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The application of variable speed limits to the F3 and the Hume Highway between Sydney and Canberra

3.1 In this chapter the specific issue of using the F3 and Hume Highway as case studies for variable speed limits will be examined.

The F3

3.2 The F3 freeway runs from Sydney to Newcastle. It is 128km long and was completed in 1999, although work commenced on sections of it in the 1960s. The F3 is part of the major transport route between Sydney, the central and north coast, up to Brisbane and forms an integral element in the transport system of the eastern seaboard.

3.3 The F3 has had a significant effect on population distribution to the north of Sydney. Before the F3, the only way to gain access to areas north of Sydney such as the Central Coast and Newcastle was by way of the two-lane road Pacific Highway or via rail. The completion of the F3 brought about increased residential development along the Central Coast and reduced the time taken to transport freight between Brisbane and Sydney. The F3 is one of the busiest National Highway corridors, carrying more than 60,000 vehicles daily.[1]

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1 The Hon. John Anderson MP, 'Federal Government Keeps New South Wales Moving', Media Release, 14 May, 2002; and http://www.dotrs.gov.au/transprog/road/nat_hwy/corridors/syd_bris.htm; accessed 30 September, 2002.

The Hume Highway

3.4 By 2006, Commonwealth investment in national roads will achieve a four-lane divided highway over much of the distance between Melbourne and Noosa Heads, on the Sunshine Coast in Queensland.[2]

3.5 In his letter to the committee, Minister Anderson indicated that the Hume Highway between Canberra and Sydney should be considered as a potential case study into ITS. The stretch of highway that runs from the Hume Highway turn-off to Canberra, is known as the Federal Highway.

3.6 A major element of this, the Hume Highway, is the main thoroughfare between Sydney and Melbourne. From Ashfield in Sydney's south-west, the Hume runs through the Southern Highlands, bypassing towns such as Camden, Moss Vale and Mittagong that were once on the highway. The freeway standard road continues into the New South Wales highlands, bypassing Goulburn, Gunning and Yass. From Yass to Albury, the road slowly descends to the Murray River valley to the Victorian border. Within New South Wales, about 415 km of the 520 km of Hume Highway south of Liverpool is dual carriageway.

3.7 The Hume Highway links Australia's two largest cities, and as such it is a major interstate transport corridor. It carries road freight worth about $20 billion annually and is used by 10 million people every year. The highway provides a vital link to regional freight networks, and for the transport of rural produce from some of the nation's most significant agricultural regions. Daily traffic levels vary considerably – from around 80,000 vehicles per day at the southern edge of Sydney, to a low of about 4,700 vehicles per day between Tarcutta and Holbrook in southern New South Wales. Traffic levels on the Hume Highway in Victoria average 20,000 vehicles per day, while about 66,000 vehicles per day use the highway north of Melbourne. Commercial and heavy transport vehicles comprise between 16–40 per cent of the traffic stream, depending on the location.

3.8 Fatalities on specific stretches of the Hume Highway for recent years are:

Table 1: Fatalities on selected portions of the Hume Highway

Stretch	Period	Number of fatalities
Liverpool – Yass	1997	18
Liverpool – Yass	2000	7
Ashfield – NSW to Victorian border	Year to August 2002	15

2 Hon John Anderson MP, Address at the Official Opening of the ACT-Sutton Section of the Federal Highway, 12 September 2000; http://www.ministers.dotars.gov.au/ja/speeches/2000/as12_2000.htm; accessed 30 September, 2002.

3.9 Most of the Hume Highway, including all of the 294 km in Victoria, is built as a four-lane dual carriageway. About 100 km of the Hume Highway in New South Wales is single carriageway, the majority (some 88 km) being a section south of the Sturt Highway junction through Albury to Wodonga. Total vehicle numbers are expected to grow by between 4,000 and 15,000 per day by 2015.[3] This will affect traffic numbers between Sydney and Canberra.

3.10 The Federal Highway begins 10km west of Goulburn at the Hume Highway. From this point the dual carriageway heads south-west, bypasses Collector, continues on around Lake George and climbs up into the ACT where it ends at Canberra.

3.11 More than 12,000 vehicles use the 77 kilometre-long Federal Highway each day of which 15 per cent are commercial vehicles. Average annual daily traffic volumes are expected to increase to around 13,370 by 2010. This represents a yearly growth rate of 3.6 per cent.[4] In 1997, there was one fatality on the Federal Highway while in 2000, 4 fatalities occurred.[5]

3.12 The route is a vital road transport link from Sydney via the Hume Highway to Canberra and the surrounding region. The task of converting the Federal Highway into a dual carriageway was completed in 2000. This upgrading was designed to cater to projected traffic volumes for the next two decades.

Variable speed limits (VSL)

3.13 Experience abroad indicates that on congested roads VSL can have a beneficial effect on traffic flow and safety. On the M25 in England, speed limits were adjusted in response to the level of congestion. The M25 is one of the most congested freeways in England and one of the busiest motorways in Europe, with more than 700,000 journeys made daily.[6] Using variable message signs (VMS) and loop detectors measuring traffic density and speed, speed limits were lowered in increments as congestion

3 http://www.dotars.gov.au/transprog/road/nat_hwy/corridors/syd_melb.htm; accessed 30 September, 2002.

4 http://www.dotars.gov.au/transprog/road/nat_hwy/corridors/canberra.htm; accessed 22 September, 2002.

5 NSW Government (Roads and Traffic Authority, Road Safety Strategy Branch), *Road Traffic Accidents in NSW – 1997: Statistical statement year ended 31 December, 1997*, Sydney: 1999. and *Road Traffic Accidents in NSW – 2000: Statistical statement year ended 31 December, 2000*, Sydney: 2001.

6 Department for Transport (UK), 'A New Deal for Trunk Roads in England, Regional Leaflets: M25 London Orbital Motorway'; http://www.dft.gov.uk/itwp/trunkroads/leaflets/londono.htm; accessed 13 November, 2002.

increased. Speed cameras were used to enforce the speed limits, resulting in 26,000 fines.

3.14 The study found that motorists were more inclined to keep to their lane when a 'faster lane' no longer existed. They were also more inclined to keep to the inside lane and to keep proper distances between successive vehicles, resulting in smoother traffic flow which actually increased average travel times of traffic. Results show that traffic accidents decreased by 28 per cent during the 18 months of operation.[7]

3.15 Vicroads advised the committee that it supported VSL because:

> Dynamic, real time variable freeway speed limits have the potential to provide significant benefits in terms of efficient traffic flow and road safety improvements.[8]

3.16 The Hume Highway and the Federal Highway are important transport routes and it is apparent that these routes will need to be maintained to a high standard if they are to continue to play the crucial part in Australia's transport infrastructure that they do now.

3.17 However, witnesses, submissions and stakeholders providing briefings to the committee were divided as to the benefit of using these stretches of highway as case studies in the effectiveness of variable speed limits. ITS-Australia advised the committee that further case studies were unnecessary:

> VSS [Variable speed signs] … are now in use in hundreds of highways around the world and have been used in Australia in many projects such as the Westgate Bridge in Melbourne, the Domain and Burnley tunnels in Melbourne and many others. There really is no need to investigate the use of stand alone ITS technology such as VSS.[9]

3.18 The Warren Centre advised the committee that VSL would seem to have greater application to urban freeways, such as the eastern end of the M5 Freeway leading to the Hume Highway, where there are high traffic flows and other problems that may impede traffic flow.[10] While the committee accepted this point, it should not be to the exclusion of certain major corridors, such as the Hume Highway, where specific stretches may benefit from the application of VSL.

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7 http://www.benefitcost.its.dot.gov/ITS/benecost.nsf/ID/8FD5EA59EFFF390F852569610051E25B; accessed 26 September, 2002; cited in Submission no. 3.

8 VicRoads, submission no. 2.

9 ITS - Australia, submission no. 3.

10 The Warren Centre, submission no. 1.

3.19 A report prepared for the US Federal Highway Administration concluded that:

> … due to its high cost, VSL should be implemented in areas where environmental and / or traffic conditions resulted in significant fluctuations in the desired speed.[11]

3.20 This would appear to be supported by the experience in England on the M25, referred to previously. This is a view provided in testimony. DoTaRS advised the committee that only very specific situations – high traffic flows and adverse conditions – make VSL cost effective, because the technology is expensive:

> Certainly the international experience, particularly, in Europe, has been that VSL systems have been found to be cost-effective on roads where there is fairly high traffic volume and where there are frequent periods of extremely adverse weather conditions like heavy fog. Obviously, the combination of high traffic density and heavy fog, for example, is the kind of situation that will lead to severe traffic problems. In those kinds of circumstances, it appears to be a very cost effective treatment.[12]

3.21 There is little doubt that the Hume and the Federal Highways, as well as the F3, have high traffic flows and experience adverse weather conditions. High winds are a feature of the F3 near the Hawkesbury River, and fog is a common occurrence near Lake George on the Federal Highway and Goulburn, on the Hume Highway. Nevertheless the road conditions and road capacity are such that vehicle operators can usually adjust their speed to the conditions.

3.22 The committee notes that variable speed limits (VSL) are already operating in Australia, mainly limited to motorways (the M4 and M5) and tunnels, as well as General Holmes Drive in Sydney.[13]

3.23 The committee was also advised that VSL will be used on the Western Ring Road in Melbourne. The system being installed here is a real time, dynamic system. This road carries about 100,000 vehicles per day, 15per cent of which is heavy traffic. The high traffic flow on this 26 km stretch of divided carriageway results in traffic congestion and accidents.

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11 DoTaRS, submission no. 5. The report estimated VSL to cost between US$0.4 and US$1 million per kilometre.

12 *Transcript of Evidence,* pp. 5 and 12.

13 DoTARS, submission no. 5.

3.24 The committee notes that all these roads carry high volumes of traffic and without adequate management these roads are vulnerable to congestion problems.

3.25 Apart from specified areas on the Hume Highway, Federal Highway and the F3, widespread application of VSL across the country is unlikely to be a prudent use of taxpayer funds, unless the cost of the key component – variable message signs – can be drastically reduced and the use of VSL is finely targeted.

3.26 Moreover, sufficient data exists from the application of VSL to stretches of road in Australia and abroad, to enable the identification of the areas of road where VSL will be effective. The committee concludes therefore, in the light of information already available, that further cases studies, using the Hume and Federal Highways and the F3 are unnecessary.

3.27 Although the weight of evidence did not support using the F3 and the Hume and Federal Highways as further case studies for VSL, the submissions and briefings did support studies that bundled together different ITS technologies in a coordinated manner.

3.28 For example, Raytheon proposed to the committee a study program to evaluate a wide range of ITS technology. Raytheon proposed that it would integrate, as a minimum, these components into an 'Automated Active Highway Traffic Management System':

- Centralised management system;
- Latest technology variable speed limit signs;
- Adjusted automated notice signs;
- Traffic flow sensors;
- Weather sensors;
- Time of day / sunlight sensors;
- Digital speed violation cameras; and,
- Traffic monitoring cameras.[14]

3.29 The system that Raytheon proposed was described by the company as an 'exportable, automated highway traffic flow management system'.[15] The committee believes that the integrated system Raytheon proposed should be investigated. In acknowledging this, the committee saw the potential involvement of a number of Australian technology sectors and the

14 Raytheon Australia, submission no. 4.

15 Raytheon Australia, submission no. 4.

possible application of integrated ITS to other frequently used highways and expressways.

3.30 The Warren Centre supported a study of ITS in general rather than a narrowly focused study of one ITS technology:

> The case study of ITS application on the F3 and the Hume Highway between Sydney and Canberra is strongly supported. However, it is recommended that the … [committee] … broaden the case to study all appropriate ITS measures for these routes.[16]

3.31 DoTaRS expressed caution in using the F3 and Hume as case studies. Instead, DoTaRS supported a broad study of ITS technologies, integrated into a comprehensive ITS system, provided cost effectiveness could be established[17]

3.32 The committee notes that existing traffic management systems have specific components that could be installed on either the F3 or the Hume and Federal Highways, in order to test an *integrated* ITS system. Such technology can be obtained from, for example, the ITS infrastructure already in place in Queensland, New South Wales and Victoria.

3.33 An example of such technology is variable message signs (VMS). The committee was advised that these signs are manufactured locally, powered by solar panels, with a generator backup, the messages are programmed and the sign status monitored remotely via a GSM mobile telephone network. The committee was advised that small signs cost as little as $9,000 and larger signs cost as much as $130,000.[18] Information obtained by the committee indicated that a 2.5m by 2.2m sign used by road construction companies costs about $55,000 to manufacture. The relatively modest cost of such signs, combined with remote management, would suggest potential use in 'black spots' in rural areas and on long stretches of highway likely to induce fatigue in drivers.

3.34 The committee also notes that some integrated ITS technology has been installed on portions of the F3, as a result of Commonwealth funding of more than $3 million. The F3 electronic driver aid system uses a number of cameras along the F3 between Sydney and the New South Wales Central Coast to detect crashes and congestion, while overhead variable message boards convey instantaneous advice and instructions to road users. Targeted at the 17 km stretch between Berowra and Mt White, the cameras are linked to a central traffic management centre. Up-to-the-minute

16 The Warren Centre, submission no. 1.

17 Submission no. 5; *transcript of evidence*, p. 2.

18 Mr Colin Jensen, Briefings, Brisbane, 13 September, 2002.

information on weather conditions, safety or speed changes are relayed via the electronic message signs.[19]

3.35 There is an opportunity to install additional, integrated ITS technology on the Hume and Federal Highways and the F3. However, it should be finely targeted. For example, speed is a major cause of accidents on our roads. Perhaps increasing the number of Safe-T-Cams™, extending their operation to cover cars and motor bikes, in addition to trucks, and using significant sections of the major arterial highways in New South Wales and Queensland (for example, the Newell or the New England) as testing grounds, might lower speeds and save lives. This suggestion is in accord with recommendation 21 of the report *Beyond the Midnight Oil: Managing the Fatigue in Transport* tabled by the House of Representatives Standing Committee on Communication, Transport and the Arts in October, 2000. That committee recommended that the Minister for Transport and Regional Services should seek Australian Transport Council approval for the Australia-wide introduction of the Safe-T-Cam™ system.

3.36 Other measures might include so called 'low tech' applications such as in road serrations to warn motorists when they are veering off the roadway. Additional studies are required. However, the Hume and Federal Highways and the F3 are vital elements of the national highway system. They need to be maintained at a high ITS standard and they also provide a firm foundation to test integrated ITS non-urban road infrastructure.

3.37 The committee recognises that Commonwealth does not have the primary responsibility to maintain state and local government roads. The committee recognises, however, that cases arise where national safety interests require Commonwealth encouragement to ensure the application of ITS to specific areas of road infrastructure . An example is the provision of seed funds to use ITS technology in specified locations, particularly variable message signs to vary the speed on significant state highways and major arterial roads to match the weather conditions and manage congestion.

3.38 Such special circumstances generate the need for a new category of road funding. The committee feels that this additional category of funding should be modest and similar in size to the funds allocated by the Commonwealth for the Black Spots Program. The committee also recognises that the bulk of funds appropriated under such a program would be directed to outer metropolitan and rural road systems carrying arterial traffic.

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19 http://www.dotars.gov.au/transprog/road/nat_hwy/corridors/syd_bris.htm; accessed 30 September, 2002.

3.39 The allocation of funds, the committee believes, would involve a balance between those areas which, on the evidence, are already dangerous and those which may be revealed to be dangerous when a safety audit is conducted.

3.40 To enhance the implementation of ITS, the committee suggests that the Commonwealth portion of the funding should be seed funding, while state and local authorities should provide significant contributory funding to enhance the implementation of ITS on roads for which these agencies are normally responsible.

Recommendation 1

3.41 **The Committee recommends that the Hume Highway, the Federal Highway and the F3 not be used as case studies for variable speed limits.**

Recommendation 2

3.42 **The Committee recommends that, in addition to the National Highway, Roads to Recovery, Roads of National Importance and the Black Spots Programs, the Commonwealth establish a fifth category, a regional ITS program, to provide for the allocation of seeding funds for the implementation of integrated ITS and that as part of this program funds should be made available for selected arterial roads, and provided on the basis of:**

- **demonstrated need;**
- **existing quality of road;**
- **the significance of the arterial nature of the road; and**
- **benefit/cost analysis.**

The seed funds be made available to state and local authorities on a competitive, benefit/cost basis to encourage appropriate and cost effective ITS signage on significant state highways and major arterial roads.

Recommendation 3

3.43 **The committee recommends that the government designate as a 'National ITS Corridor', certain roads of national significance, such as the Hume Highway, the Federal Highway and the F3, and that**

- **such corridors have installed on them appropriate and cost effective ITS technology; and**
- **they be used to test integrated ITS infrastructure.**