Dear Commissions

Following the question from Professor Richard Mackay, we like to submit the following material.

We have also attached a PowerPoint with speaker notes. Hopefully, those visuals will aid in the understanding of the points we like to make. If we can help with clarification of any of the Slides/points, please do not hesitate to contact us.

Summary:
Ever since we showed the NSW Government that both Proponents demonstrated that Moorebank Intermodal traffic could not work, the Proponents now only need to deal with "front-door" traffic, that is, traffic that enters or leaves Moorebank Intermodal.

Front-door traffic
By law, all Moorebank Intermodal traffic must travel north. Since no trucks can use Anzac Rd, **ALL TRUCKS** must use the Moorebank Av – M5 intersection. This should imply that the Moorebank Av – M5 intersection should be considered in this Modification because it is used by the front-door traffic.

From publically available data, it can easily be shown that based on the last six (6) years of data, the current annual compound growth of vehicles travelling ***through*** the Moorebank Av – M5 intersection is -1.4% for the AM peak.

> This is a classical case that demonstrates traffic theory works in practise - once capacity has been reached, any additional traffic will increase traffic density – but lower the throughput.
>
> Therefore, any additional construction traffic (and later operational traffic) will reduce the intersection's throughput. This will result in longer delays and queues. Paul covered intersection delays and queues in his presentation.

For the PM peak, the annual compound growth is 0.5%. This growth should be considered with caution because:

- The existing queue on Moorebank Avenue travelling south is over 600 metres long (as modelled by EMM for the Moorebank Av deviation study). Intuitively, any additional traffic would increase the queue length – in a non-linear proportion.

This lack of intersection capacity, contradicts the urban myths about the Moorebank Av – M5 intersection operating at Level of Service B and having a vast amounts of spare capacity. We certainly would like to see how that spare capacity was calculated.

Moorebank Av – Anzac Rd intersection
The impact of the additional traffic on the Moorebank Av – Anzac Rd intersection has resulted in about 40% of the local residents taking an alternative route that is longer in the AM peak. Making trips longer goes against the aim of every transportation planner in the world. In every nation on earth, members in our profession seek ways to reduce the Vehicle Km Travelled and Vehicle Hours travelled.

Background
This analysis is based the 2014 traffic survey data found in the MICL EIS, for convenience hereafter referred to as "2014 data" or simply "2014", and the 2020 traffic survey data found in the EMM, Moorebank Avenue Realignment, Traffic report. Hereafter, referred to as "2020 data" or simply 2020. Both documents are in the public domain.

Slide 1 shows the geographic location of the common data sites.
In this text we show the icon of the Slide – please refer to the PowerPoint for the actual Slide.

All the plots containing traffic count survey data, show the AM traffic flows.

The PM flows reflect the issues of trips made by families for personal trip-purposes. It is too easy to be distracted by those secondary issues of why those trips are made and if they should be made at different times.

For this purpose it is best to keep the explanations as simple as possible and not be distracted by "other" issues, which appeal to many people. (We are more than happy to take those "other" issues on board, provided we are given all the information that proponents have access to and the calculations. This means no exclusion such as redactions, "privileged", or "confidential" etc.).

Slide 2 shows the actual AM traffic counts.
On the right-hand-side of the Slide, we show the alternative routes that this changed traffic is likely to take. Those movements are not modelled, but we would use them in sanity checking any modelled work. The point to note is that the alternative paths are significantly longer.

Slide 3 shows the changed traffic movements into and out of Moorebank Intermodal. This has been calculated from the data in Slide 1 and the approach flow into the Moorebank Av – Anzac Road intersection.

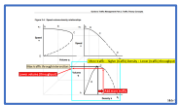
Slide 4 shows the southern approach movements.
On the right-hand-side of the Slide, we show the difference in the turning movements. It shows that 280 additional movements through the residential area- as clearly observed from the Google map. Note the two entry/exit points for the local residents in Wattle Grove, and also the main entry point for Liverpool CBD.

Slide 5 shows the eastern approach movements.
On the right-hand-side of the Slide, we show the difference of -258 trips made by local residents who now detour onto a longer alternative paths, because of the congestion at the Moorebank Av – M5 intersection.

Slide 6 shows the northern approach movements.
On the right-hand-side of the Slide, we show the alternate paths take by the local residents (-124 trips) because of the congestion at the Moorebank Av – M5 intersection.

Slide 7 shows the combined movements that impact the local residents.
Compared to six (6) years ago, 409 local residents out of 1067, now take the longer alternative route because of the congestion of the Moorebank Av – M5 intersection.

Slide 8 shows the turning movements at the Moorebank Av – M5 intersection.
From here, it is a trivial step to calculate the annual compound growth rate of -1.4%.



Slide 9 shows the theory behind the negative growth.
On the Volume-Density graph (highlighted with the blue box), the black arrow points to the maximum traffic Volume (think of capacity) and the associated Density. [Density is simply a count of the number of vehicles per km. It is standard practise to express it "per lane"- so that comparisons can easily be made].

If more traffic is added – indicated by the red arrow point, the (traffic) density will increase (more vehicles/km/lane). This new Density will have its associated (traffic) Volume that will travel through the system. The vertical red arrow points from this higher Density to the Volume (throughput). The horizontal red arrow points to a lower Volume than the maximum Volume. This explains the negative growth – once past the system capacity, if more traffic is added, a lower system throughput will result. This is reflected by the long queues and delays to drivers.

Despite all the road network improvements from the pinch-point programs, congestion-busting schemes, intersection capacity improvements, better signal coordination … etc. that have occurred in the local area, here we have a negative growth.

It should be remembered that this negative growth is the most critical intersection for the largest intermodal in the southern hemisphere.

<u>The following Slides are provided to encourage Commissioners to carefully consider the existing modelling that is being relied upon: "everything in OK – Moorebank only contributes 3% to the local traffic".</u>

Conceptually, there are three (3) baskets or modelling: (1) this publically available, (2) that is available under confidentially clauses, and (3) that is internal working documents.

This following information relates to the second basket – modelling work that is only available under confidentially clauses.

If the Commissioners have access to those models, hopefully the following background information enables the Commissioners to ask the right questions about the models.

Irrespective of the actual total truck numbers quoted, a very large proportion of Moorebank traffic trucks will have to access the M5 Bridge.

For illustrative purposes, the simplest explanation is to consider the westbound flow in the PM.

> *In the AM, the eastbound flow (used by the returning Moorebank trucks), requires a different explanation with other considerations. Essentially it relates to Moorebank Av. Paul's presentation on the two intersections only scratches the surface of the issues on Moorebank Av. If both the AM and PM issues were presented, it may provide opportunities for confusion.*

This access to the M5 Bridge movement falls into three (3) separate issues.

Slide 10 shows the Moorebank Intermodal traffic movements towards the M5 Bridge. This an “exploded view” for illustrative purposes only.

The larger proportion of the Moorebank Intermodal must merge with the M5 traffic. A smaller proportion will travel straight to the Hume Highway off-ramp.

For this conceptual explanation the actual traffic numbers are immaterial (that is the next level of detail).

Proponents will point out that this traffic (from Moorebank Intermodal to the M5 on-ramp) has a “continuous” movement in the Moorebank Av – M5 intersection. This implies free-flowing traffic conditions.

Slide 11 shows the details of this continuous traffic movement – shown with the pink curve.

We can observe that this continuous movement ends at the T junction with the southbound turning movement. The right-hand-turn movement has a higher traffic priority than the continuous movement. Therefore the continuous movement must give way to that movement.

The continuous movement has to stop whenever the right-hand-turning is traffic flowing– and therefore not “continuous” anymore.

> If there are two, or three, heavily loaded trucks waiting at this T junction, this continuous movement will take time to recover.

However, this situation is far more complex.

This interfering right-hand-turning movement must merge from two-lanes into one-lane. In the transition part, vehicles must “zipper” before the one-lane section. Depending on the right turning traffic volumes and the traffic on the M5 on ramp, this right-hand-turning traffic could queue and spill back onto the on-ramp.

In fact, this is indeed the case. See next Slide (Slide 12).

Slide 12 shows the EMM modelled queue for 2020 PM.
We have drawn the queue lengths on a Google Map. The model shows that the intersection queue is 634.7 metres long, and the queue on the “continuous” movement is 155.0 meters long.

Clearly, the “continuous” movement is not continuous, nor free-flowing.

<u>Achilles heel of the Moorebank Intermodal project</u>

Slide 13 shows the <u>on-ramp</u> traffic merging with the M5 traffic.
The circle represent the approximate area in which this merging must occur.

Slide 14 shows the M5 traffic exiting the M5 in essentially the same geographic location and same time-frame where the merging occurs.

The newly proposed westbound bridge, deals with the M5 exit traffic issue (Slide 13), but does not address the merging issue (Slide 12).

We have tried to address this merging issue on several occasions. See the Q & A section of Paul's last PowerPoint. He raised this in PAC 2 and again in IPC 1. It has taken the NSW Government many years to acknowledge this merging and weaving issue.

Last year, late in July, Nell presented our modelled results to the Minister for Transport. This work was from our own internal documents. This meeting was followed up with a more detailed presentation to TfNSW in August last year. We explained the merging issue in greater detail.

The NSW Government is well aware of the issues with Moorebank Intermodal.

In that meeting with TfNSW, we were advised that the NSW Government is building a brand new model. Clearly, this reflects their lack of confidence in the previous model, and associated modelling work.

As far as the Commissioners are concerned, they have to deal with what is in front of them:
For the traffic aspect – it is the "front-door" traffic:

- Given the traffic capacity issue at the Moorebank Av – M5 intersection, any additional traffic, in this case from construction traffic, will reduce the throughput of that intersection, resulting in far longer queues and delays as illustrated in Paul's presentation to the commissioners.
- The analysis of the Moorebank Av – Anzac Rd has revealed that 40% of the residents now take a longer route because of the local congestion from Moorebank Intermodal. Makes trips longer goes against all transport planning principles.

Possible considerations

Ten (10) years ago, SIMTA use a micro simulator software package. However, SIMTA could not model the base network. Their future scenarios modelling was brutally criticized by their model auditors.

In the other EIS documents the SIDRA intersection software was used. In Australia, SIDRA is the standard software package. It was developed, and continued to be improved, by Dr Rahmi Akcelik and Mark Besley. The company is Melbourne based. Like every software package, it has limitation. We would be extremely surprised, if Rahmi, and/or Mark would nominate this package to model the Moorebank Av – M5 intersection with the merging and weaving issue restricting the "continuous" flow. The modelling challenge is to how to determine the "blocking" factor for this continuous movement and then how to implement this blocking factor in the model.

We have been advised by very senior members of the NSW Government that a new model will be available in August this year, and that we may be able to look at it.

May be it is wise to wait for this model and actually examine the impacts in detail.

Conclusion

Moorebank Av – M5 intersection

From publically available data, it can easily be shown that based on the last six (6) years of data, the current annual compound growth of vehicles travelling ***through*** the Moorebank Av – M5 intersection is -1.4% for the AM peak.

Moorebank Av – Anzac Rd intersection

The impact of the additional traffic on the Moorebank Av – Anzac Rd intersection has resulted in about 40% of the local residents taking an alternative route that is longer in the AM peak. Making trips longer goes against the aim of every transportation planner in the world. In every nation on earth, members in our profession seek ways to reduce the Vehicle Km Travelled and Vehicle Hours travelled.

There, any additional will negatively impact the Moorebank Av – M5 intersection, and more local residents have to detour onto longer paths.

Kind regards
Nell and Paul van den Bos