Interlink Roads Pty Ltd

M5 South-West Motorway Post-Widening Environmental Review –

Final Report

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Introduction

The widening of the M5 South-West Motorway was pivotal to the needs and enabling growth of South West Sydney. The population of South West Sydney has been growing steadily since before the millennium, which has placed additional pressures on infrastructure. This was felt markedly during the last decade as the M5 South-West Motorway steadily reached capacity, experiencing significant congestion in both directions at peak times in particular; much traffic was stuck in stop-start conditions, which was gradually increasing the time taken for users to complete their journey on the road.

Therefore, in 2010, a proposal was submitted to the Roads and Traffic Authority NSW for the following:

- Eastbound widening by from two to three lanes from Camden Valley Way to Fairford Road
- Westbound widening from two to three lanes from King Georges Road to Camden Valley Way
- Provision of an Operations Management and Control System for the M5 South-West
- Converted the motorway to fully electronic tolling
- Noise attenuation measures for sections of the motorway requiring treatment for additional noise impacts from increased traffic volumes.

Throughout much of 2014, the construction of the project was carried out, opening in December of the same year.

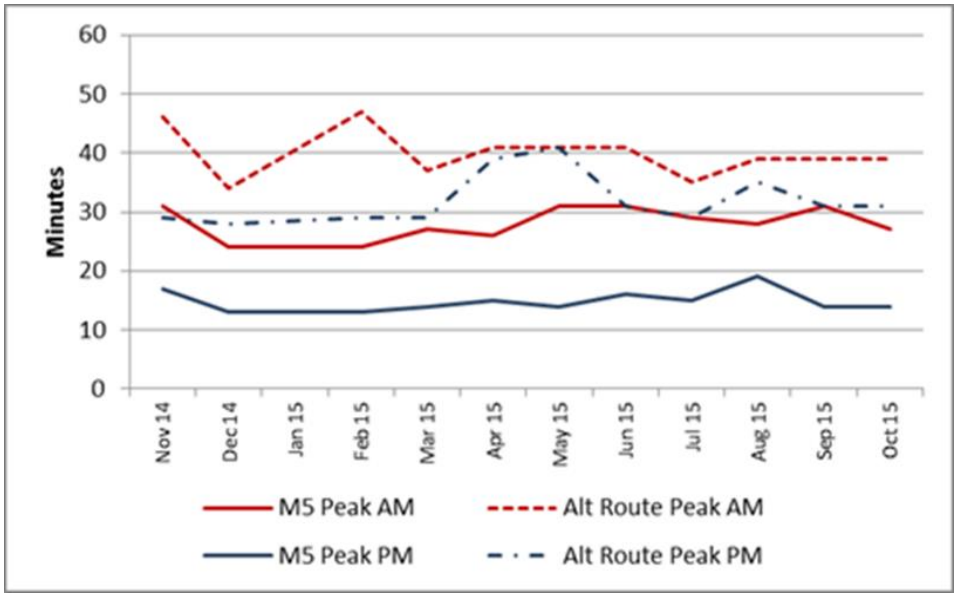
Whilst the capacity of the road has increased by 40-50% throughout the vast majority of its length, the level of traffic has increased by around 15% over the last 3 years, pre- and post-widening. This compares with the growth of traffic in New South Wales of 2.5% per annum, so it is fair to assume that the road has drawn in more vehicles from the local road network at a time when the utilisation of public transport has also increased.

When the widening of the M5 South-West motorway was planned, a number of benefits were forecast arising from additional lane construction. This summary reviews some of the key criteria highlighted in the project's cost benefit analysis review in a period since the new widened road had been completed at the end of 2014. The key benefits assessed include travel time, vehicle operating costs, emissions, noise and safety.

Travel Time

The predominant reason for upgrading the capacity of the M5 Motorway was to improve the travel times of drivers using the road; in the pre-project cost benefit analysis, almost 90% of the benefits were attributed to time savings for the road's users. Before the road was built, congestion was experienced on several parts of the road at peak times in both East and West directions with the stop-starting of traffic commonplace. Morning peak travel times on the motorway had increased from 19.5 minutes in 2002 to 33 minutes in 2007.

Recent improved data-gathering has shown that the average time difference between those vehicles using the Motorway, versus those travelling the same distance on the local network shows a significant benefit of travelling on the M5 South-West. In the AM peak, average vehicle travelling time is at least 8 minutes faster using the Motorway, and in the evening the benefits are twice as great, with around 17 minutes of time being saved. (See figure overleaf)



Travel times on the M5 South-West Motorway. Source Interlink Roads Pty Ltd – Nov 15

Travel times are slower in the morning as most of the traffic heads east into the city and is slowed as it meets the M5 East junction. As a consequence of the widening project, in the evening, traffic heading westbound is now mainly free flowing. Total average daily traffic flows have increased from around 125,000 vehicles per day pre-widening to around 145,000 vehicles per day post widening, i.e. growth of around 16%.

Recent statistics (see following graphs) show that around 10,000 vehicles per hour (total for both directions) are using the road in the morning and 11,000 vehicles per hour are using it in the evening.

Considering the time savings in morning and evening peak (with each period lasting two hours), during the peak alone, the road is saving Sydney residents a total of 160,000 minutes (2,667 hours) in the morning and 374,000 minutes (6,233 hours) in the evening. Using an average value of time rate of at least $35.06 per hour for vehicles (specified by the NSW RTA Economic Analysis Manual) implies that **there is a simple average total saving of $312,000 every day**. Pro-rata on a per annum basis, this equates to some $113.9m per annum of financial benefit, which is a substantial contribution to the NSW economy.

Traffic on the M5 South-West Motorway is growing more strongly than the average growth on Sydney metropolitan roads. The wider motorway is attracting more vehicles that would otherwise be using local urban roads. This means vehicles travelling on both the motorway and the local roads can move more quickly on their journey.

Vehicle Operating Costs

The cost of operating a vehicle on the M5 had been increasing up to its widening due to:

- Increasing fuel consumption along the route
- Additional stop-starts due to congestion and associated wear and tear on the vehicle
- Longer journey times

The NSW RTA Economic Analysis Manual provides values for Vehicle Operating Costs (VOC), comprised of the following:

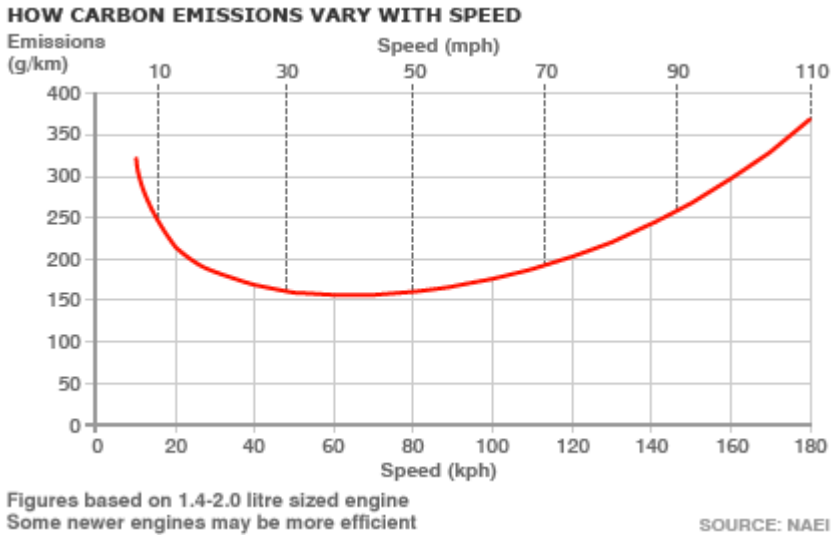
- Basic running costs such as fuel, depreciation, repairs and maintenance
- Additional running costs due to the road surface
- Additional running costs due to any speed fluctuations from cruising speed and
- Additional fuel costs due to stopping, starting and queuing

Most data from vehicle manufacturers illustrates how wasteful stop-start congestion is in terms of fuel economy. Typically, cars travelling at 15 km/h will use at least 3 times the amount of fuel as those travelling at 80 km/h, much worse when stationary. Clearly, the reductions in peak time congestion, especially in the hours from (at least 0700 to 0900 and 1600 to 1800), that the widening of the M5 motorway has allowed will have improved significantly the fuel economy of users of the road, translating to costs savings and associated environmental benefits. It had been predicted that the road improvement would yield an overall vehicle operating cost saving of 13.45 cents/km benefit to car users, with around $1.35 saved per litre of fuel unburnt by vehicle owners.

The pre-widening analysis indicated that the M5 West widening project would enable Vehicle **Operating Cost (VOC) savings of over $85m over 30 years**. This represents just under 10% of the value of the financial benefits forecast from reductions in travel time. However, as the traffic growth onto the road, most of which has been absorbed from the local road network, is higher than anticipated, then this figure is likely to be even greater than forecast. Originally car use, for example, was predicted to grow on the motorway by 15% from 2011 to 2021, however, **this level of traffic (145,000 vehicles post widening vs 125,000 pre-widening) has already been reached in 2015**. **The financial benefits accrued by the project, in terms of VOC, should be even higher than anticipated.**

Emissions

The smoother, faster flowing traffic post widening enables overall reduction in pollution. For hydrocarbons, the rate of emissions/km travelled diminishes significantly as a vehicle picks up speed. A typical vehicle traveling at 15 km/h can emit over 5 times the amount of hydrocarbons as one travelling at 80 km/h. For carbon emissions, a vehicle travelling at 15 km/h or less can have nearly double the emissions of one travelling at 80 km/h. Nitrogen dioxide emissions/km may increase slightly with speed, but the outcomes are better than when compared to a greater number of stationary, congested vehicles, which existed before the road was widened.



As well as benefits on the M5 South-West, there are environmental benefits each time vehicles on local urban roads opt to use the widened motorway, reducing congestion and therefore emissions on local roads.

The modelling below highlighted the forecasted benefits of the project, with up to 14% reductions for carbon emissions and particulates and 9% reductions for hydrocarbons:

Scenario	Route	Hydrocarbon (HC) (grams)	Oxides of Nitrogen (Nox) (grams)	Carbon Dioxides (CO2) (kilograms)	Particulates (grams)
No Widening	M5SW	4.31	10.27	5.05	0.40
	Alternative	27.37	36.35	9.11	0.72
M5 Widening	M5SW	2.55	10.08	4.48	0.35
	Alternative	25.17	34.58	8.25	0.65
Percentage Change	M5SW	-41%	-2%	-11%	-11%
	Alternative	-8%	-5%	-9%	-9%

Table 1.2 Impact of M5 Widening on greenhouse gas emissions of one vehicle for M5 and alternative route, during the morning (AM) peak period

Scenario	Route	Hydrocarbon (HC) (grams)	Oxides of Nitrogen (Nox) (grams)	Carbon Dioxides (CO2) (kilograms)	Particulates (grams)
No Widening	M5SW	1.74	10.20	4.22	0.33
	Alternative	21.82	35.72	6.62	0.52
M5 Widening	M5SW	0.51	10.12	3.78	0.30
	Alternative	19.79	35.55	5.70	0.45
Percentage Change	M5SW	-71%	-1%	-10%	-10%
	Alternative	-9%	0%	-14%	-14%

Table 1.3 Impact of M5 Widening on greenhouse gas emissions of one vehicle for M5SW and alternative route, during the afternoon (PM) peak period

As the number of vehicles using the smoother flowing M5 motorway, drawn from the local urban road network, is higher than anticipated (i.e. a 15% growth after 4 years, not 10), then it can be confidently assumed that the **overall reduction** of modelled carbon emissions and hydrocarbons would be **greater than 14% and 9% respectively, between pre-and post-widening**.

Noise

It is a fact that more vehicles on a road will create more noise, be it from car engines, exhaust, tyres, brakes or aerodynamics**. The M5 road will create more noise with more traffic at point source**. Nevertheless, **mitigation measures were put in place**, e.g. construction of noise walls, noise attenuating open grade pavement and architectural treatment noise mitigation measures to adjacent residents where required.

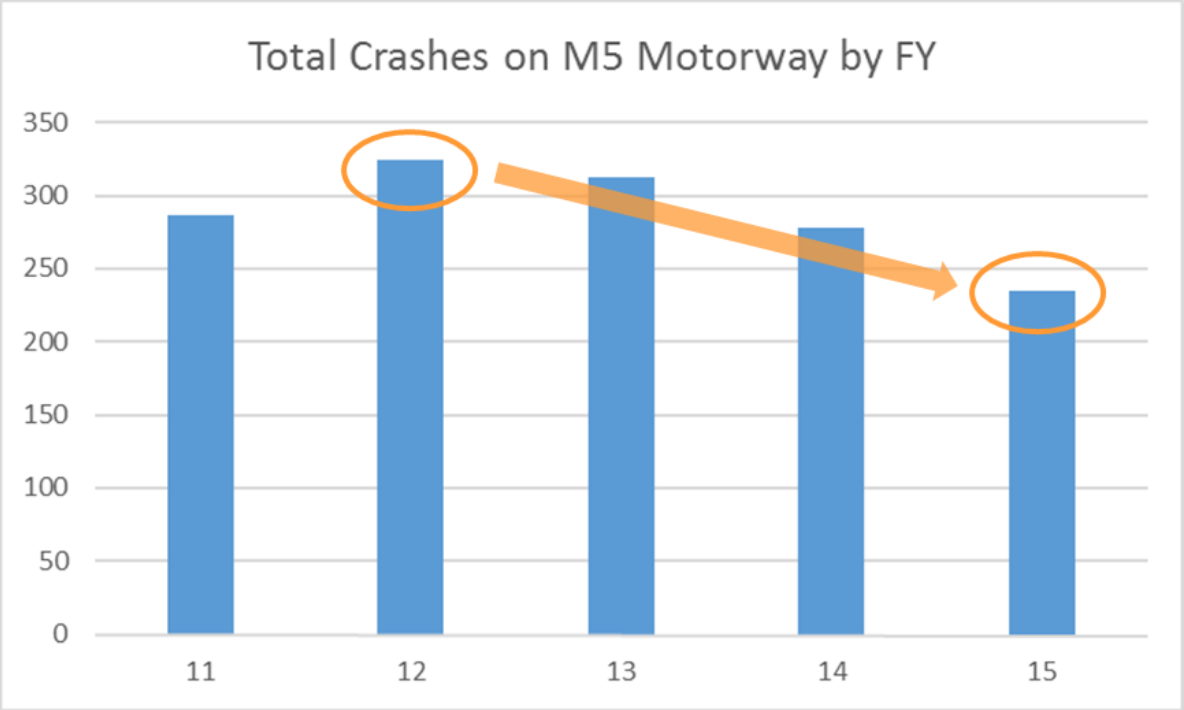
During the road widening construction program, the following occurred

- **A quieter,** smoother, and safer trip **due to resurfaced paving of over 180,000 tonnes** of asphalt
- Added **50,000m^2 of new noise walls** and other noise mitigation for local residents

In addition, with the additional vehicles drawn from the local urban road network, there will be less noise at these locations as a result of the additional capacity on the M5 South-West. In 2017, the NSW Department of Roads and Maritime Services will undertake a physical survey to assess the impact the widened M5 South-West has had on road noise.

Safety

It is generally understood that motorways are safer than the local urban road network in terms of accidents per km travelled. It was also assumed in the pre-planning phase of the road-widening project that the widening of the M5 would lead to greater levels of safety. This has been borne out with the statistics so far for total number of accidents pre- and post-widening.



25% fewer crashes in spite of 15% more traffic on the road - the conclusion from these statistics is that the widening of the M5 motorway has led to a safer road for all those who need to use it.

The Customers View

The KREAB customer survey feedback after the road widening scheme confirmed that the M5 South-West Motorway:

- Saves time
- Safer and more reliable than alternative routes
- Saves them petrol, and
- Is a valuable asset for business

Those people of south-west Sydney who have lived through the disruption of roadwork and report: **"It was worth it!"**

References

1. RUCBA Report M5 West Widening – May 2010
2. IMIS M5 Widening Traffic Forecast Report, 21 April 2010
3. RTA Economic Analysis Manual, Appendix B, 2007 & 2012
4. M5 Motorway South-West Gross Traffic Hourly Data, 2009 – 2015
5. National Atmospheric Emissions Inventory for Transport
6. Interlink Roads Pty Ltd – Safety Data for M5 South-West Motorway 2011-2015