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

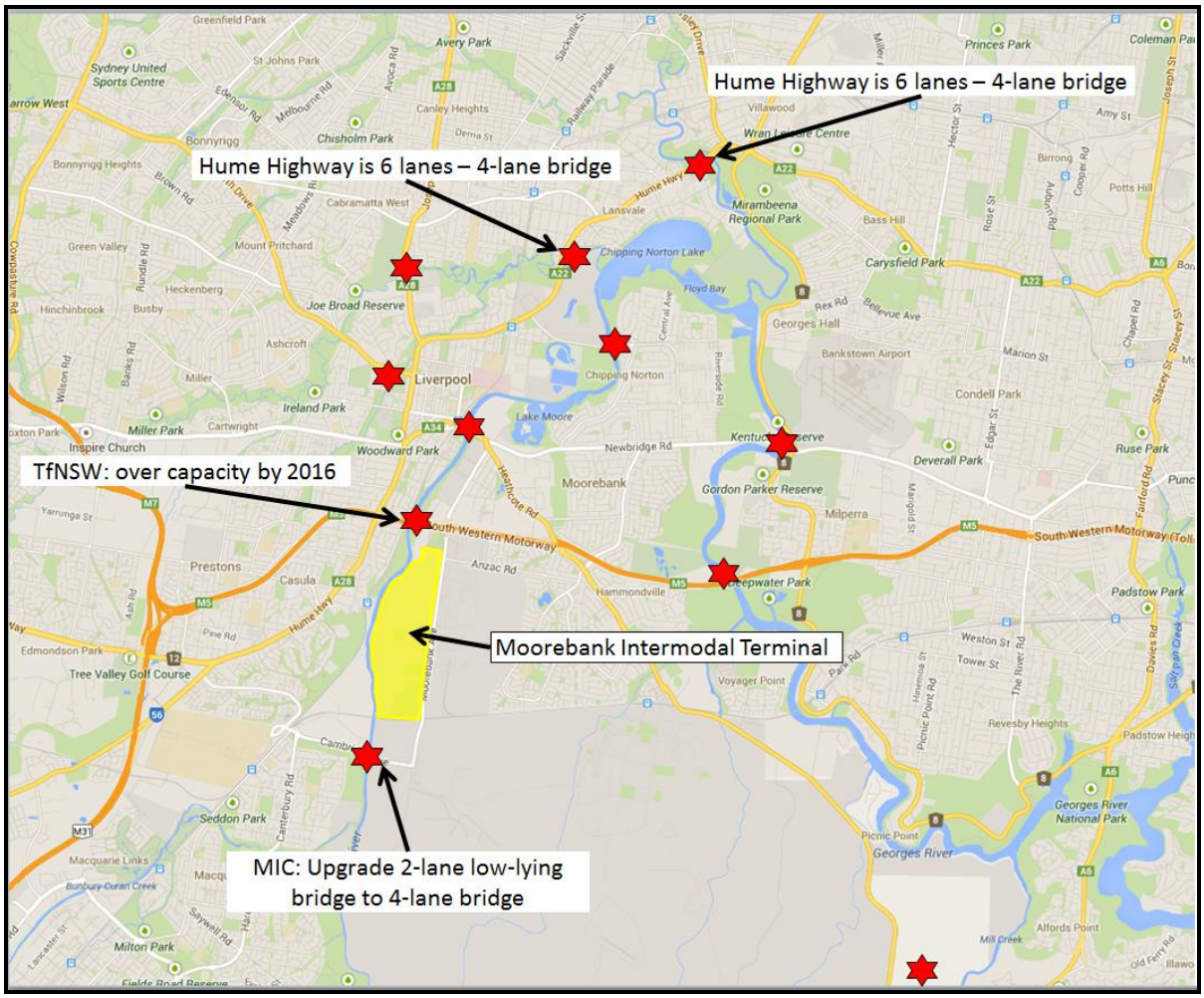
The site chosen for the Moorebank Intermodal is on an inland island in other words it is “landlocked” which means that every time a truck goes to or from the intermodal it must pass over at least one bridge, in many cases, two and three bridges need to be crossed.

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:

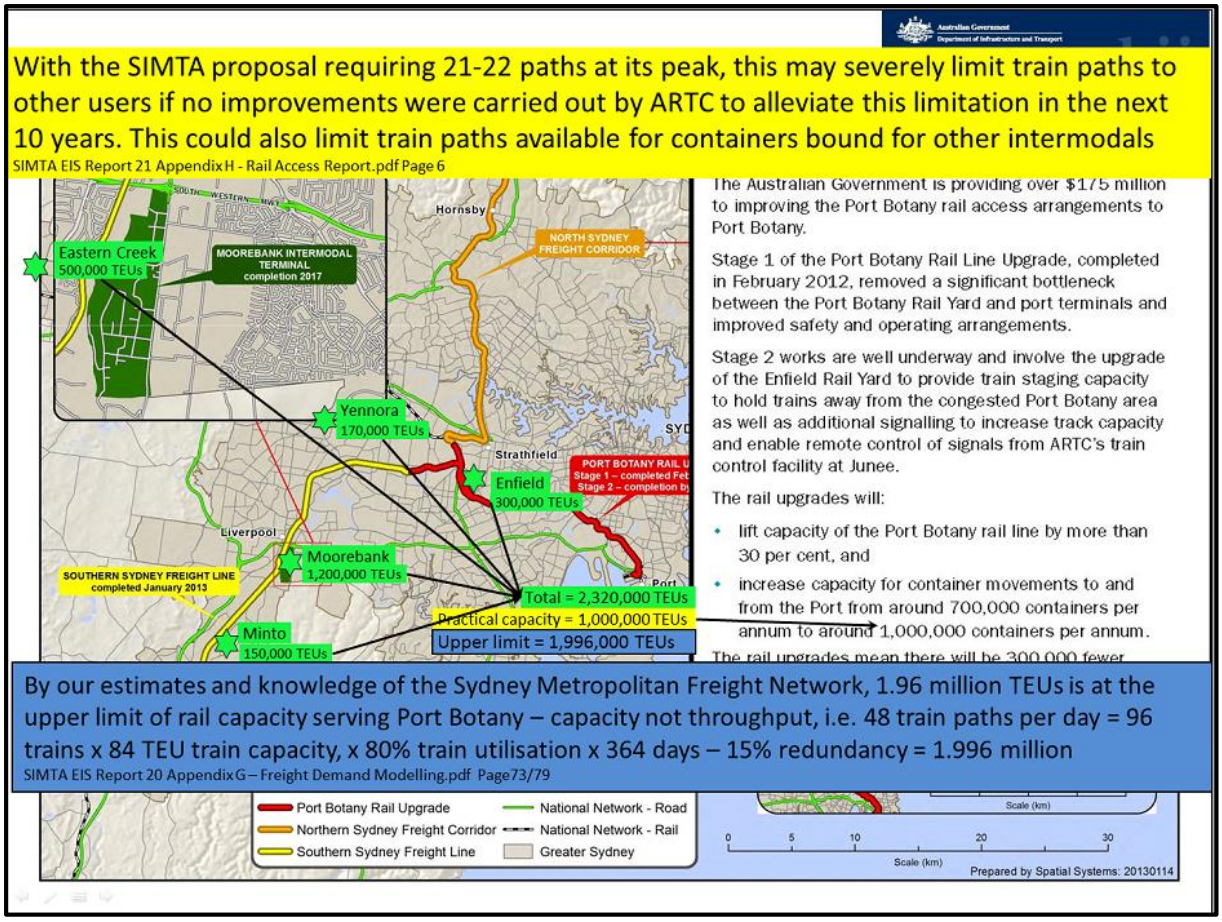
- Both the truck mode and the rail mode do not pay for their full costs. Therefore both modes are effectively subsidised by the taxpayer;
- The truck mode has fixed and variable costs. The variable cost depends on the distance;
- The rail mode contains three parts: (a) the train part, (b) the additional 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

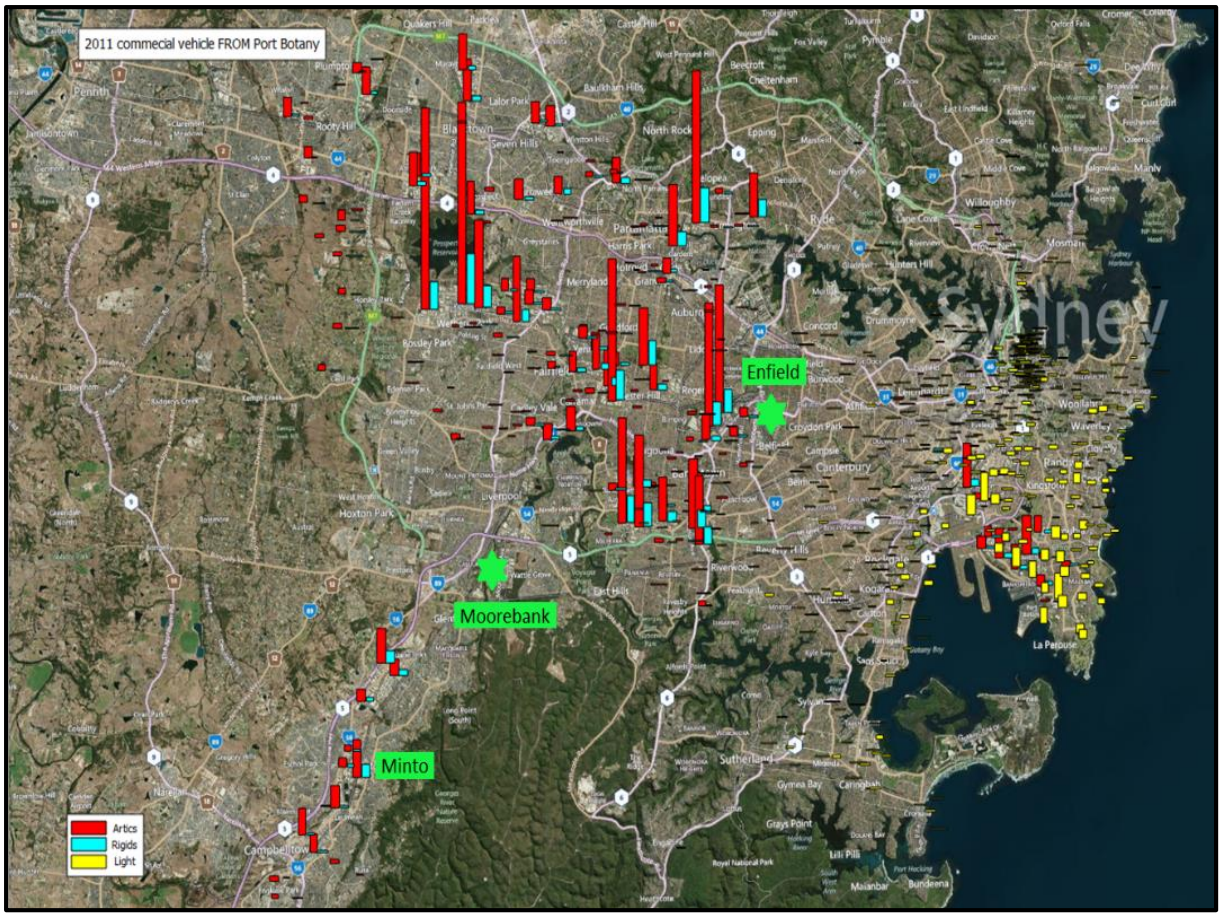
Freight Imports – trucks FROM Port Botany

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.

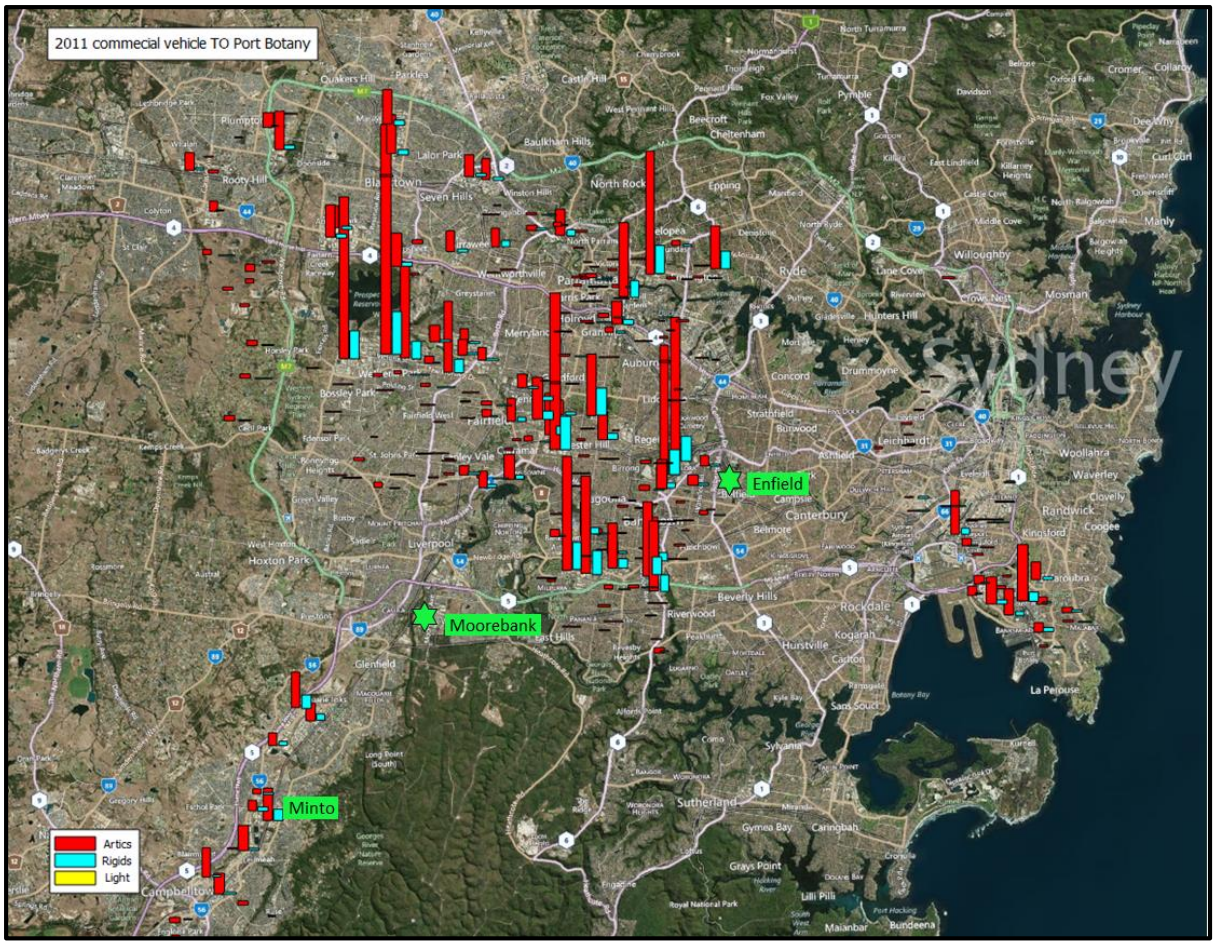
Freight Exports – trucks TO Port Botany

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.

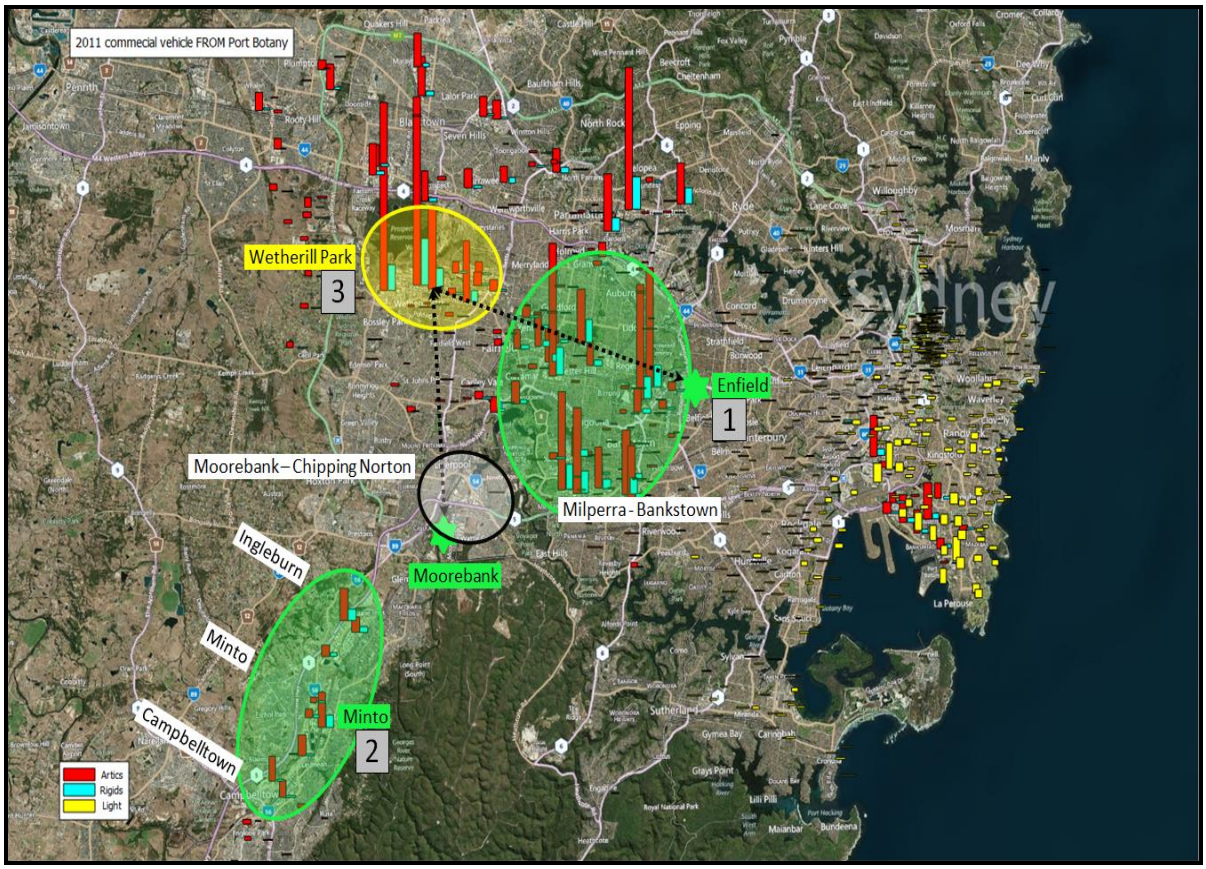
Ingleburn, Minto and Campbelltown market: See Figure 11 Green Oval 2.
The Minto Intermodal has recently been expanded. It now has a 150,000 TEU capacity, and ultimately it may have a 200,000 TEU capacity. Therefore

- 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 grow has remained almost the same since 2009.

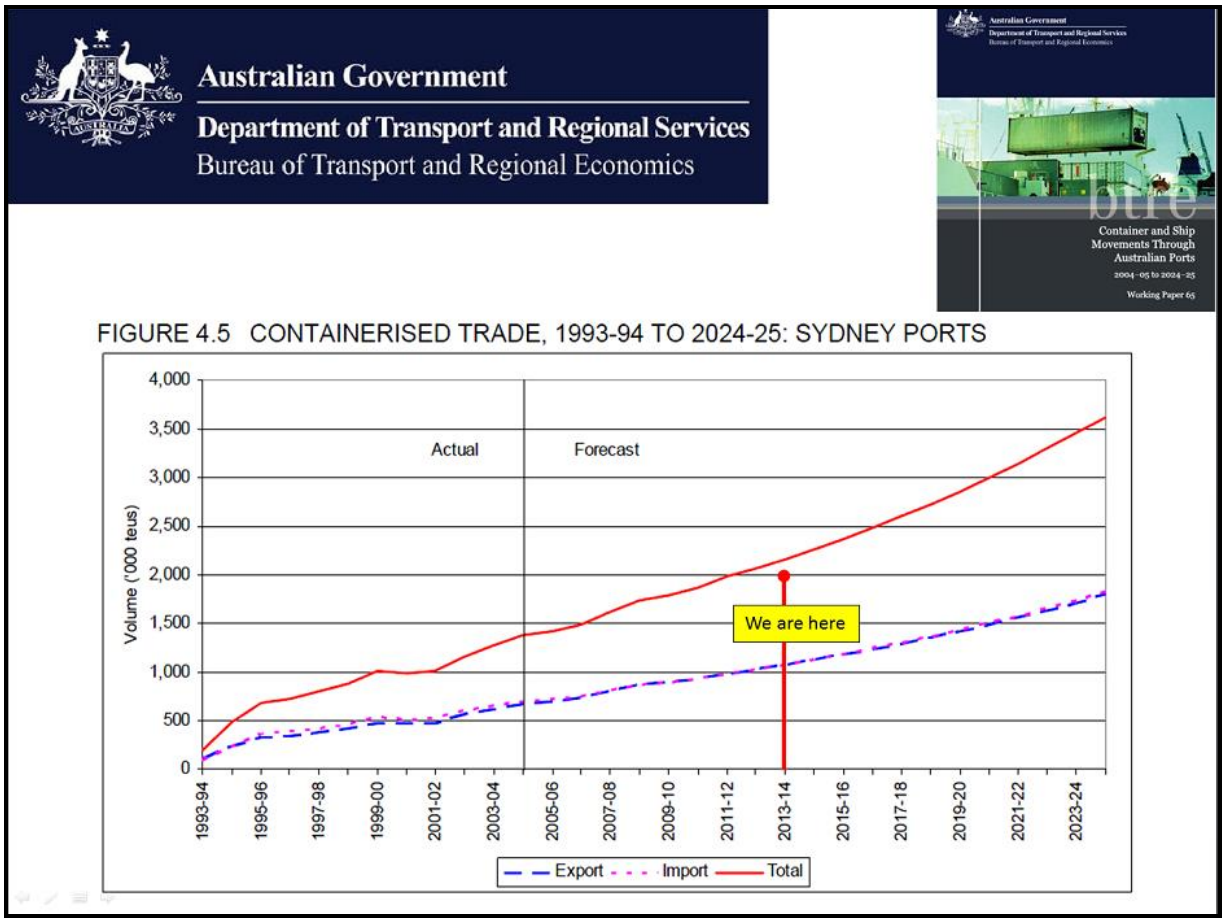
The Bureau of Transport and Regional Economics, Working Paper 65 [27] (BTRE) presents the national and port level forecasts of container and ship movements through Australian ports over the next twenty years, from when the report was published in 2005.

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.

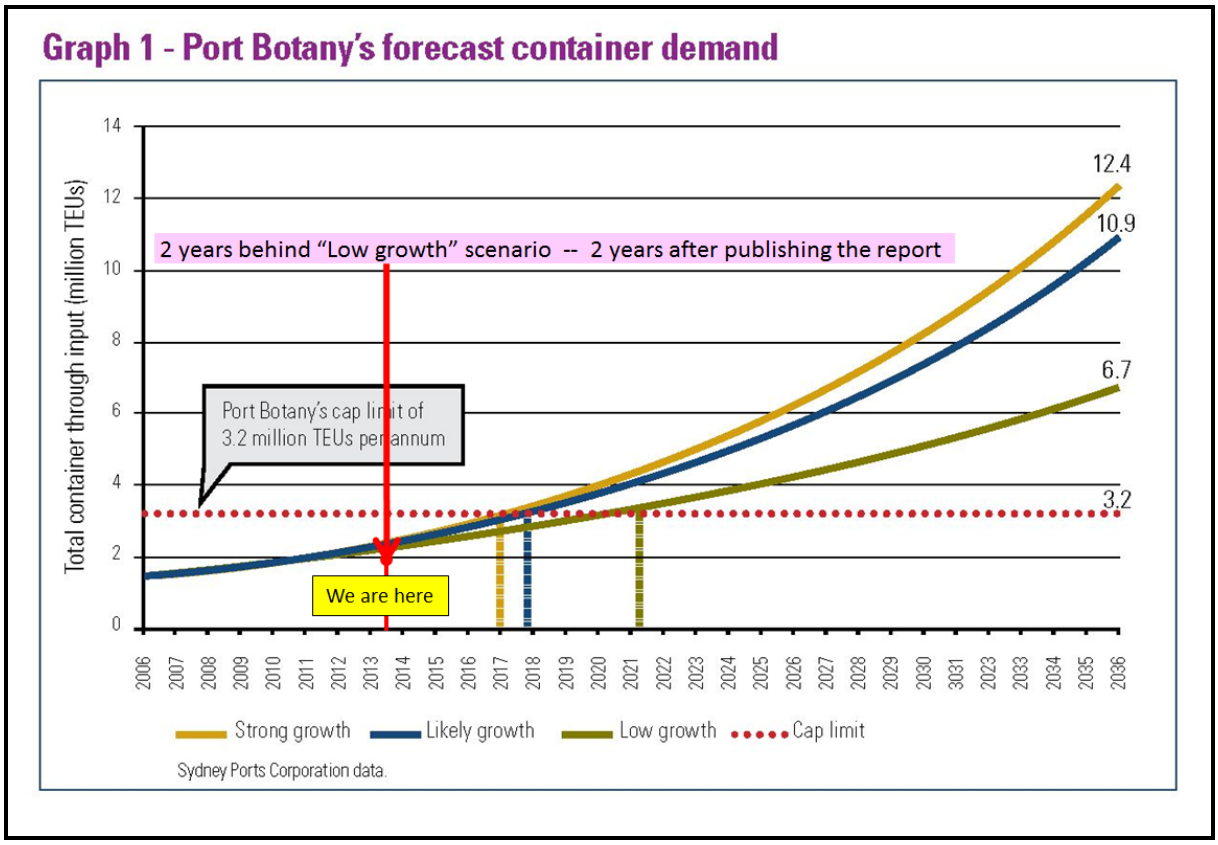
5.1.2 Sydney Ports freight estimates very optimistic

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.

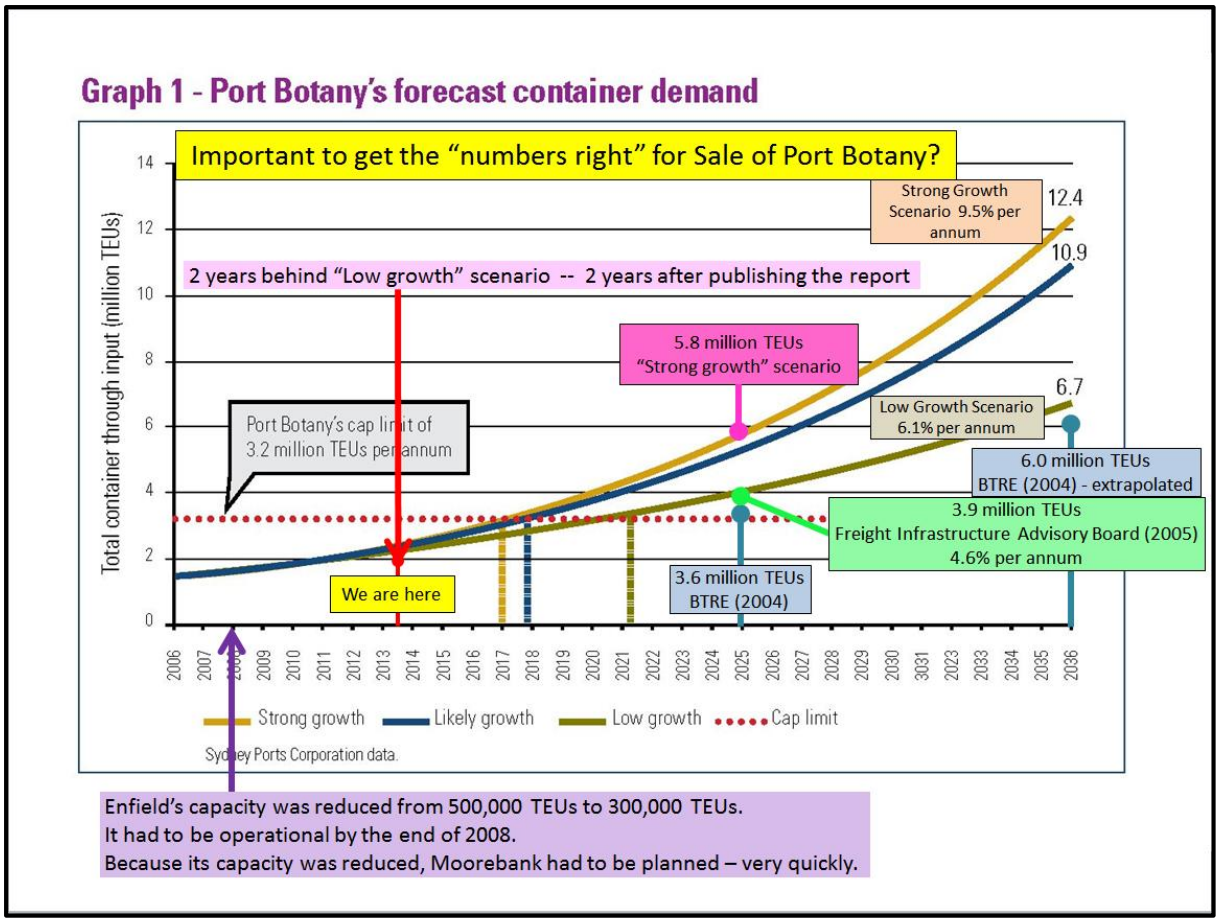
The authors speculate that the Sydney Ports numbers may have been produced simply using extrapolation techniques, rather than strong scientific analyses that the BTRE employed.

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.

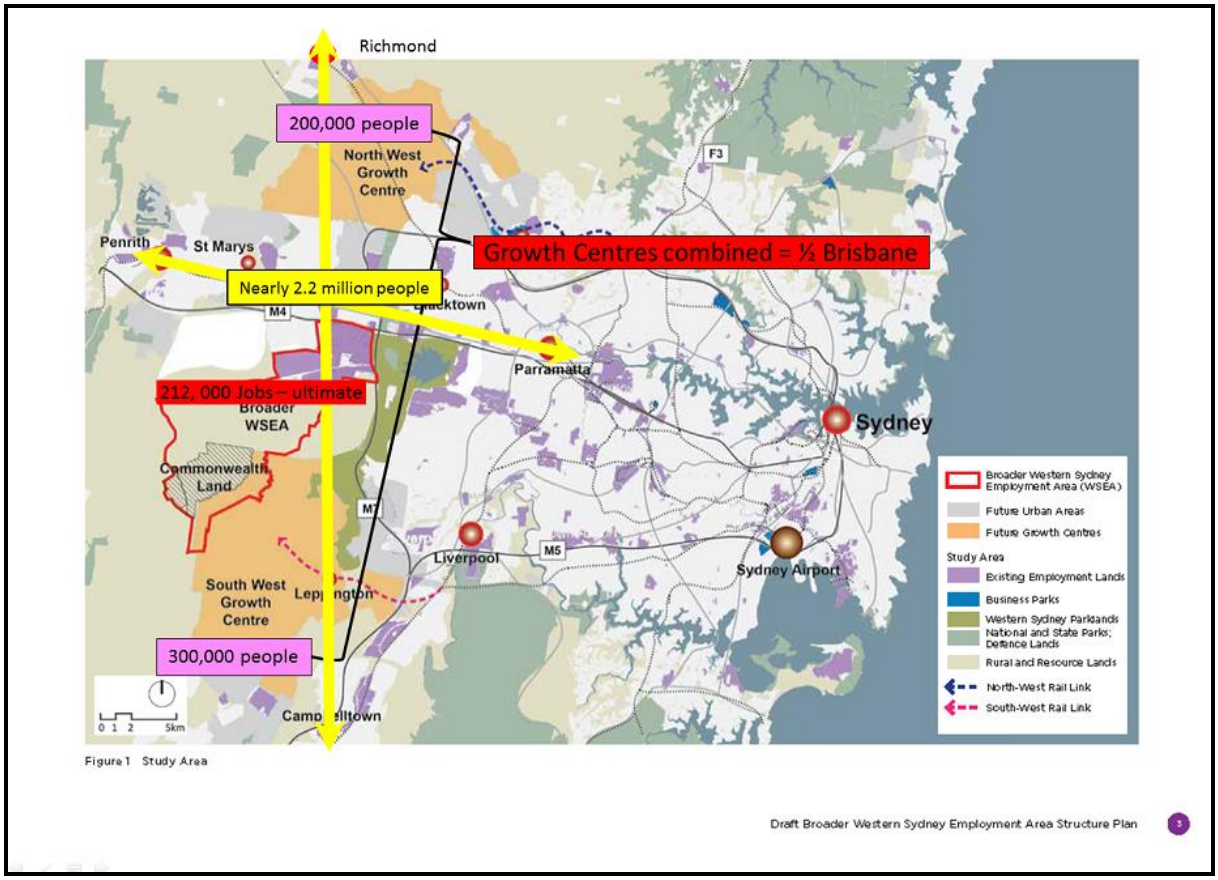
5.2 Future freight market

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.

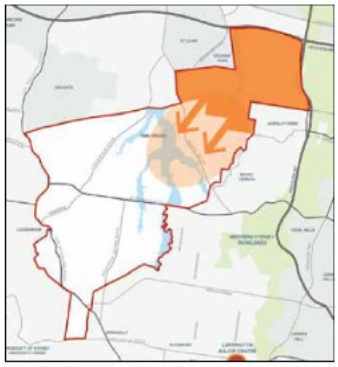


Figure 34 Single front staging scenario

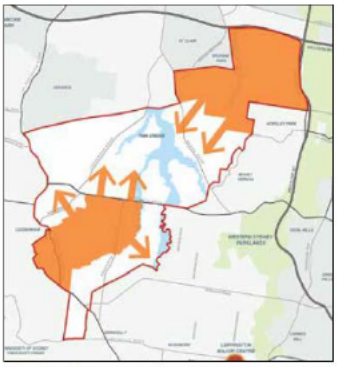


Figure 35 Two front staging scenario

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

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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.

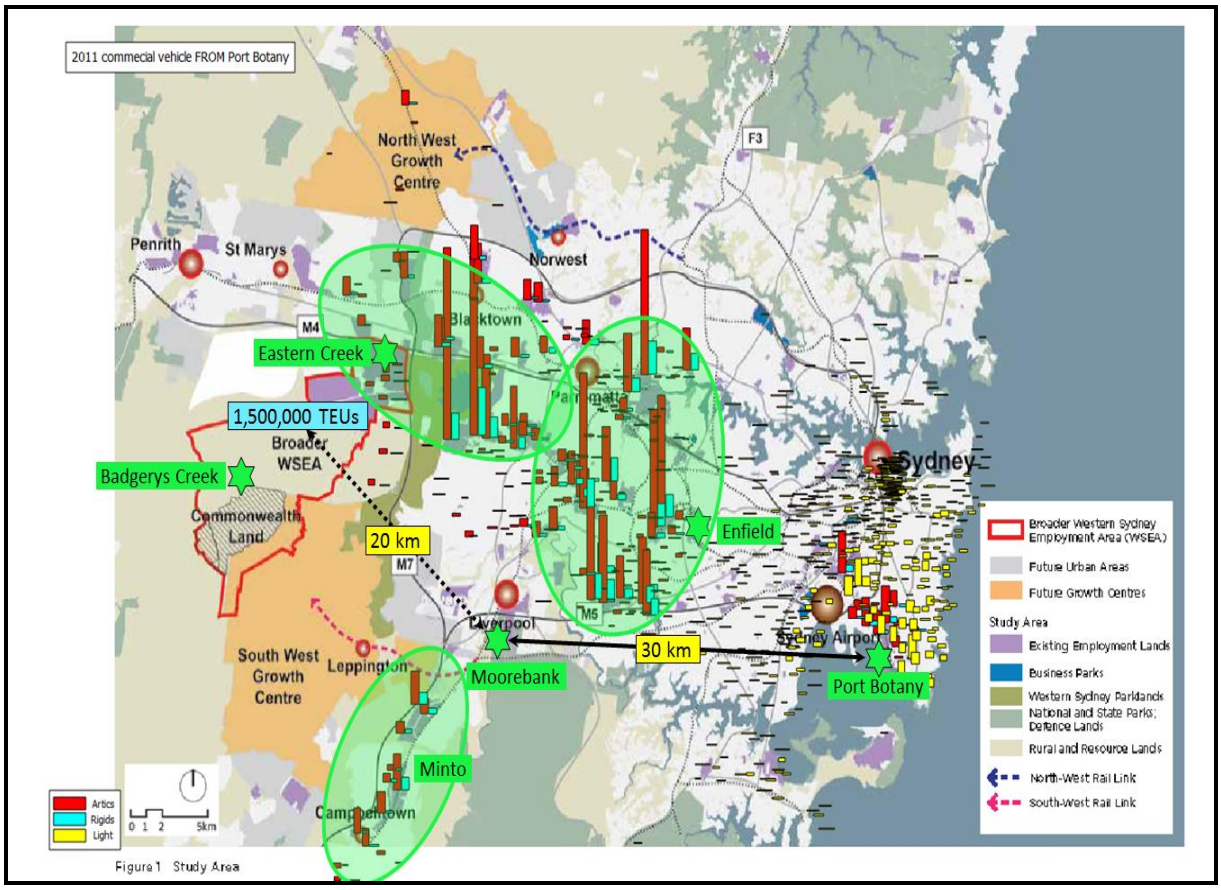
Figure 17 shows the existing truck movements from Port Botany on a typical day in 2011. The underlay of this plot shows the future North West and South West Growth Centres and the Broader WSEA.

- 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.

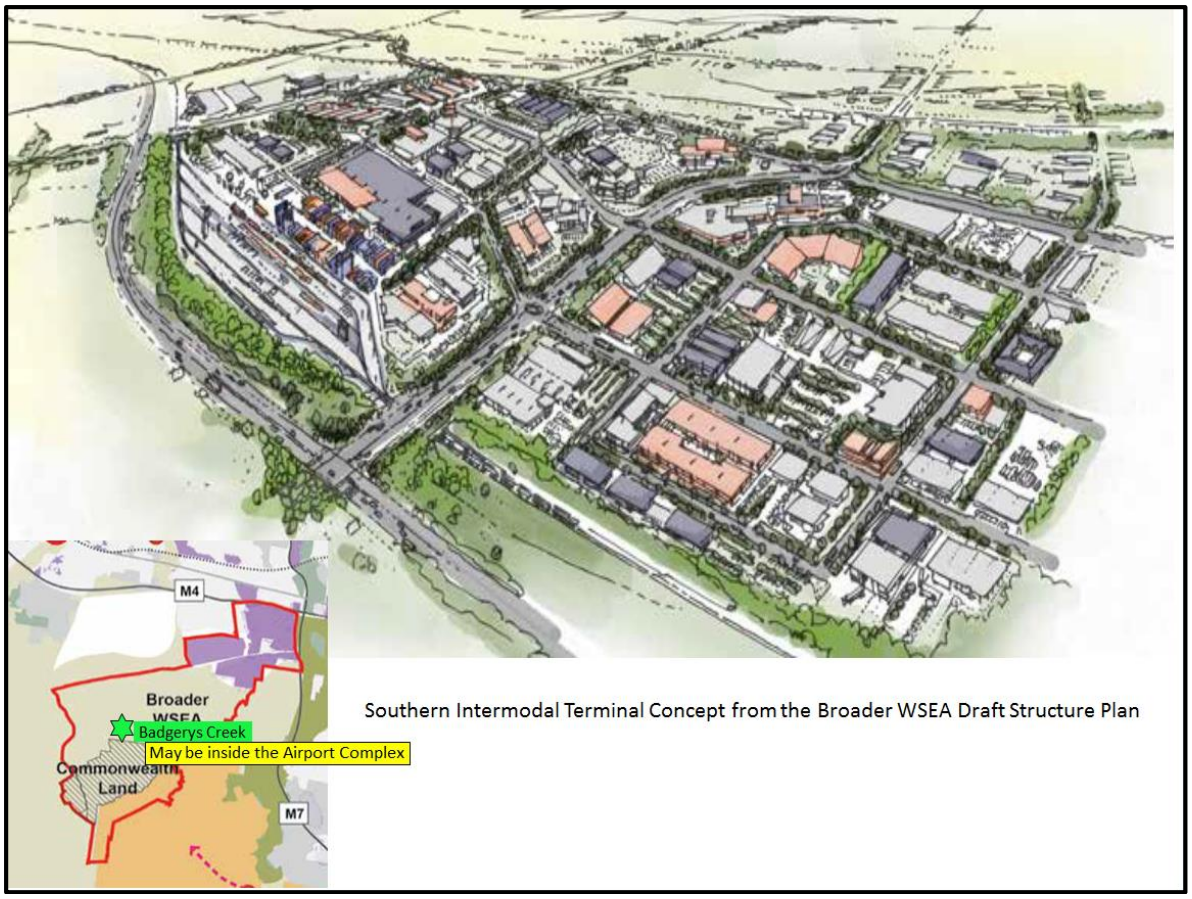
5.3 Potential locations for Intermodals

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



5.3.1Potential 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

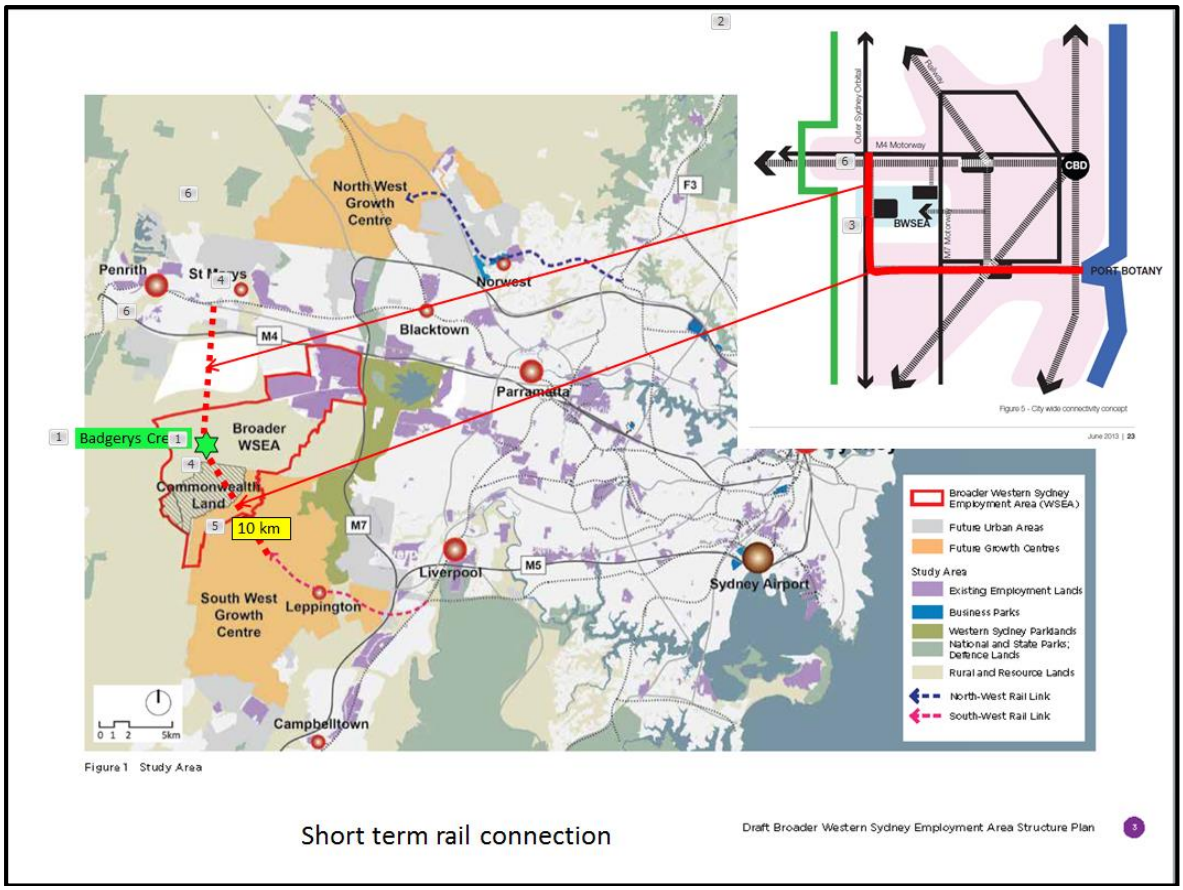
In the short term, the Eastern Creek Intermodal could be connected to the Western Line, and in the long term connected to the Southern Freight Line.

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

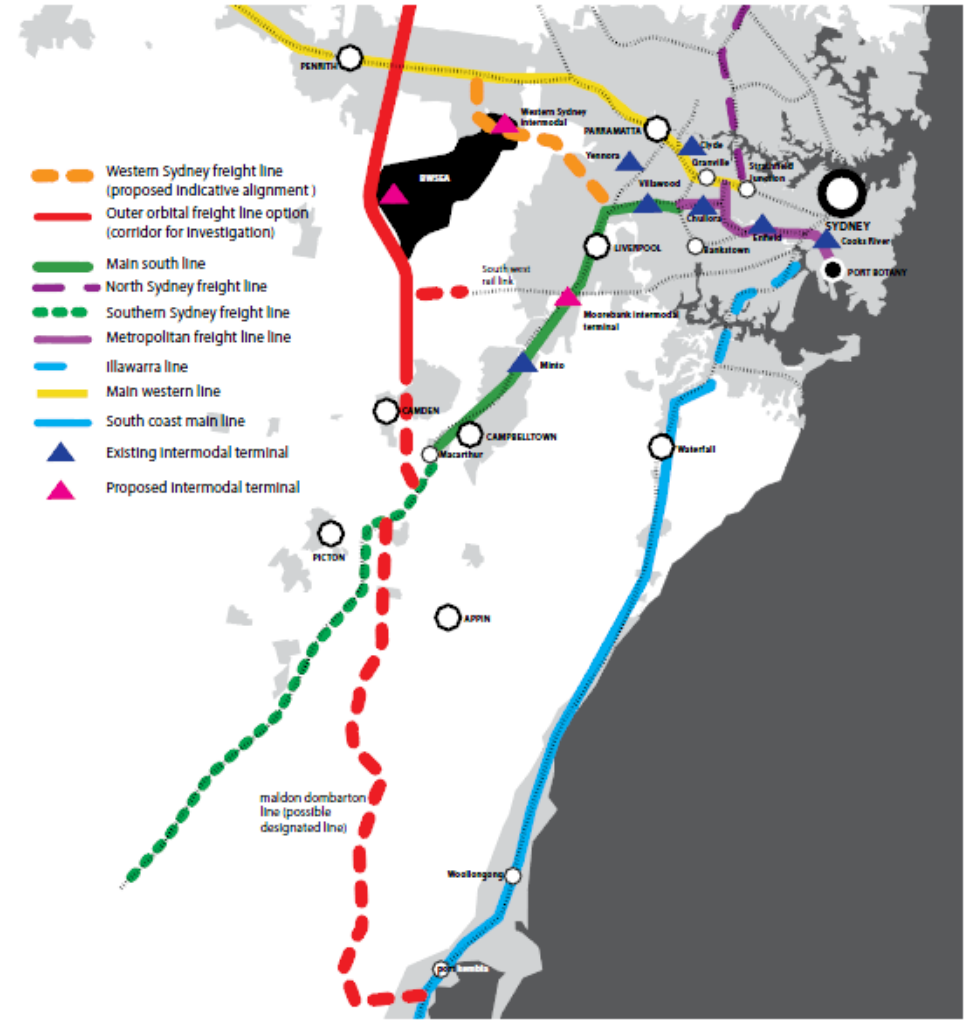


Figure 28 Potential freight and passenger rail network (source: GHD)

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

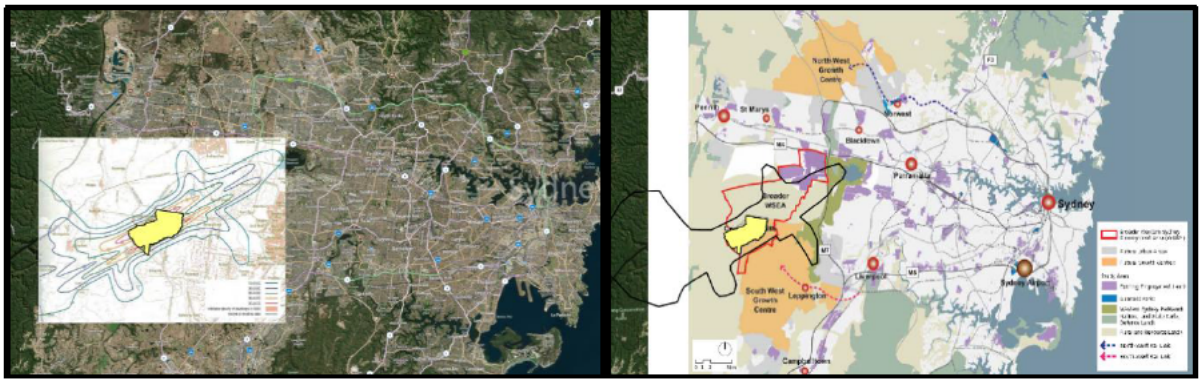
5.4 Badgerys Creek Airport

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.

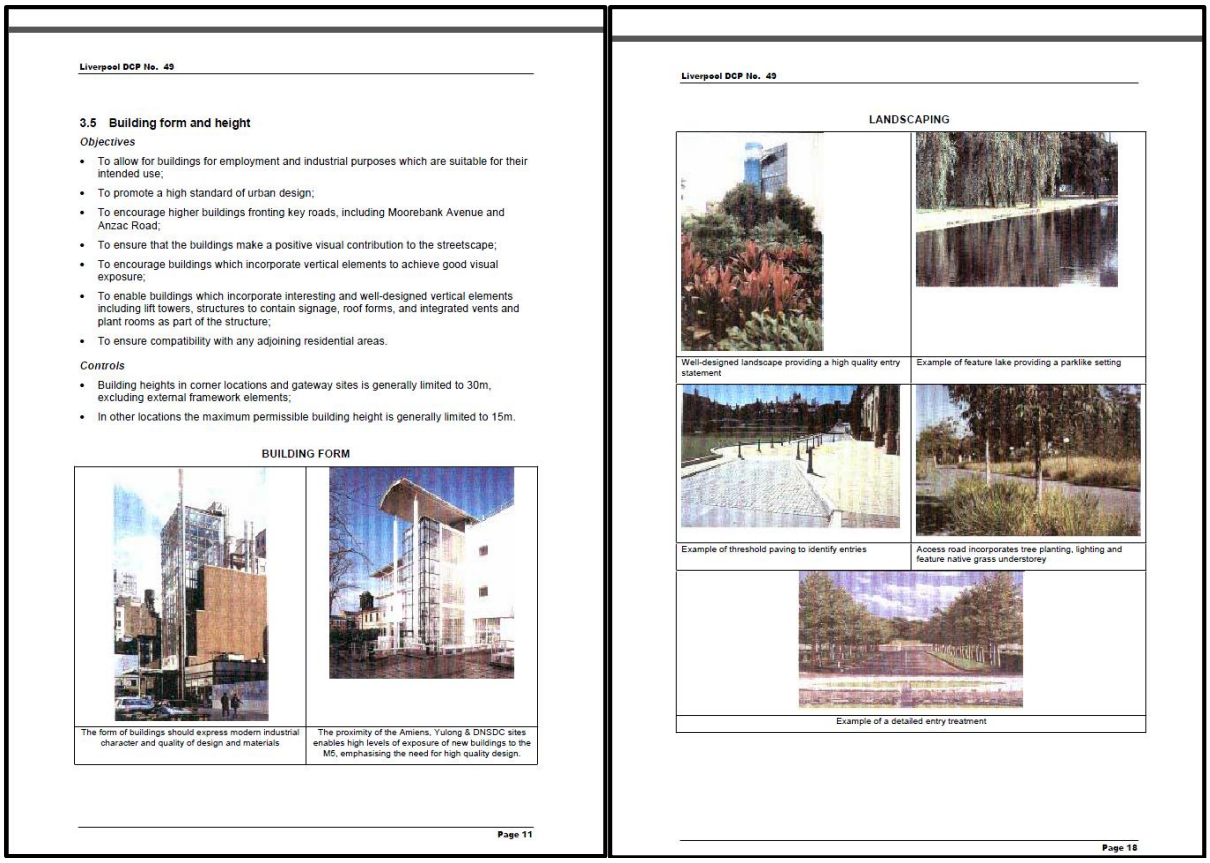
The aim in the Draft Metropolitan Strategy is for Liverpool Regional City to enhance its role as the subregion's main centre for commercial, retail, service and entertainment. The Moorebank Federal Government land could be an ideal starting point to achieve all these objectives, as commercial and retail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



Liverpool DCP No. 49

3.5 Building form and height

Objectives

- To allow for buildings for employment and industrial purposes which are suitable for their intended use;
- To promote a high standard of urban design;
- To encourage higher buildings fronting key roads, including Moorebank Avenue and Anzac Road;
- To ensure that the buildings make a positive visual contribution to the streetscape;
- To encourage buildings which incorporate vertical elements to achieve good visual exposure;
- To enable buildings which incorporate interesting and well-designed vertical elements including lift towers, structures to contain signage, roof forms, and integrated vents and plant rooms as part of the structure;
- To ensure compatibility with any adjoining residential areas.

Controls

- Building heights in corner locations and gateway sites is generally limited to 30m, excluding external framework elements;
- In other locations the maximum permissible building height is generally limited to 15m.

BUILDING FORM

The form of buildings should express modern industrial character and quality of design and materials

The proximity of the Amiens, Yulong & DNSDC sites enables high levels of exposure of new buildings to the M5, emphasising the need for high quality design.

Page 11

Liverpool DCP No. 49

LANDSCAPING

Well-designed landscape providing a high quality entry statement

Example of feature lake providing a parklike setting

Example of threshold paving to identify entries

Access road incorporates tree planting, lighting and feature native grass understorey

Example of a detailed entry treatment

Page 18

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.

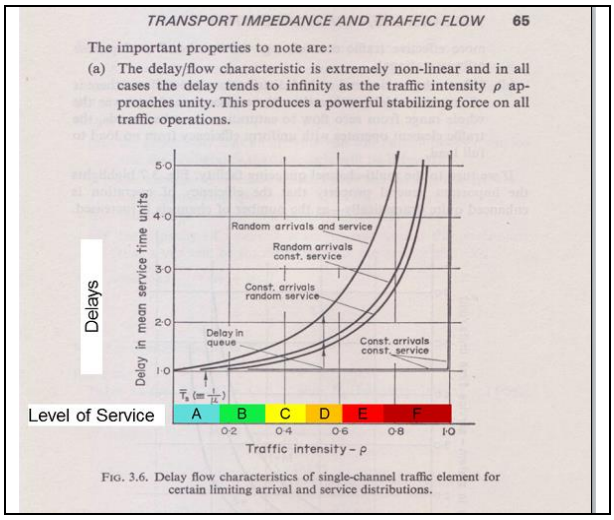
It is recommended that:
Given Menangle's location on the very fringe of Sydney's metropolitan area, the Sydney RailPort Facility's proposal has the potential to provide capacity for the domestic interstate non-bulk freight task and be considered by the Department of Infrastructure, Planning and Natural 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.

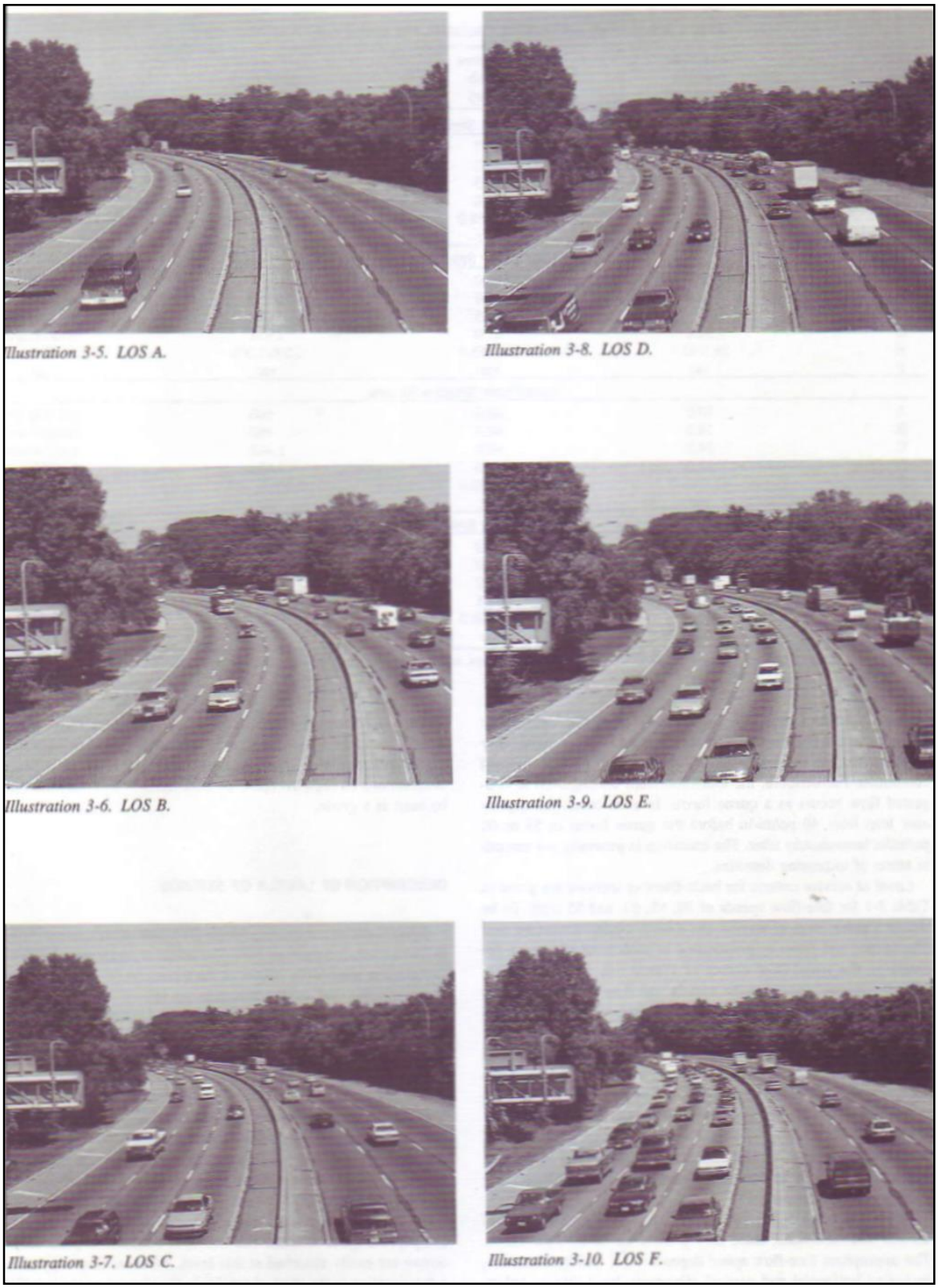


Illustration 3-5. LOS A.

Illustration 3-8. LOS D.

Illustration 3-6. LOS B.

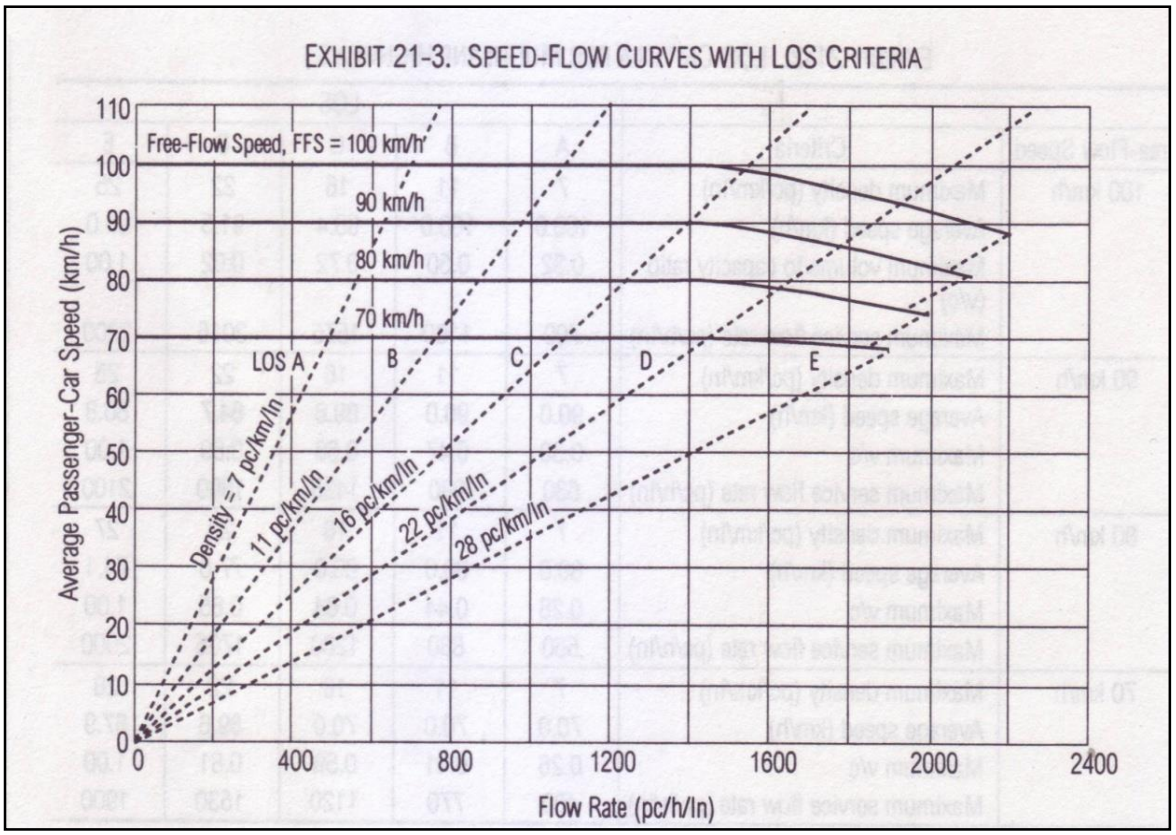
Illustration 3-9. LOS E.

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

Austroads is the association of Australian and New Zealand road transport and traffic authorities. Austroads 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

Road closure
Rainfall record: 57.8 mm fell on 18th August 2014
Photo: Paul van den Bos – 19th August 2014 11:17 AM – note the blue skies

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

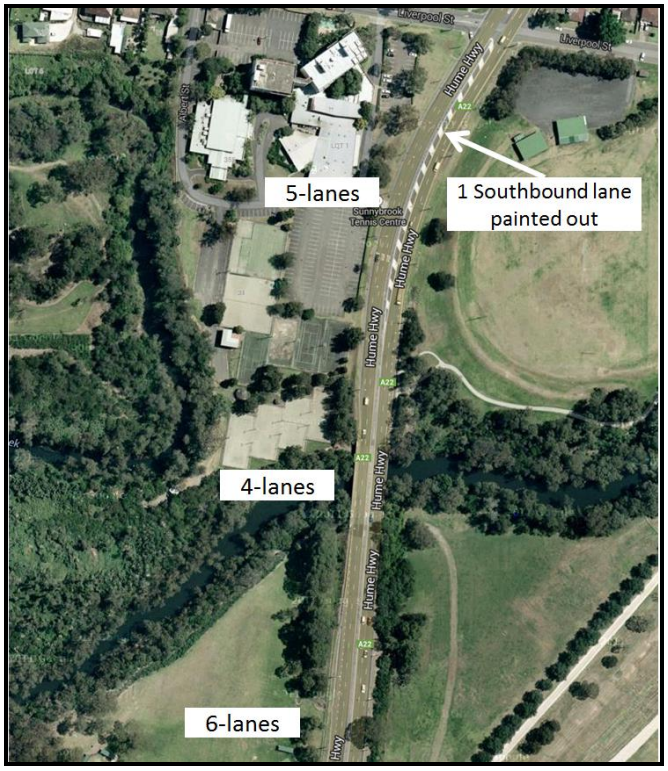


Figure A4 3 2-lane bridges over Prospect Creek

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