



New South Wales

IPWEA

INSTITUTE OF PUBLIC WORKS
ENGINEERING AUSTRALASIA



**IPWEA (NSW)
ROADS & TRANSPORT
DIRECTORATE**

Local Government Transport Infrastructure Management in NSW

An information paper prepared by

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for

Infrastructure NSW

February 2017

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Executive Summary

This paper details infrastructure management issues that must be addressed sooner rather than later to provide adequate resources to meet community needs. These issues include:

1. The scale of the Regional and Local Road Network. The fact that Councils are responsible for 163,850 km of the road network with an estimated replacement value in excess of \$65.7 billion is not understood or considered by the other levels of government.
2. Inadequate resources are being made available to councils from all sources to maintain their infrastructure assets. In 2015 the estimated annual funding shortfall was estimated at \$447 million.
3. Lack of an auditable system for assessing and reporting the value and condition of infrastructure assets, an ability to identify and implement innovative products and processes and the lack of a sustainable long term funding model are inhibitors to dealing with these issues.
4. Infrastructure maintenance and renewal costs are increasing at a significantly greater rate than the available revenue stream. This ongoing trend means that infrastructure assets cannot be sustained into the future and that current levels of service cannot be maintained.
5. The State Government cannot achieve the targets contained in its NSW Road Strategy without engaging with Local Government to reduce the road toll on regional and local roads by at least 30%. This level of engagement is currently not in evidence.
6. The management of infrastructure assets requires that there needs to be a concerted and ongoing plan to develop recognise and employ skilled engineers in Local Government.
7. A uniform and clear articulation between TAFE, University and Industry qualifications to provide a simple progression from Certificate, through Diploma through to Degree, Graduate Diploma and Masters, involving cooperation between the VET sector, TAFE, and University would greatly assist in training of potential engineers, especially those supervisors etc. who already work in the industry.
8. There is a need for more comprehensive transport planning across the State to identify which elements of the network need to be upgraded to deliver enriched community outcomes and to concentrate the allocation of additional resources to these elements.
9. Both Local and State Governments require detailed information on the infrastructure needs to support driverless vehicle technology to allow for appropriate long term planning and infrastructure implementation.
10. Management of the total road network requires the development of new products, new road building techniques including providing the necessary knowledge transfer and training across all aspects of the road construction and management industry. This might involve the establishment of a state-wide Research & Development capability. This aim might also be achieved by more focused support for Austroads and wider dissemination and application of its research to Local Government.

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1. Introduction

The Institute of Public Works Engineering Australasia (NSW Division) is a registered charity, membership based, professional organisation representing engineers and others involved in the provision of public works and services predominantly in the local government sphere.

The Roads & Transport Directorate has been set up by IPWEA (NSW) in conjunction with Local Government NSW to provide support to its members working in local government across the state. It is supported financially by membership contributions from Local Councils in NSW.

2. Background

The Roads & Transport Directorate has been set up to meet the demand from members of IPWEA (NSW) to act as a focus for research activities and to provide technical advice.

Its main purpose is to assist Local Government in NSW in the area of road infrastructure and transport related activities by:

- Assisting members in discharging their road management roles in the most effective manner consistent with current legal obligations and the most recent technical practices in the critical area of consistent and cost effective asset management and road safety;
- Assisting the IPWEA (NSW), Local Government NSW, individual Councils and members in lobbying for a higher priority to be placed on road infrastructure provision and maintenance and for a more equitable share of resources and funding; and
- Providing for IPWEA members and Local Government a powerful technical and research resource on transport issues at regional, state and national level. The activities would be, as circumstances dictate, either proactive or reactive to achieve the optimum benefit for the region or state.

The Directorate commenced operation in October 2004 and has been involved in determining the needs of members and developing solutions to meet those needs. Over that period the Directorate has made submissions on a range of issues.

3. The Local and Regional Road Network

Approximately 80% of the Australian road network is managed by Local Government. Half of this network is unsealed. Low-volume local roads provide the vital links between local communities and the national road network. They provide access to international markets and facilitate commerce between communities.

Despite this, the majority of the available funding is directed towards the state and national road networks and Local Government is no longer able to adequately fund the upkeep of this network; 'last mile' issues come as a surprise to higher levels of government.

Road users do not care who the road owner is – they simply want to get from point A to point B safely and without unnecessary delay. On this basis, it is suggested that the road network should be viewed as a whole, with resources assigned to where the demand is greatest or where the economic return to the community is greatest, irrespective of the class of road or which level of government is responsible for it.

The problem, however, is that, currently, planning is carried out on a level of government basis. Current Federal, State and Local Government (Council) plans each dealing with that part of the problem for which they are responsible in isolation. Consultation between all levels of government has been, at best, limited. As a result, outcomes are fragmented and in many cases they do not provide end-to-end transport connectivity.

In terms of road management issues at the technical level, there is a declining understanding of the underlying principles of road asset management within many of the smaller road agencies, including local government agencies. This lack of appreciation of the issues can result in resources not being applied to those areas of the network at greatest risk, which in turn leads to less than optimal road asset performance and increased community costs. An example of this is the lack of understanding of the interrelationships between geometric road design, pavement design, pavement condition and road safety.

This paper discusses these issues and suggests a number of approaches which, if adopted, could deliver significant community benefits without requiring a significant increase in funding.

3.1 The New South Wales Road Network

The NSW road network is mainly managed by Roads and Maritime Services (RMS) and 128 (currently) local Councils. Whilst there are other road managers (e.g. National Parks, which is responsible for 38,500 km of largely unsealed roads), they do not represent significant links between communities, including freight movements (New South Wales National Parks & Wildlife Service 2011).

RMS is responsible for the management of the State Road network, including 18,028 km of the major arterial network plus 2,970 km of regional and local roads (largely unsealed) in the unincorporated area in the west of NSW (Roads & Maritime Services 2015).

In May 2015 the IPWEA (NSW) Roads & Transport Directorate published the fifth in a series of biennial reports from the *Road Asset Benchmarking 2014 Road Management Report* Project. A summary is presented in *Table 1*. Based on data collected from 150 of the (then) 152 councils, it was estimated that the length of regional and local roads was 163,850 km, including 81,002 km of sealed roads and 82,848 km of unsealed roads. The replacement value as at 30 June 2014 was estimated at \$65.7 billion (IPWEA 2015).

Table 1
Details of Road Network in NSW
(excluding National Parks and other privately managed roads)

Type of road	Length of road (km)	Proportion of total length (%)
Roads & Maritime Services		
Sealed	18,000	9.73
Unincorporated area	3,000	1.62
Total	21,000	11.35
Local Government		
Sealed	81,000	43.79
Unsealed	83,000	44.86
Total	164,000	88.65
GRAND TOTAL	185,000	

4. Resources for Local Roads

In terms of funding gap for the management of low-volume local government roads, the IPWEA (2015) estimated that, based on the data obtained from the 150 responding councils, and extrapolated to 152 councils, the annual road funding gap was \$447 million. It was suggested in the report that increasing the funding to this level would require a 41% increase on the 2013/14 road expenditure if asset management principles were not further developed to manage the gap.

Beginning in 2006, the benchmarking reports suggested a range of asset management principles that could be applied to managing the procurement of resources. These principles, and the actions that Local Government has taken in NSW to implement them, are presented in Table 2.

Those actions yet to be addressed are highlighted.

Table 2

Asset Management Principles and Implementation Actions

Management Principles	Implementation Actions
Ensure that all councils have adequate and accurate knowledge on their road assets and how their assets are performing	Integrated Planning and Reporting legislation requires Asset Management Plans and Long Term Finance Plans
Ensure that sealed roads are resurfaced/resealed at the optimum time to maintain waterproofing of pavements	Integrated Planning and Reporting legislation requires Asset Management Plans and Long Term Finance Plans
Select appropriate levels of service, and costs, to meet community needs and in line with available resources	Integrated Planning and Reporting legislation requires community consultation to determine levels of service
Ensure that unsealed roads are re-sheeted at the optimum time to meet agreed service levels and within available resources	Integrated Planning and Reporting legislation requires community consultation to determine levels of service
Make efficiencies in operations, maintenance, resurfacing and pavement renewal aimed at reducing life cycle costs	Annual asset reporting through Special Schedule 7 reporting currently under review
If necessary, improve maintenance practices and funding to extend pavement life and defer projected renewal	Focus on practices and innovation has not been addressed as part of local road asset management
Rationalise (dispose) of unnecessary infrastructure assets	Disposal of low-trafficked roads has not been investigated

Management Principles	Implementation Actions
Adjust service levels in consultation with the community	Integrated Planning and Reporting legislation now requires community consultation to determine levels of service
Identify future renewal needs, and the expenditure required, to meet agreed service levels and document this in a road asset management plan	Integrated Planning and Reporting legislation requires Asset Management Plans and Long Term Finance Plans
Increase funding	In the short term, funding needs have been recognised through the Federal Bridges and Heavy Vehicles Safety Programmes and the State Fixing Country Roads Programme. Framework for sustainable long term funding has not been addressed.
A combination of all these actions	All avenues of resource management are required to develop a sustainable outcome.

(Savage 2016)

The outstanding issues include lack of an auditable system for assessing and reporting the value and condition of infrastructure assets, an ability to identify and implement innovative products and processes and the lack of a sustainable long term funding model.

5. Infrastructure Maintenance and Renewal

One of the ongoing concerns of Local Government in NSW is that infrastructure maintenance and renewal costs are increasing at a significantly greater rate than the available revenue stream. This ongoing trend means that infrastructure assets cannot be sustained into the future and that current levels of service cannot be maintained.

With this issue in mind, the Roads & Transport Directorate has commissioned two pieces of work over recent years - *NSW Local Road Construction Cost Forecasts 2016 – 2026* and *Analysis of State Government Regional Road Funding Assistance – New South Wales*.

5.1. Construction Cost Forecasts

In 2011 The IPWEA (NSW) Roads & Transport Directorate undertook a project to publish the NSW Local Road Construction Cost Forecasts 2010 - 2020 Report. This project was aimed at assisting Asset Managers in NSW in preparing long term (10 year) financial plans from their current year asset management data. An update report was published in October 2012 following the Local Government elections.

The initial proposal was to publish an updated Cost Index Report every four years following the Local Government elections. While the present election cycle has been split, the Roads & Transport Directorate published the NSW Local Road Construction Cost Forecasts 2016 - 2026 Report in October 2016.

The report provides indexes of the costs associated with undertaking road construction work in the local road sector in New South Wales. The indexes capture changes over time in the cost of undertaking road works. These indexes include estimates of historical changes in costs, and also, forecasts of future changes in costs. The forecasts of the cost indexes are provided as a guide to making cost projections in relation to road works, as part of financial planning by local governments in New South Wales.

The indexes are designed to be used as a guide to forecasting costs as part of budgeting and financial planning. They provide forecasts of general cost increases in overall local government road construction works, and also general increases in overall bridge construction, drainage construction and pavement construction. Where planning requires the projection into the future of general cost levels for these various types of work, then the percentage changes in the indexes can be used.

Table 12 of this report (p.38) shows that the index for roads (Index7) is expected to increase by 2.7% while the Rate Peg announced for the 2017/18 financial year is 1.5%. The result is a funding shortfall for the year of at least 1.2% which will significantly worsen the last funding gap estimate of \$447 million per annum.

5.2. Regional Road Funding

At the request of LGNSW the Roads & Transport Directorate prepared a *NSW Local Road Construction Cost Forecasts 2016 – 2026 and Analysis of State Government Regional Road Funding Assistance – New South Wales* Report to determine if State Government Funding for Regional Roads is being provided at an adequate level.

The data provided shows that the basis for carrying out this analysis is clouded by the termination of the 3x3 program and the addition of a comparable amount to the Block Grant programme in 2000/01. Despite this adjustment the report shows that State Government funding is significantly below the Road and Bridge Construction Index (Chart 4).

The Report Summary concludes in part:

- *Looking only at changes in funding since 2000/01, State Government regional road funding assistance has increased at around the same rate as CPI, which is well below the rate of increase in costs of road construction and maintenance in New South Wales.*

The report also includes a section (Section 3) showing the changes in the road and rail freight task in response to a request from another council. This data shows that there has been an under funding of the rail network since well before the change to the Roads Act and subsequent funding distributions in 1993. This has undoubtedly increased the volume of freight carried on the road network in NSW.

6. Road Safety Considerations

6.1. The Road Toll

There was a total of 350 deaths on NSW roads in 2015 (BITRE 2016). Sixty-one per cent of these deaths (210) occurred on the regional and local road network under the control of local government. The total toll has increased to 384 in 2016 – assuming the same percentage as for the previous year (indications are that the proportion has increased) there have been around 234 deaths on the regional and local road network.

The aim of the National Road Safety Strategy 2011-2015 (Department of Infrastructure and Regional Development 2015) is ‘To elevate Australia's road safety ambitions through this decade and beyond’. It is based on the adoption of the ‘safe systems’ principles. It is framed by the guiding vision that no person should be killed or seriously injured on Australia's roads. As a step towards this long-term vision, the strategy presents a 10-year plan to reduce the annual numbers of both deaths and serious injuries on Australian roads by at least 30%.

Based on current statistics, the State Government cannot achieve this target without engaging with Local Government to reduce the road toll on regional and local roads by at least 30%. This level of engagement is currently not in evidence.

6.2. Roadside Environment

In 2015 it was reported that 30% of the 210 crashes (about 60) involved single vehicle impacts with roadside objects. This is a high figure which indicates that there are probably a range of causes: distraction, alcohol, fatigue and poor road design and condition.

One solution is to clear roadside vegetation to provide less hazards and a greater chance of not encountering a tree. The Austroads standard “Clear Zone” for 100km/hr roads is 5 meters from the edge of seal. Very few roads meet this standard.

It has been estimated that the total land area for road reserves is about 6% of the land area of NSW. Apart from covering a large area, the State's roadside reserves contain significant native biodiversity, including ecological communities that are not represented in national parks, public reserves or private land. In rural areas, roadside reserves may constitute the only remaining intact natural environment in the district due to extensive clearing for broad acre farming and other land uses. (NSW Roadside Environment Committee *Managing Roadsides Assessment*)

Trees of more than 100mm diameter are considered as non-frangible hazards and should not be present within the area from edge of traffic lane to the required offset for minimum Clear Zone plus design lane width.

There are many existing trees within this area and they should either be progressively removed or protected by guard fence. Available resources limit the amount of tree clearing and guard fencing that can be carried out and locations are prioritised on a highest risk first basis.

The dilemma is how do we balance the risk of road deaths against the value of biodiversity contained within the road corridor? Local Government is not receiving adequate assistance in dealing with this dilemma.

7. Available Engineering Knowledge and Expertise

In mid-2016 the NSW Branch of Young IPWEA made a submission to the NSW Office of Local Government covering the issue of engineering knowledge and skills. The summary of the problem at the beginning of this submission stated:

In Australia we have a problem, in that less than half of the Australian engineering population is staying employed as an engineer.

Feedback received from members within YIPWEA NSW has given rise to some consistent observations of the sustainability of the Public Works Engineering Profession including:

- *The scarceness of female engineers within the profession;*
- *A concern of a shortage of skilled engineers joining and remaining within Public Works;*
- *The increasing average age of the profession and the difficulties associated with knowledge being transferred and remaining within the industry;*
- *Attracting qualified professionals to live and work in rural/regional communities;*
- *The gap between the academic knowledge and skills gained in university degrees versus the practical experience and ability required to work in the industry; and*
- *The lack of awareness of Public Works as a potential career path for future engineers.*

YIPWEA believe that one of the most effective strategies to address these issues is to not try to import skilled professionals, but rather to raise and nurture skilled professionals from within the local community.

However, the issue is much greater than just the training of new engineers, it encompasses the de-engineering of local government, the management of assets based on least tender price with no regard to whole-of life costs, the early retirement of senior experience engineers and the more rapid turnover of senior staff without accumulated local knowledge being added to.

The fact that infrastructure assets are continuing to be depleted at such an alarming rate coupled with the application of only a rudimentary knowledge of asset management suggests that there needs to be a concerted and ongoing plan to develop recognise and employ skilled engineers in Local Government.

8. Technical Education and Training

There is a current shortage of skilled engineers and technicians in the roads and civil construction fields and in particular in the Local Government Industry.

The problem can be summarised by...

- Not enough students in years 10 to 12 studying subjects deemed suited towards engineering studies
- Engineering students not completing their tertiary studies.
- Students in hot demand and the two speed economy (resource sector very needy for graduates).
- A lack of cohesion between universities and TAFE's students can't articulate easily from one course to another.
- International graduates not necessarily trained to the same level of competency or aware of Australian Standards and lack real life experience in Australian Conditions
- Difficult to undertake part time or distance education
- Lack of uniform registration across states and differing regulations
- Lack of recognition by employers of the specialised skill set, training and importance of engineers. (some employers have simply given up employing engineers at huge risk to the community)

IPWEA (NSW) supports a review of current practises in Education and Training including:

- a. A uniform and clear articulation between TAFE, University and Industry qualifications to provide a simple progression from Certificate, through Diploma through to Degree, Graduate Diploma and Masters, involving cooperation between the VET sector , TAFE , and University would greatly assist in training of potential engineers, especially those supervisors etc. who already work in the industry.
- b. Tertiary education embracing the needs of regional students with attention to part time study, traineeships and mentoring. All evidence and testimony from Regional engineers highlights the challenges facing regional students.
- c. Encouragement of flexible learning, the reinstatement of the University of Technology Sydney Sandwich Course for example is a way in which employers can attract trainees and assist with training and real work experience, especially in regional areas. Emphasis is needed on whole-of-life training programmes to meet the needs of local staff resources.
- d. Sharing of resources between TAFE Colleges and Universities, rather than competing. Currently individual TAFE's are competing with each other and this includes teaching resources. The same could be said for individual universities competing for students.
- e. Development and funding of technical industry learning resources as currently being developed by organisations on a shoe string budget such as IPWEA NSW
- f. Investigation of a fully funded scheme attracting trainee engineers and Apprenticeships in civil construction supervision in the specialised local Government sector with long term training and financial support to Local Government.

9. Regional Transport Planning

There is a need for more comprehensive transport planning across the State. It is obvious from the preceding data that it is not possible to construct all roads to a standard capable of carrying more efficient freight vehicles or more widely dispersed public transport networks. The solution is to identify which elements of the network need to be upgraded to deliver enriched community outcomes and to concentrate the allocation of additional resources to these elements.

It is recognised that the State Government has completed some high level regional transport planning and the Local Councils have developed local transport plans. There is now a need to integrate these two levels of planning to provide a comprehensive, end to end, transport plan which can support present and future resource allocation.

Development of regional transport plans will facilitate the identification of high outcome transport related investment that will maximise economic growth and return on investment while at the same time meeting community expectations. It is the Road & Transport Directorate's view that the areas of road funding and knowledge sharing need to be developed to provide for more efficient infrastructure provision.

As stated earlier, the existing road funding model is unsustainable and needs to be overhauled. For the vast majority of councils there is no direct incentive to invest proactively for freight vehicles since there is no direct link between heavy vehicle usage and income for road improvements and maintenance. Nevertheless, most Councils are concerned to do what they are able to, to encourage improved productivity and increased economic growth (or to avoid negative growth). Many Councils are involved in regional transport or ROCs which are interested in working to improve economic and employment outcomes.

A direct and transparent link between increased demand by heavy vehicles and funding to support the increase in the level of service required would allow councils to make better investment decisions in relation to heavy vehicle networks.

The current *Fixing Country Roads* Programme is an excellent first step in providing additional resources to the local and regional network. It is the view of the Roads & Transport Directorate that the benefits of this Programme would be enhanced by the allocation of resources in accordance with a comprehensive Local / Regional / State transport blueprint.

10. Future Network Requirements – Autonomous Vehicles

In March 2006, the Roads & Transport Directorate made a submission to the NSW Staysafe Committee Inquiry into Driverless Vehicles and Road Safety in NSW. While the Directorate does not profess to have expertise into this developing technology it was able to raise a number of issues which will provide a context for making informed decisions in the immediate future.

The implementing of driverless vehicle technology across the total road network will render licencing of drivers obsolete. This will provide advantages to both younger and older members of the community that are currently unable to operate a vehicle.

If the technology is only available over part of the network (e.g. only the sealed road network) then licencing will still be needed but the range of skills required will need to be enhanced.

In any case there will be a transition period dependant on the uptake of technology within the national vehicle fleet.

To date, the most comprehensive Australian trials have been carried out in South Australia. These trials provided very promising results but there is a long way to go between a trafficless freeway and an unsealed outback road west of Bourke.

Based on the above assumptions the Roads & Transport Directorate raised the following questions in the hope of widening the debate into the implementation of driverless vehicle technology in NSW:

Question 1: What are the minimum infrastructure requirements to support driverless vehicle technology?

Question 2: Who will meet the cost of providing the required infrastructure?

Question 3: Who will meet the cost of maintaining the required infrastructure?

Question 4: What liability will road authorities carry in the event of vehicle accidents resulting from poor or failed infrastructure elements?

Question 5: Does current driverless vehicle technology provide for travel on unsealed roads or will the vast majority of the network be excluded from use by these vehicles?

Question 6: What is the transition period for the full implementation of driverless vehicle technology?

Question 7: What additional liability might road authorities incur if current technology does not remove all impacts with roadside objects such as trees, steep shoulders, significant batters and small drainage structures?

Question 8: What technology will be needed by Road Authorities to manage roadworks including the use of temporary barriers and speed restrictions?

Question 9: Has any research been carried out to determine the likely impacts of driverless vehicles on the public transport system in NSW?

Both State and Local Governments need the answers to these questions so that transport planning can be extended into the future.

11. Embracing Innovation

The Australian Government's Innovation and Science Australia Report titled *Performance Review of the Australian Innovation, Science and Research System 2016*, released in December 2016 confirms IPWEA (NSW) observations across local government.

In relation to the findings Ron Johnston Executive Director, Australian Centre for Innovation, University of Sydney concludes:

Unsurprisingly, perhaps, we do well in many aspects of knowledge creation, but we perform poorly when it comes to knowledge transfer and application.

The report is an excellent compendium of reliable data on key aspects of the innovation, science and research system, including six “enablers”: money; infrastructure; skills; networks; culture; and policy. There will no longer be a need to recite the almost endless number of prior reports on this topic, at least where data are concerned.

Knowledge creation scores its usual 9 out of 10 – a solid “A” on Janey’s report card. Comparatively high funding for research in universities, world class and internationally connected researchers and research infrastructure, but still no university in, or near, the global top 20.

Knowledge transfer looks to come in at about 5 out of 10 – a worrying “C-”. There are few direct mechanisms to support knowledge transfer, under-utilisation of vocational education and training, and the notoriously low level of collaboration between researchers and industry.

Knowledge application barely scrapes a 1 out of 10 – a clear “F”. There is low business expenditure on R&D and employment of researchers, ongoing poor business skills, a low ranking of Australian businesses in international collaboration with other companies, and limited use by government of procurement to promote innovation.

There is a tendency for engineers in Local Government to be highly conservative and risk averse. There is a reluctance to test new products of innovative solutions even if there is supporting data available from other countries. There is still an attitude of “Yes but that won’t work in Australia / NSW/ on local roads” without appropriate review or testing.

Underlying the overall management of the total road network is a need to develop new products, new road building techniques and to provide the necessary knowledge transfer and training across all aspects of the road construction and management industry. This might involve the establishment of a state-wide Research & Development capability. This aim might also be achieved by more focused support for Austroads and wider dissemination and application of its research to Local Government.

I am drawn to Einstein’s definition of insanity – insanity is doing what we’ve always done and expecting to get a different result.

12. Summary and Conclusions

This paper details the major infrastructure management issues facing the Local Government Industry in NSW in continuing to provide sustainable infrastructure for its communities. One approach that has been applied has been the ongoing reduction in service levels. This approach will have dire consequences since it masks the true condition of infrastructure assets in the short term without thought to how basic renewals will be funded in the future. The long lives of infrastructure assets requires that a long term view of maintenance and renewal must be taken to ensure the sustainability of community assets.

This paper details issues that must be addressed sooner rather than later to provide adequate resources to meet community needs. These issues include:

12. The scale of the Regional and Local Road Network. The fact that Councils are responsible for 163,850 km of the road network with an estimated replacement value in excess of \$65.7 billion is not understood or considered by the other levels of government.
13. Inadequate resources are being made available to councils from all sources to maintain their infrastructure assets. In 2015 the estimated annual funding shortfall was estimated at \$447 million.
14. Lack of an auditable system for assessing and reporting the value and condition of infrastructure assets, an ability to identify and implement innovative products and processes and the lack of a sustainable long term funding model are inhibitors to dealing with these issues.
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16. The State Government cannot achieve the targets contained in its NSW Road Strategy without engaging with Local Government to reduce the road toll on regional and local roads by at least 30%. This level of engagement is currently not in evidence.
17. The management of infrastructure assets requires that there needs to be a concerted and ongoing plan to develop recognise and employ skilled engineers in Local Government.
18. A uniform and clear articulation between TAFE, University and Industry qualifications to provide a simple progression from Certificate, through Diploma through to Degree, Graduate Diploma and Masters, involving cooperation between the VET sector, TAFE, and University would greatly assist in training of potential engineers, especially those supervisors etc. who already work in the industry.
19. There is a need for more comprehensive transport planning across the State to identify which elements of the network need to be upgraded to deliver enriched community outcomes and to concentrate the allocation of additional resources to these elements.
20. Both Local and State Governments require detailed information on the infrastructure needs to support driverless vehicle technology to allow for appropriate long term planning and infrastructure implementation.
21. Management of the total road network requires the development of new products, new road building techniques including providing the necessary knowledge transfer and training across all aspects of the road construction and management industry. This might involve the establishment of a state-wide Research & Development capability. This aim

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