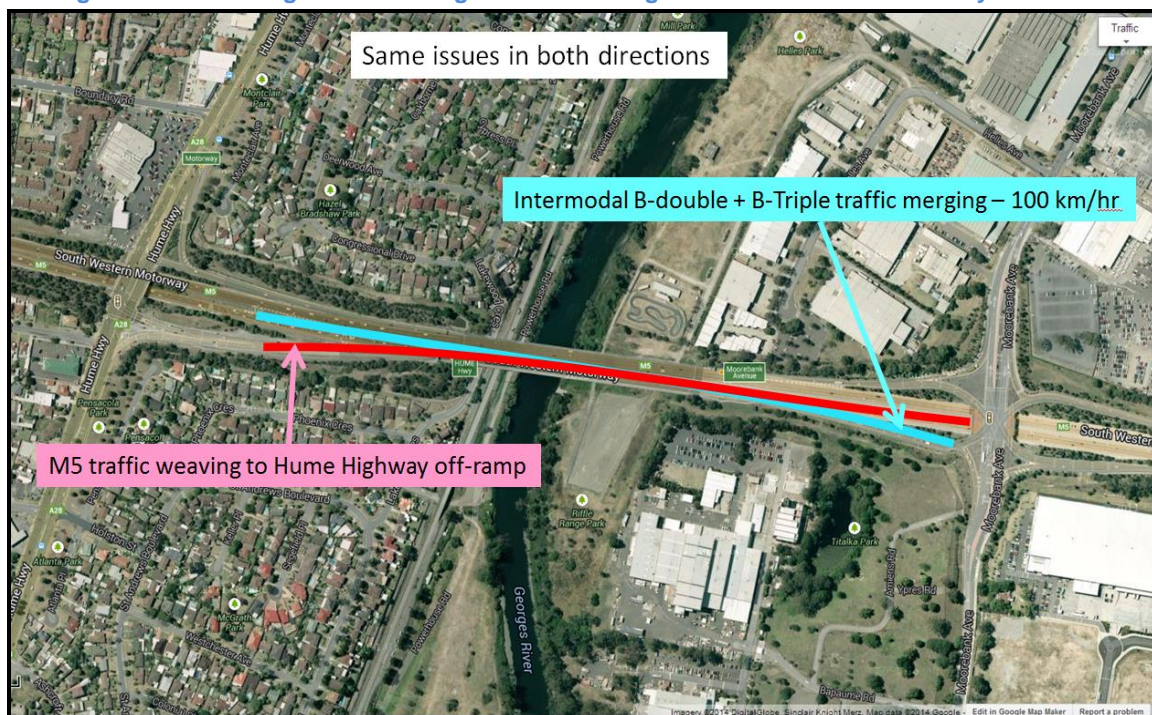
In the Detailed Business Case this upgrade was budgeted for 2029/30. Both the SIMTA and MIC concept designs show that this upgrade is part of the initial design. This means that the budgeted expenditure is brought forward 15 years.

4.5 Intermodal direct access to M5

The Detailed Business Case stated that the Intermodal has direct access to the M5. While that statement is politically correct, the implementation of the connection is technically challenging and very expensive. Indeed, the SIMTA EIS has a report dedicated to this issue. ⁽¹⁰⁾

4.6 Weaving on the M5 Motorway on the Georges River Bridge

Figure A4 4 Weaving issue on bridge over the Georges River on the M5 Motorway



On this section of the network in the westbound direction, there is a merging movement from the SIMTA traffic into a fast (100 km/hr) traffic stream. At the end of the section, there is a weaving movement from the M5 Motorway traffic wanting to enter the Hume Highway off-ramp. The physical distance between the on-ramp and off-ramp is too short for these movements to occur at a 100km/hr zone.

SIMTA timing runs have shown that the average speeds are between 50-60 km/hr. This indicates that the traffic stream on this section is close to capacity. When the traffic stream is close to capacity, there are few “gaps” in the traffic stream.



As it is, there are few “gaps” in the traffic stream. There will be even fewer gaps when the traffic flow increases naturally. Intermodal truck traffic requires large gaps in the traffic stream for the big and relatively slow accelerating vehicles as they are heavily loaded with containers.

There are no simple engineering solutions to this merging and weaving movement.

4.7 Possible new rail overpass connecting Cambridge Av and Glenfield Rd

The existing Glenfield Rd with its 270 degree loop on a slope will be a very difficult path for loaded B-Doubles and B-Triples.

MIC is investigating “a possible new road in the corridor to the M5 and M7 Motorways (an initiative recommended by some community participants at the information sessions. ⁽¹¹⁾

This is shown schematically in Figure A5 5 below.

Figure A4 5 Possible new rail crossing over the Southern Freight Line and Macarthur lines (MIC)





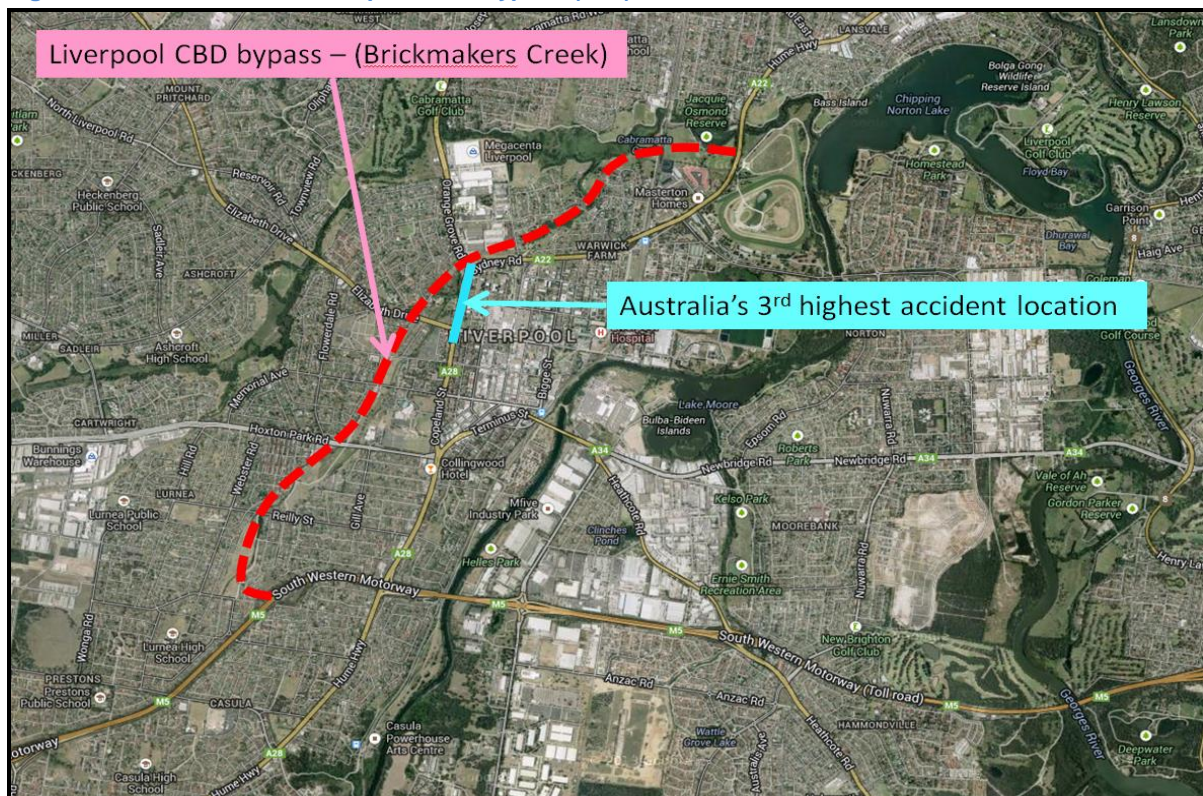
4.8 Possible new Liverpool CBD bypass

Liverpool CBD bypass: MIC is investigating “measures to prevent other traffic impacts, like ‘rat-running’”. ⁽¹¹⁾

This translates to a Liverpool CBD bypass along Brickmakers Creek that would solve having such a high number of Intermodal trucks traversing Australia’s third highest accident hot spot.

However, building a bypass through an old creek bed, and established parkland, will require not only sound engineering skills, but also very good environmental impact statements.

Figure A4 6 Possible new Liverpool CBD bypass (MIC)

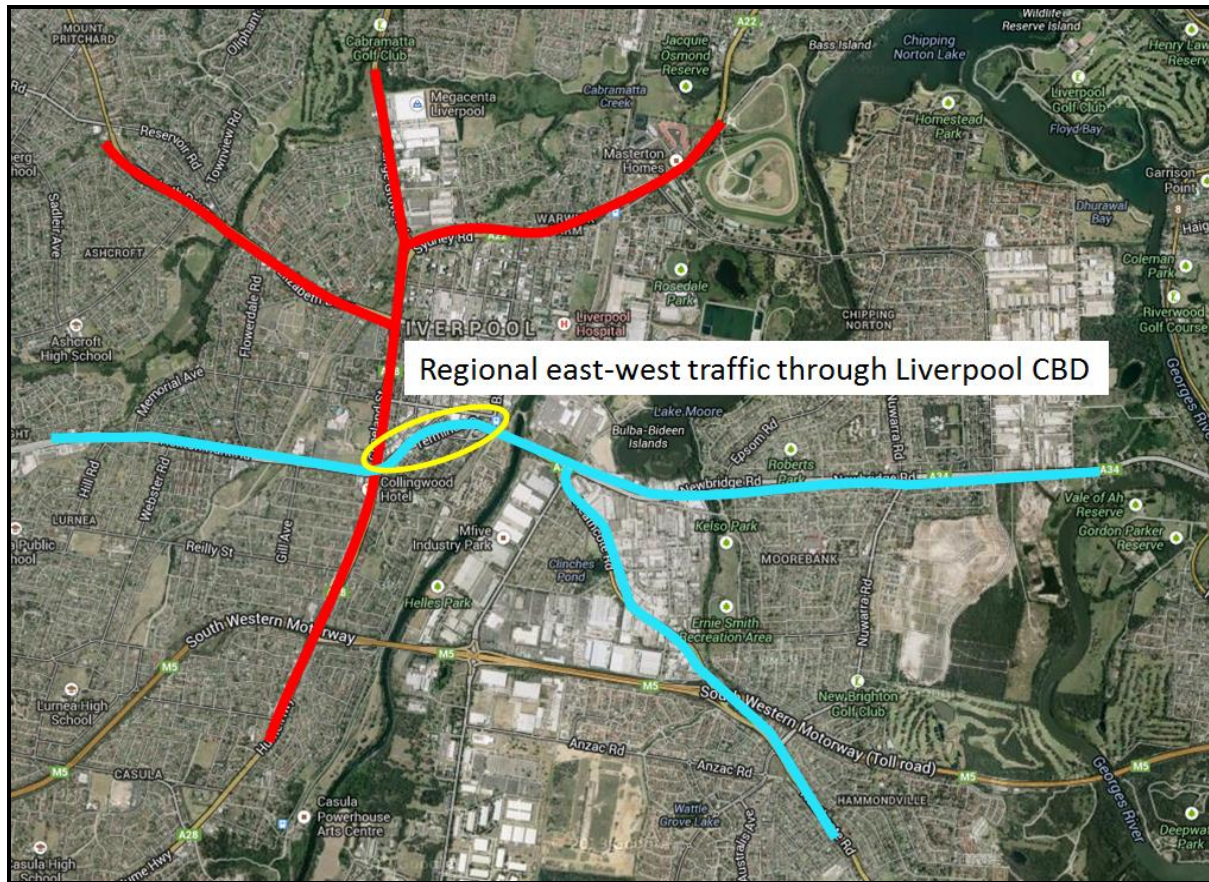




4.9 Macquarie St – Terminus St congestion

Macquarie St – Terminus St carries the region's east-west traffic through the Liverpool CBD. Travel time surveys showed that the average speed is 18km/hr, while it has a sign-posted speed: 60km/hr (2010). This compares with a typical bicycle speed of 15km/hr.

Figure A4 7 East-west traffic through Liverpool CBD. Surveyed speed: 18/km, sign posted: 60km/hr

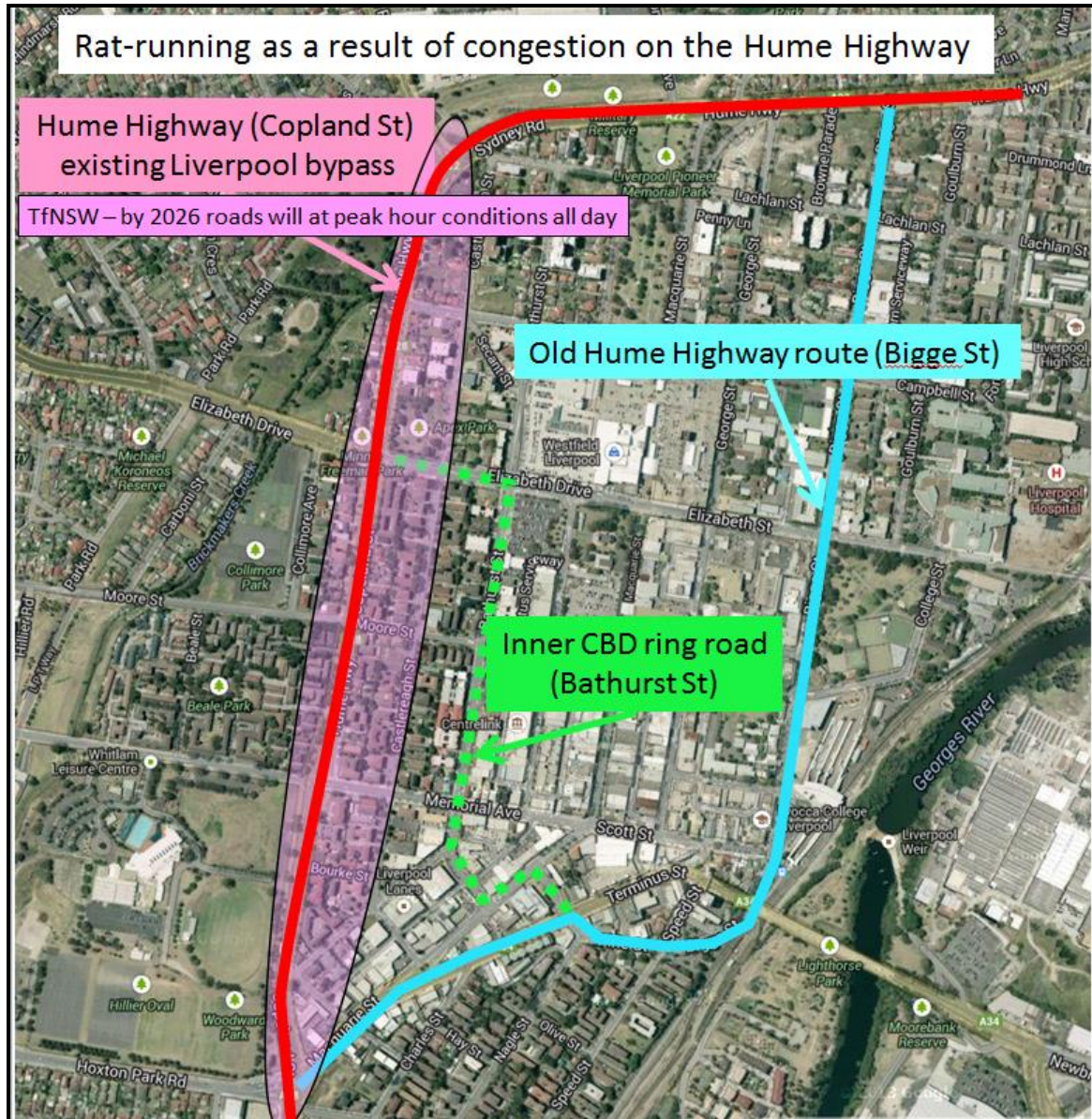




4.10 Bigge St – Terminus St - resolving the rat-run through Liverpool CBD

Bigge St – Terminus St is likely to experience an increase in rat-running traffic because of the additional congestion on Copeland St. Other streets such as Bathurst St may similarly be impacted.

Figure A4 8 Possible rat-running as a result of more congestion on the Hume Highway



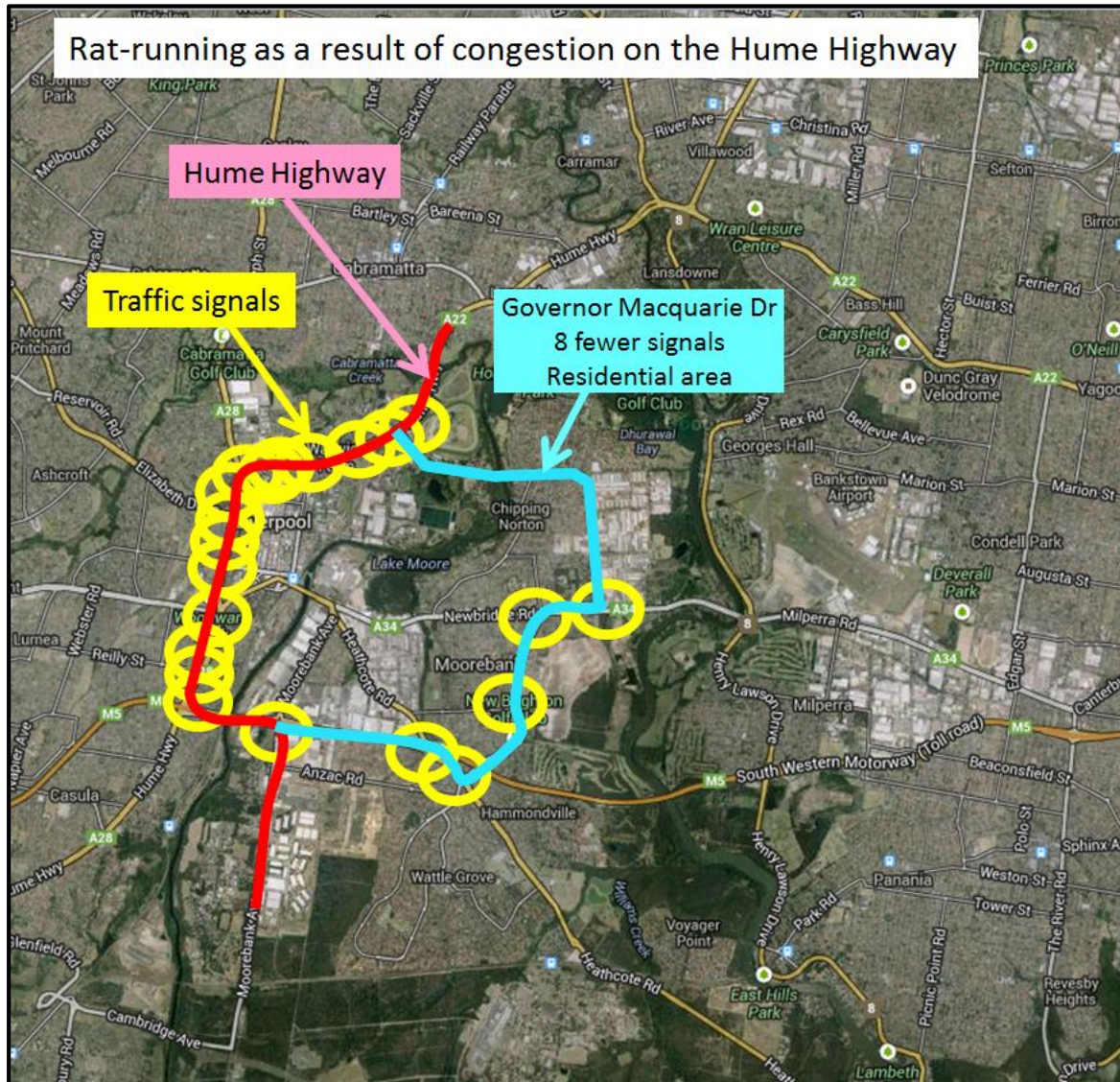
The Intermodal trucks may stay on the Hume Highway, but the cars will have more choice and some of these will choose the rat-runs.



4.11 Governor Macquarie Dr though residential area in Chipping Norton

Governor Macquarie Dr is likely to experience an increase of both truck and car traffic because of the congestion on the Hume Highway.

Figure A4 9 Rat-running as a result of congestion on the Hume Highway



Governor Macquarie Dr is an unofficial link between the Hume Highway and Newbridge Rd. The link passes through residential areas of Moorebank and Chipping Norton, has a 2-lane bridge over the Georges River and passes through Australia's premier horse racing industry.

Local development applications in Warwick Farm have shown that the Hume Highway – Governor Macquarie Dr has serious network capacity issues, and in addition, Munday St, which is mainly used by the industrial area and the horse racing industry, has serious issues of access to Governor Macquarie Drive and then the Hume Highway.



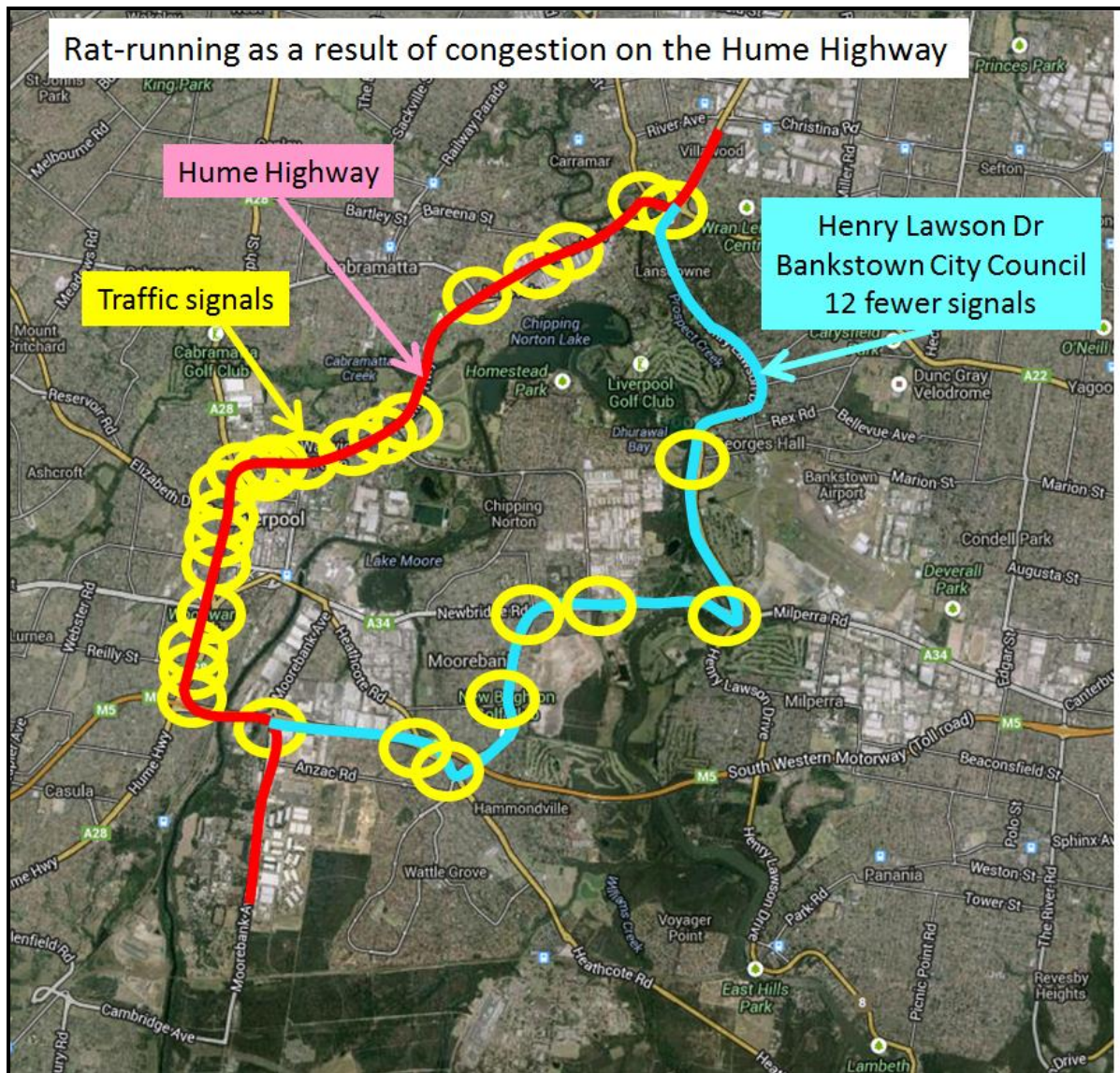
4.12 Henry Lawson Dr between Milperra Rd and Hume Highway

Henry Lawson Dr between Milperra Rd and Hume Highway needs upgrading. ⁽⁸⁾

There are two paths between the Moorebank Intermodal and Woodville Rd: (1) the Hume Highway, and (2) Henry Lawson Dr.

The Henry Lawson Dr path has 12 fewer signalised intersections. For a driver of a loaded B-double or B-triple that must be a distinct advantage.

Figure A4 10 Rat-running as a result of congestion on the Hume Highway





4.13 Nuwarra Rd – between Heathcote Rd and Newbridge Rd

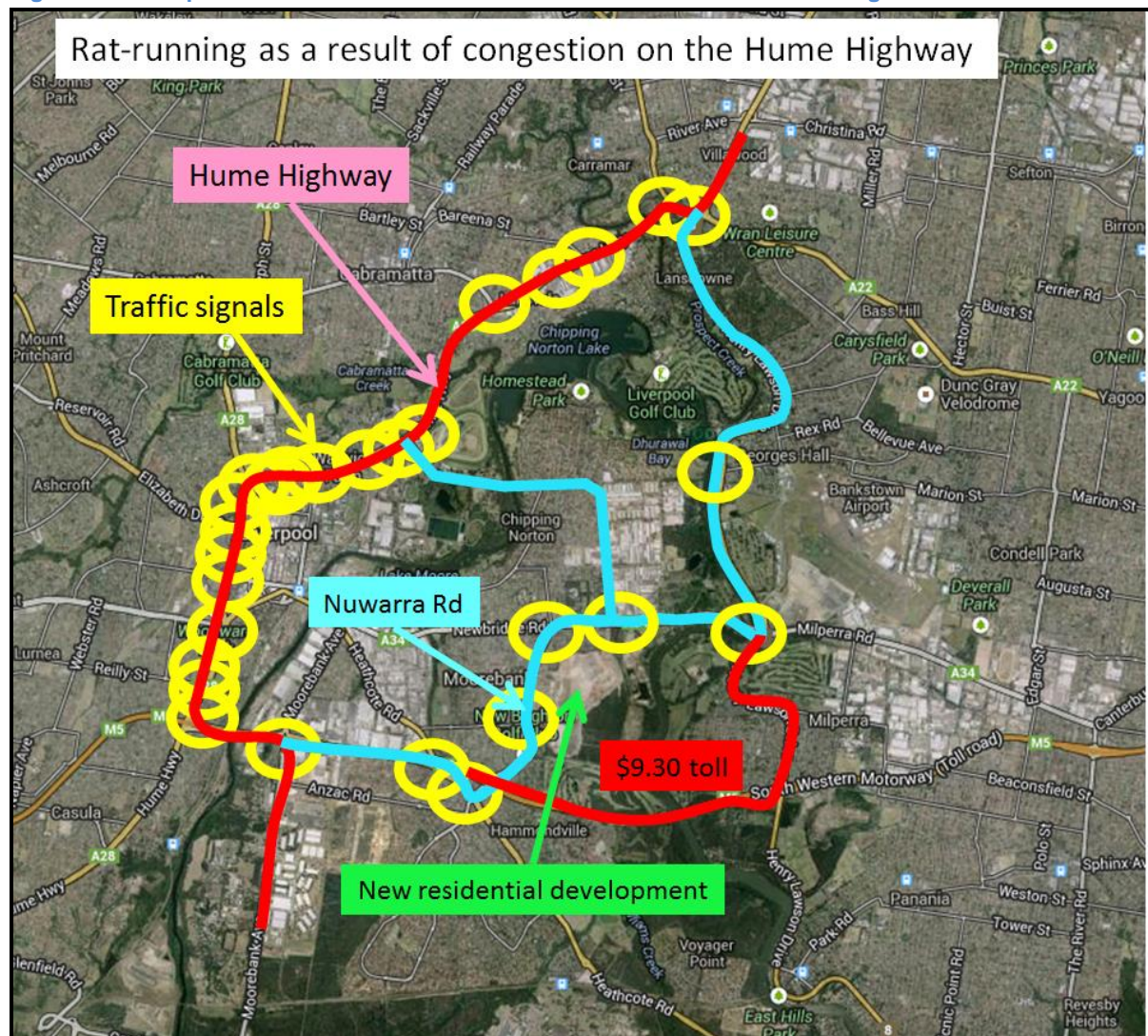
Nuwarra Rd – between Heathcote Rd and Newbridge Rd.

Traffic use Nuwarra Rd to avoid the \$9.30 toll on the M5 Motorway.

Nuwarra Rd is a 2-lane roadway with right turning bays. A very new residential development is being developed which has access point onto Nuwarra Rd.

For truck operators who wish to avoid the heavy congestion of the Hume Highway, this path will lead to the 'short-cut' to Governor Macquarie Dr and Henry Lawson Dr (see Figure A5 11 below).

Figure A4 11 Impact on Nuwarra Rd for local residents as a result of rat-running



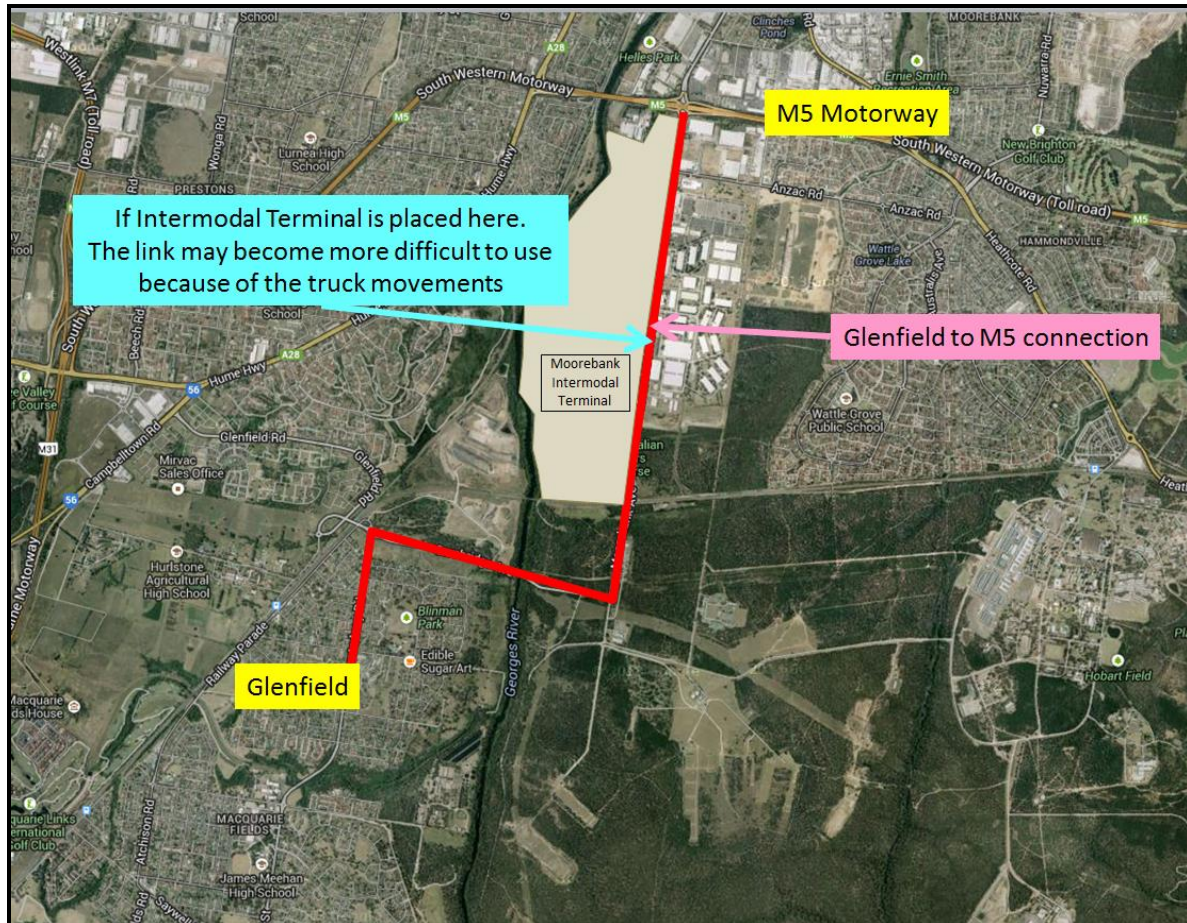


4.14 Glenfield to M5 Motorway link

Glenfield to M5 Motorway link

Moorebank Av is currently part of the Glenfield to M5 connection. If the Intermodal is built, it will have dramatic impacts on this link.

Figure A4 12 Glenfield to the M5 Motorway connection





4.16 Intersections that may require grade separation (overpass – underpass)

4.16.1 Hume Highway – Hoxton Park Rd – Macquarie St

The north-south regional traffic on the Hume Highway crosses the east-west traffic on Hoxton Park Rd – Macquarie St. Therefore, it is a major intersection in the regional network.

The double right hand turn bay from the Hume Highway into Macquarie St was constructed to have a queue length as long as physically possible. At the time of its initial design it was known that the expected queue length was going to be extraordinary long. The modelling indicated that the queue length should be significantly longer than was physically possible.

The TfNSW is advocating the construction of the west facing ramps to ease the traffic conditions on the M5 Bridge and Moorebank Av.

One of the effects of this “improvement” will be transferring the Liverpool CBD bound traffic from Moorebank Av onto the Hume Highway. This transferred traffic now has to negotiate a double right hand turn, which is currently operating over capacity.

A recent improvement under the RMS’s pinch point program has had only a marginal improvement on the operations of the intersection.

If the SIMTA modelling is correct, then 27% of the Intermodal traffic is going to use this intersection. The TfNSW estimates that the truck generation rate is 10 times higher than SIMTA’s estimate.

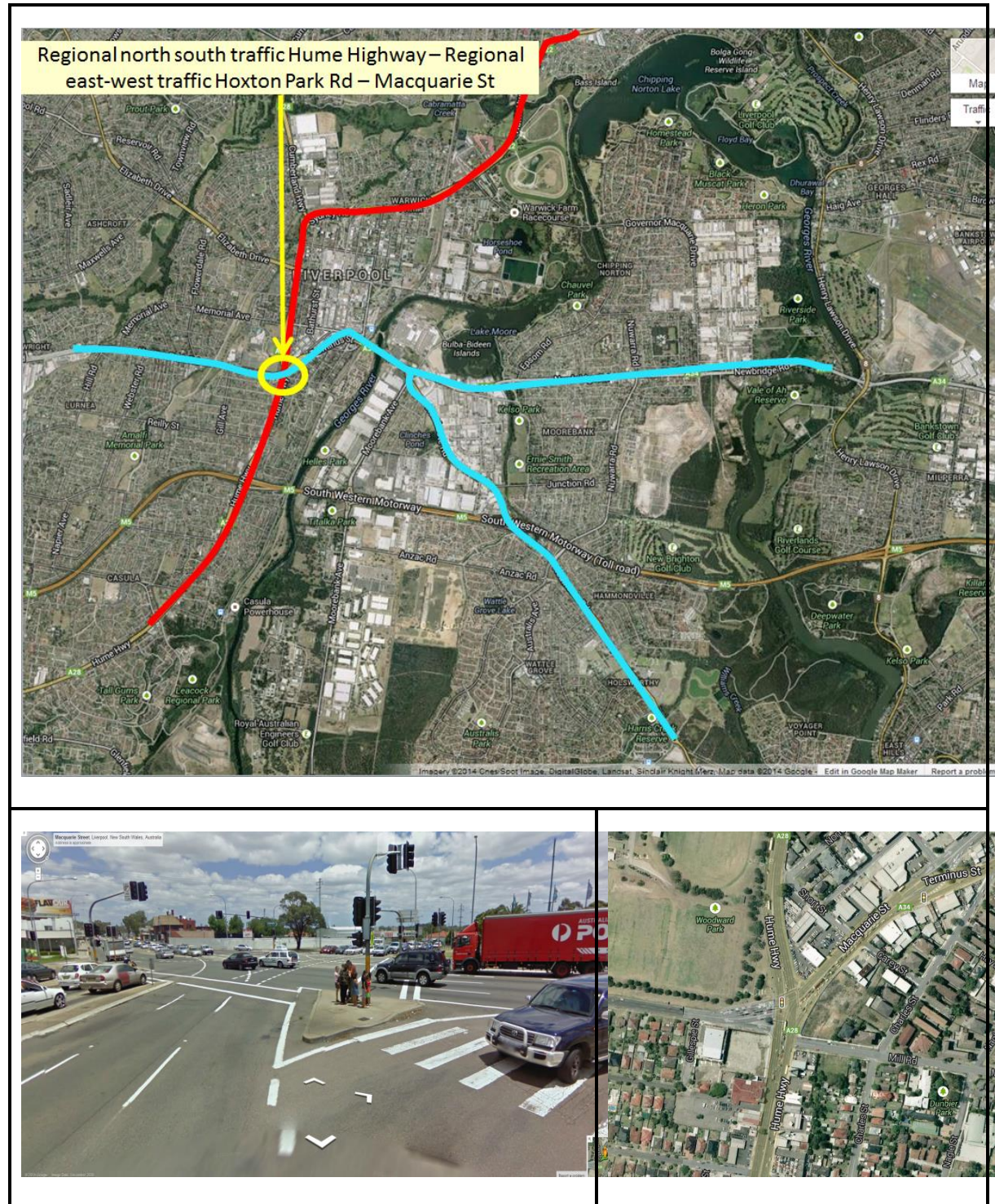
If both these estimates are correct, it translates to about ¾ of the current Port Botany truck traffic travelling through this intersection. See Figure A5 14 below.

If this were the case, a very different engineering solution will be required. This intersection will most likely require the separation of the north-south and east-west traffic. Given that the loaded B-doubles and B-triples require gentle slopes and wide curvatures, land-resumption may possibly be required.

Since this is a major road, any construction of such a massive structure can only be done during off peak time. This will add up to massive amounts of taxpayer money.



Figure A4 14 Critical intersection in the network - expected to be very heavily used by Intermodal traffic





4.16.2 Hume Highway – Henry Lawson Dr

The east-west regional traffic on the Hume Highway crosses the north-south traffic on Henry Lawson Dr - Woodville Rd. This is a major intersection in the regional network.

The intersection is locally known as the “meccano set”, from the overhead structure. Bankstown Council has indicated that this intersection, which already has long queues, will need to be upgraded to a grade separated intersection.

Figure A4 15 Critical intersection - expected to be heavily used by the Intermodal traffic



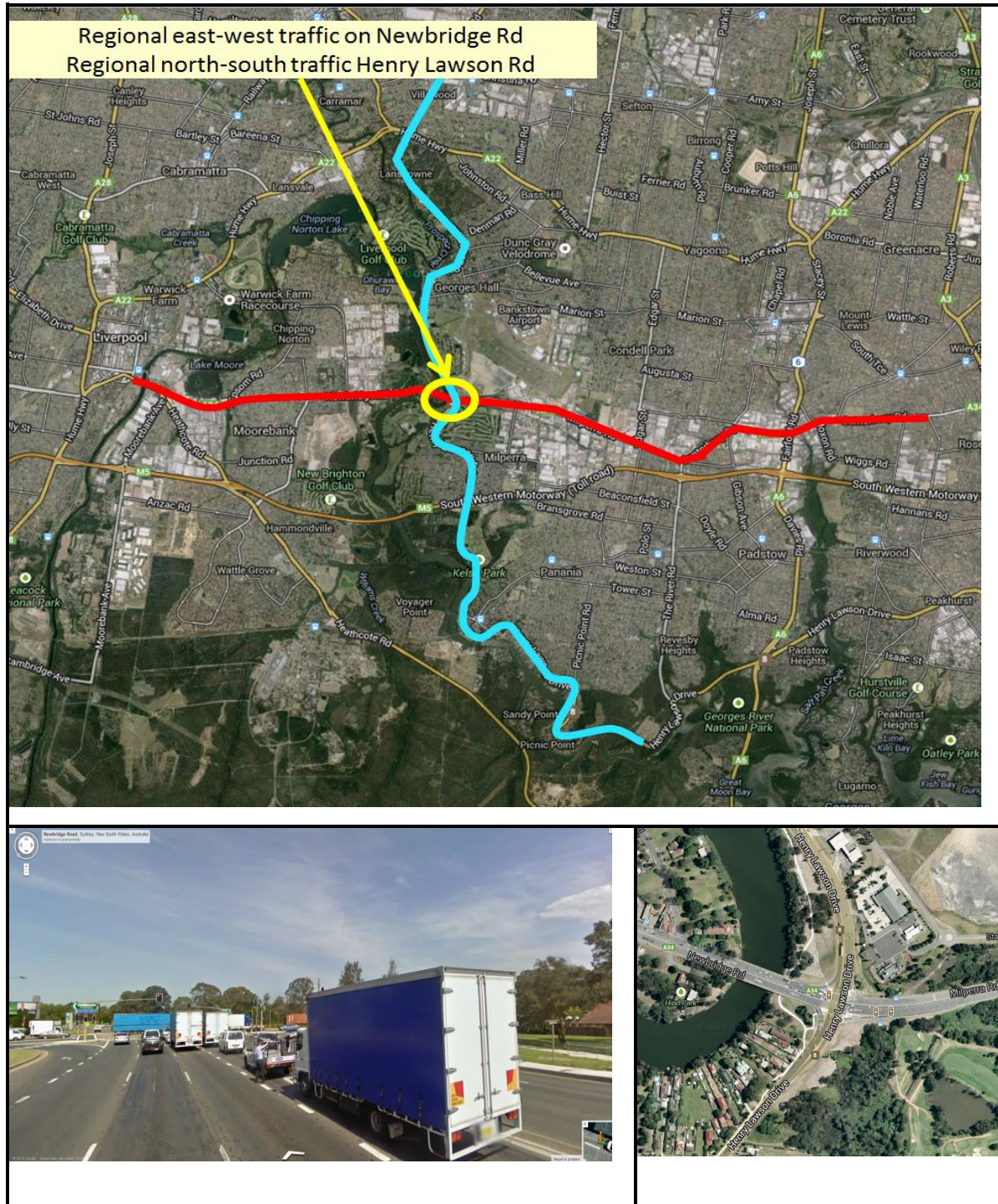


4.16.3 Milperra Rd – Henry Lawson Dr

The north-south regional traffic on the Henry Lawson Dr crosses the east-west traffic on Newbridge Rd. This is a major intersection in the regional network.

Bankstown Council has indicated that this intersection, which already has long queues, will need to be upgraded to a grade separated intersection.

Figure A4 16 Critical intersection - expected to be heavily used by the Intermodal traffic





5.17 Very complex Intersections

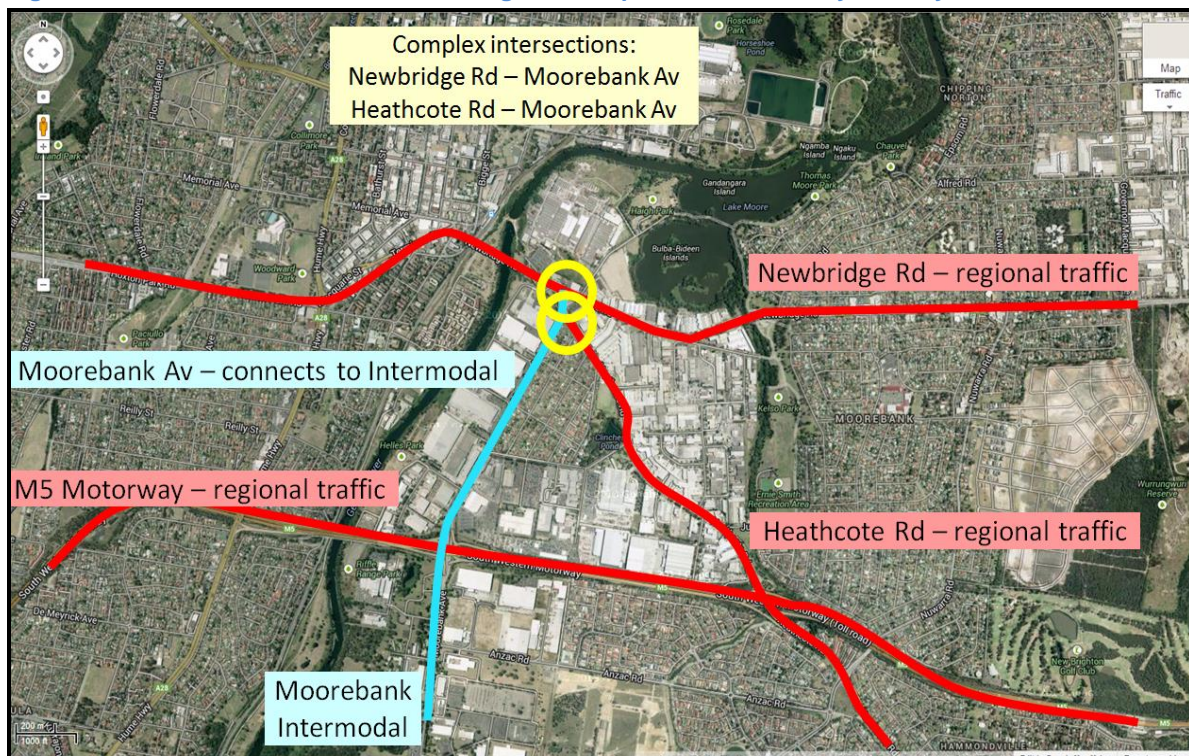
5.17.1 Moorebank Av – Newbridge Rd and Moorebank – Heathcote Rd Intersections

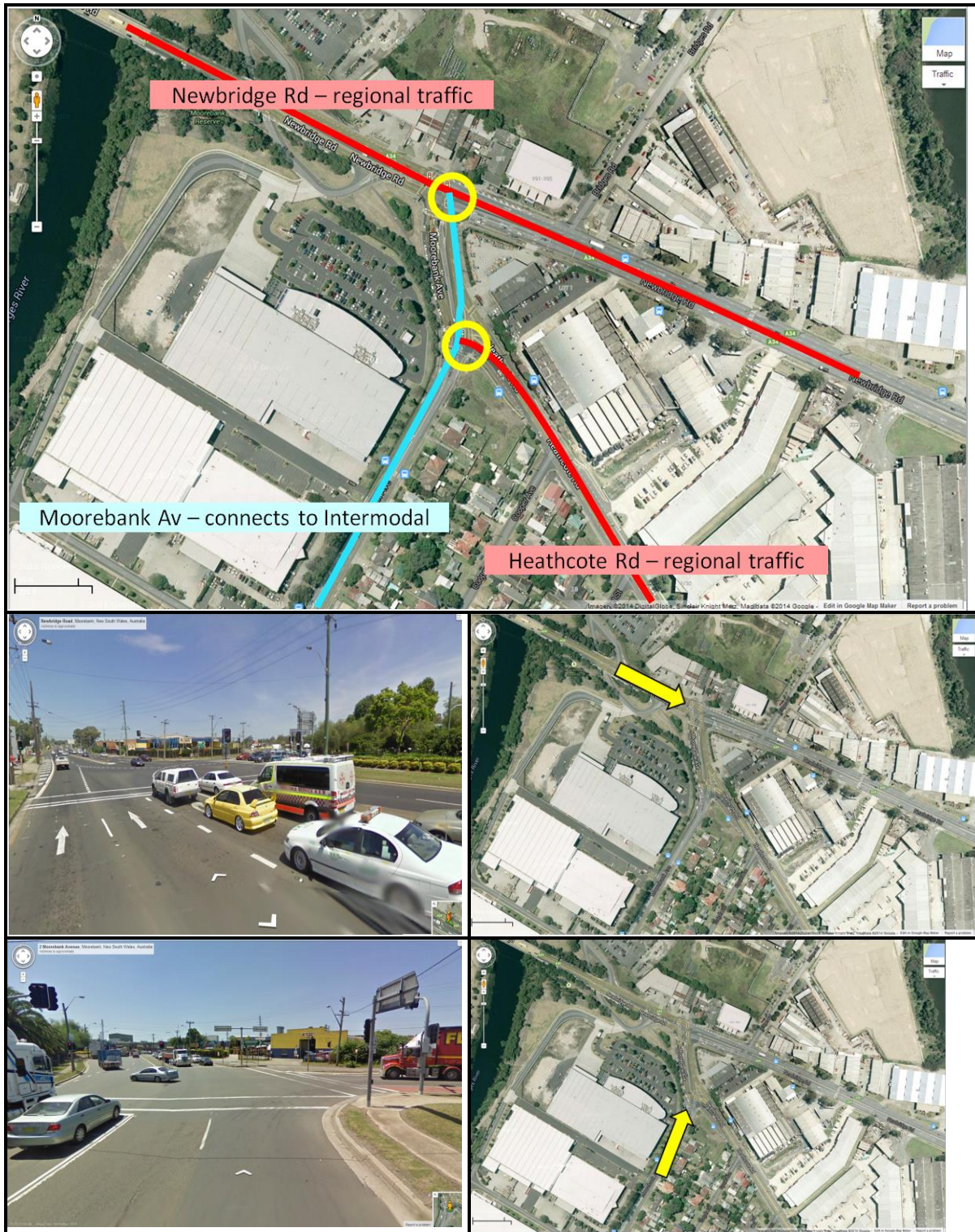
The Moorebank Av – Newbridge Rd and Moorebank – Heathcote Rd intersections are very close together.

Newbridge Rd is a major east-west route, and Moorebank Av is a major north-south route. Bus priority schemes operate on these two intersections.

The section on Moorebank Av, between Newbridge Rd and Heathcote Rd is used by both the regional traffic and the local traffic wishing to access the M5.

Figure A4 17 Critical intersections close together - expected to be heavily used by Intermodal traffic





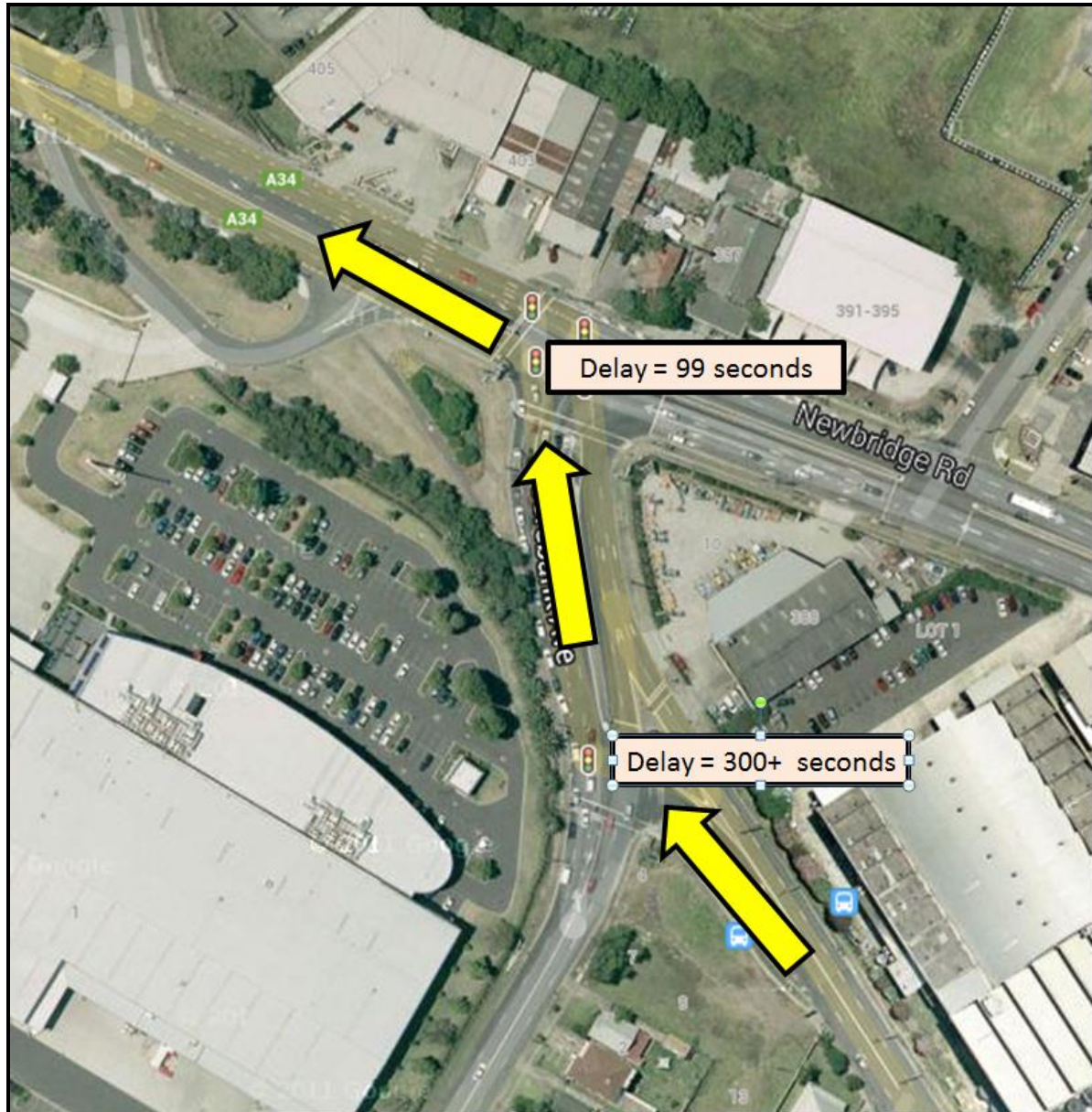
During the investigation of the M5 Motorway widening project, these intersections were identified as having extremely poor operating characteristics.

Any local resident knows that the queues on the Moorebank Av approaching Newbridge Rd, affects the operation of the Moorebank Av – Heathcote Rd intersection.



The SIMTA EIS states that 18% of its traffic will traverse these intersections. This means that in the afternoon, a quick trip into Liverpool, would take over 400 seconds (5 minutes and 40 seconds) from Heathcote Rd to Liverpool CBD.

Figure A4 18 SIMTA modelled delays for PM peak with SIMTA traffic



There is nearly a 7-minute delay through these intersections alone.



4.17.2 Newbridge Rd – Nuwarra Rd intersection

The intersection is on a hill, in a built-up area. The image below does not show this so well.

Commercial activity surrounds the intersection on the Nuwarra Rd side and a residential area on the opposite side.

Figure A4 19 Critical intersection - expected to be heavily used by Intermodal traffic



The SIMTA EIS states that with only the background traffic flowing through this intersection, there is an expected average vehicle delay of about 6 minutes and 15 seconds.

This delay is before the SIMTA traffic is added to the traffic flow calculations. The recycling plant being considered by the NSW Planning and Infrastructure, expects that about 50% of their trucks will use this intersection.



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