

WORTH FEEDING

Case studies of rural local road efficiency
and reform of Australia's road pricing
and investment systems

Prepared by Juturna Consulting for Australian Rural Roads Group
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CONTENTS

Preface	3
Executive Summary	4
Introduction	5
Question 1: What is the current basis of road pricing and is it the right one?	6
Question 2: Is the way higher governments distribute road funds to local governments an efficient one for rural Australia?	13
Question 3: What inherited assumptions do policy makers make about rural local roads?	16
Hypothesis: 'some rural local roads can pay for themselves'	16
'Worth feeding': 4 case studies of rural local road efficiency	19
Case study results	22
Implications and observations	24
How local road funding and investment reform can work	24
Linking road charges to investment: the benefits	25
ARRG case study findings in the broader reform context	28
Appendix: Case study key data sets	31

PREFACE

The Australian Rural Roads Group (ARRG) is an alliance of over 20% of all local governments in Australia, comprising much of Australia's rural and remote local government areas. Our objective is to increase the total amount of rural local road funding available, by advocating better policies. These goals are being pursued to improve the efficiency, sustainability and safety of rural communities.

The ARRG's inaugural report *Going Nowhere: The Rural Local Roads Crisis, Its National Significance and Proposed Reforms* (2010) brought this issue to greater prominence. The report revealed a multi-billion dollar annual maintenance gap facing rural local roads – a gap substantially higher than governments had previously assumed – and flagged an increasing road funding debt being left to future generations to service. The report also drew attention to underlying agricultural productivity, emphasising how much of the prosperity and (road) safety of these farming communities was dependant on

efficient road infrastructure. Finally, the report advanced practical policy recommendations regarding asset reporting, management and a more efficient future investment mechanism for the local road network.

Following publication of its inaugural report, the ARRG executive met with a great many politicians and senior public servants at all levels of government. The consistent message from these meetings was that intuitively the group had a good case and an attractive suite of reforms, but that these broad assumptions needed to be tested with dedicated research and analysis. Since this time the ARRG has commissioned professional case study analysis to test its policy reform proposals.

In this first research paper, the ARRG tests a key inherited assumption about rural local roads: government policy makers have long considered rural local roads to be largely a loss-making exercise,

dependant on taxpayer subsidy to survive. This case study challenges that stereotype with hard analysis of actual local rural roads. The results may surprise and they have implications for the inadequate grant funding model that these roads are currently forced to rely upon. This paper also has a lot to say about the inadequacies of our current road pricing and funding allocation systems. We hope that this research paper will deliver a compelling way forward for national road asset management and better rural road investment models.

We particularly hope this paper can contribute to constructive thinking around road reform as part of the Australian Tax Summit 2011.

John Coulton

Mayor Gwydir Shire NSW
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EXECUTIVE SUMMARY

- Rural local roads have traditionally been viewed as the least productive parts of Australia's road network. This has impacted adversely on funding outcomes for these roads.
- The ARRГ resolved to test this assumption about rural local roads. It carried out a detailed case study of 4 rural local roads in Gwydir local government area in northern NSW;
- This analysis has revealed that 2 of the 4 roads already entirely pay for their long-term maintenance costs through the amount of road user fees that these same stretches of road generate in current vehicle traffic;
- This analysis was only possible because the local government involved was able to produce very accurate road asset condition and maintenance costs for these roads;
- Without nationwide production of such road asset reports – and without a national system that makes these reports visible to everyone - private sector funding in roads will never occur. This will force Australia's local roads to remain wholly dependent upon dwindling taxpayer revenue to fund an Australian local road network that is valued at over \$75 billion.
- Under current arrangements, where public sector revenue is the only source of funds available for local roads, these roads are never guaranteed to see effective funding outcomes because Australia does not have a road pricing system interested in getting to grips with the road assets themselves and their true condition. The presence of big maintenance funding gaps nationwide bears this out;
- In its road pricing reform proposals, the Productivity Commission's *Inquiry into Road and Rail Infrastructure Pricing* in 2006 did not pay enough attention to the importance of understanding the road asset itself, and its costs. ARRГ is concerned that COAG's present road reform program has similarly failed to understand the importance of road asset reporting and analysis for better road pricing and funding;
- The ARRГ's proposals for mandatory road asset reporting by all governments and collation and analysis of this information by a national road portfolio manager are practical ways to solve this problem and start getting to grips with the true rural road funding crisis; and
- This ARRГ recommendation is consistent with the views and recommendations of Infrastructure Australia regarding road asset management. These recommendations are also the essential structural reforms which would pave the way for private investment in road infrastructure in the future.

INTRODUCTION

The Australian Rural Roads Group is concerned about the poor state of roads and the significant lack of funding available for rural local roads in particular.

In the ARRG's view, this all stems from a national road charging and funding system that is fundamentally poorly designed, as it refuses to base itself on accurate road condition reporting; it is a highly-theoretical, highly averaged system that is not meeting the real funding needs of this vital infrastructure.

This situation is exacerbated by only scarce *public* funds being available to commit to local roads. Private investment in road infrastructure remains an untapped resource for Australia's road networks. This stems in large part from a failure to get to grips with accurate road asset condition and cost reporting to higher governments.

This case study and analysis sets out to examine this matter in more detail. It attempts to present a 'plain English' summary of the features of Australia's complex and impractical current road pricing and funding system, as well as offering alternatives, so as to prompt serious debate of this system in the community and in turn to prompt sensible reforms by government.

The paper revolves around the lessons drawn from a detailed case study analysis on 4 rural local roads in the productive agricultural local government area of Gwydir in northern NSW. But the paper begins by asking 3 important questions about road pricing and funding policy in Australia:

1. **What is the current basis of road pricing - and is it the right one for our roads?**

2. **Is the current way higher governments distribute road funds to local governments an efficient one for rural Australia?**
3. **What inherited assumptions do policy makers have about rural local roads - and are these assumptions correct?**

The paper then discusses the case studies in detail and draws conclusions from this field testing. Finally, the report closes by suggesting how this paper can assist wider government reform efforts in road pricing and investment as well as what sort of practical structural reforms should occur to deliver better results for rural communities and their roads.

QUESTION 1:

WHAT IS THE CURRENT BASIS OF ROAD PRICING - AND IS IT THE RIGHT ONE FOR RURAL LOCAL ROADS?

The wear and tear that occurs on Australian roads is a result of the effects of both natural elements over time sun, rain, heat, cold, etc) and of road use by vehicles, with heavy articulated trucks doing the most to reduce the strength and condition of a road over time. To ensure that costs are met so that a road can be maintained in more or less its current condition, Australia needs an effective road pricing system that generates revenues to cover the costs of maintaining these roads. Getting road pricing right is vital for Australia's economic productivity and the road safety and amenity of its communities.

In the ARRG's view, Australia does not have an effective road pricing system.

What passes for Australia's pricing model simply involves government estimates of recent road expenditure being recovered through future road user charges. But all the while, Australia's roads are not receiving the funding they truly need: the presence of maintenance, resealing, resheeting and renewal funding gaps experienced across local government road networks bears out the failure of the system. This system must change and greater attention must be paid to the actual current condition of local road assets, if Australia's road networks are to be saved from accelerating decay and ultimate failure.

In more detail: what is the 'road pricing' system we have now?

'Road pricing' refers to how government calculates the cost of damage to the road network, so that it can levy charges on road users and use them to make sufficient funds available to keep the road network maintained over time.

At present in Australia, revenue comes about through fees and charges levied on drivers and vehicles: drivers pay excise on the fuel they burn and they pay to register vehicles on the road. Australia uses a pay-as-you-go system (PAYGO) which aims to generate enough road revenue to cover the direct financial cost of road provision. Under Australia's PAYGO system, the National Transport Commission gathers annual expenditure on roads across all levels of government; theoretical modelling is then employed to establish which classes of vehicles contributed to that road expenditure in a proportional sense (for example, how much did the wear and tear of each respective vehicle class contribute to total road expenditure?). Different charges by class of vehicle are set from these calculations.

The Productivity Commission considered the PAYGO system...

While it proposed several reforms, the Productivity Commission's official 2006 *Inquiry into Road and Rail Infrastructure Pricing* came out broadly in support of basic features of the current model. It found that, all things being equal:'

...annual road expenditure will be a reasonable approximation of the annualised (financial) costs of road provision in any period...'

The Inquiry went on to find that:

'In principle, PAYGO charges will cover the financial and economic costs of providing road services over time.'

But did the Productivity Commission get it wrong?

The ARRG believes this finding to be in error. Australia's current PAYGO road charging system is in fact not a *cost recovery system* at all. Instead, it is at best an *expenditure recovery system*: this is because PAYGO calculates and recovers (through vehicle charging) only the (insufficient) amounts that governments have been spending on the roads in the recent past. This is a crucial point: what *was spent* does not necessarily equate to what *should have been spent* in order to address all genuine road maintenance needs.



The road pricing system Australia has now doesn't cover the true cost of road costs – it just reflects (in road user fees) the inadequate amount governments have spent on roads in the past.

QUESTION 1: CONTINUED

ARRG is very confident that the true cost pressures of Australia's roads are not being met: it draws this confidence from the undisputed presence of very large identified 'maintenance funding gaps' across Australia's road network.

Big maintenance gaps on our roads means the model doesn't work

'Maintenance gaps' – also known as 'life-cycle funding gaps' – are terms used by civil engineers to describe essential work for the maintenance of the road that cannot be performed because of road budget limitations. In 2010 the ARRG's first report used a very detailed set of *Institute of Public Works and Engineering Australia surveys* of local government areas to uncover a projected \$2.823 billion *per annum* nationwide maintenance funding gap on local government roads¹⁸.

Several previous government-endorsed estimates of this annual local road funding gap were smaller than the ARRG's estimate. Notwithstanding a difference of opinion over the precise *size* of the gap, the fact remains that a very sizeable road maintenance gap *does exist* between the funds being expended on roads and the costs roads actually face to be maintained to current conditions.

Self-evidently, if the PAYGO system was truly recovering the wear and tear costs, there would be no substantial funding gap: new road user charges would cover the true costs of replacing and maintaining roads, were the system to work as the Productivity Commission has asserted. But this is not the observed case – the identified funding gap for local roads alone has been estimated at between many hundreds of millions to several billions per year. Professional evidence supports this view: the presence of a large funding gap is corroborated by successive Engineers Australia's report cards on Australia's local road infrastructure. The 2011 *Infrastructure Report Card* rated Australia's local road network as 'poor' and marked these roads at only D+; The report went on to state that:

'The gap is widening between the funds required to maintain and improve local roads and what is actually being spent'¹⁹.

The ARRG believes this important matter warrants comprehensive re-examination. This scale of maintenance deficit cannot be blamed solely upon incompetent local government road spending choices. Poor individual funding choices aside, the *quantum* of funds being made available to deal with road

maintenance is clearly too small for Australia's local road needs.

In light of these very significant funding gaps being identified by engineers, by industry, by communities and even officially by multiple levels of government, how did the Productivity Commission get its assessment of the system so wrong?

A failure to address road asset management and reporting has created this broken road pricing system

In the ARRG's view, the answer lies in the failure of Australia's road pricing system to test its road charging assumptions against actual, costed road asset reports. In statistics terminology, the problem is one of *identification*: the current model only examines what *was spent* previously on roads. But the most important question a good pricing model must ask is whether the amount that *was spent* reflected the true road maintenance needs of the roads. Unfortunately, Australia's current pricing system does not ask that question. Asking that question would require a system that tests road spending levels against quantitative analysis about the *actual* condition of our roads.



Because there is no interest in reporting on the actual condition of roads and their true long run maintenance costs nationwide, Australia is underestimating its road pricing needs – the presence of big funding gaps in the local road network make this clear.

QUESTION 1: CONTINUED

Why aren't actual road condition reports used?

There appears to be a fundamental lack of faith amongst State and Federal road agencies, Austroads and the National Transport Commission that the actual condition and costs of Australia's roads can be observed and reported on accurately and efficiently. The ARRG also suspects that the PAYGO system, with its focus on complex modelling undertaken by higher government agencies, has become intuitively attractive to large, centrally-located bureaucracies, which can tend to become disconnected from the real engineering realities of actual road networks – particularly rural local roads.

Nobody has a picture of actual road asset cost and condition nationwide

It is true that at present, there is almost no national road asset information available from which to develop a picture of the true cost pressures of Australia's roads. Almost 30 years ago, probably the last very detailed Federal statistical analysis of local government roads noted:

'One point of concern to this study is the general lack

of available detailed information on these roads, both physical and financial, as compared with arterial roads. This lack of information and the diverse nature of local roads has inhibited the development of mathematical models which would be suitable for analysing the performance of local roads'.

In other words, feeding historical road spending data into the model without checking this against actual road condition and maintenance needs (which is what happens currently) produces road user charges that nobody can have any confidence in.

Many years on from this report, access to useful and consistent road condition and cost data has not improved and may well have deteriorated.

But this is not the fault of local government, many local governments maintain very accurate cost and condition pictures and long-run maintenance cycles *for every single road in their shire*. The problem, it seems to the ARRG, is that nobody in higher government seems interested in getting to grips with the facts about road conditions and costs.

This matter will be returned to later in this paper in recommending a national road portfolio manager who would be in a position to compare assumptions with

actual road condition reports, so as to ensure prices are being generated for road users to cover actual road needs.

No asset reporting = no chance of private investment

As this report will go on to discuss, it is this failure to make available an accurate 'picture' of the cost and condition of the local road network that is also the major inhibitor to potential private sector investment in this network in future.

Pricing mechanics disadvantage rural local governments most of all

In its 2006 Inquiry, the Productivity Commission noted that in developing its estimates of road charges, the National Transport Commission decided to exclude around \$2 billion dollars of the estimated \$10.6 billion in road expenditure from its road user calculations; this \$ 2 billion reflected the money spent on local road access maintenance. According to the Inquiry, the National Transport Commission considered that these works should not be funded by road users through the pricing model, but would more appropriately be funded by local government own-source revenue.'

Rural and remote local governments – the ones with the least ability to generate big revenues – have suffered the most from the questionable assumptions of a centralised, highly-averaged and theoretical approach to road pricing.



QUESTION 1: CONTINUED

This outcome seems to have been particularly damaging for local road budgets in rural and remote areas. As the ARRG's first report noted - and the *NSW Inquiry into the Financial Sustainability of NSW Local Government*¹⁶ made quite clear some years earlier - rural and remote local governments do not have significant own source revenue generation capabilities - their populations are small, and these populations for the most part earn a lower average *per capita* income than urban ratepayers. More importantly, rural local governments cannot rely on the lucrative revenue to be found in parking fines, property development revenue and fees and fines that urban councils enjoy.

Ironically, two years later, the Productivity Commission itself came to this conclusion in its 2008 research report into local government revenue raising, which found that:

'for many but not all urban councils (an) increase

in (own source) revenue would lead to them being financially independent, based on current levels of expenditure... but for rural and remote councils, the situation is different'.

It seems therefore that \$2 billion in road user charges has been left unlevied on road users, on the basis that local governments should find this money themselves to pay for their road networks. This quite arbitrary central road pricing decision continues to penalise rural local governments and deserves review in the next national road user charges determination.

More broadly, the ARRG believes this to be a powerful example of the dangers inherent in Australia persisting with a central, 'highly-averaged' theoretical road pricing system that has no clear link to quantitative information about the condition and cost of real roads, and what is more, no obligation to source this real information as a vital check on the accuracy of its road charging assumptions.

This issue was identified in 2006 - what has happened since?

In defence of the Productivity Commission, the ARRG notes that the 2006 Inquiry did raise concerns over the basis of the NTC's removal of \$2 billion dollars of local access road expenditure from its overall model. The Commission found that:

'collecting disaggregated local road data would significantly improve the robustness of the cost allocation methodology'.

But 6 years after the Productivity Commission made the finding¹⁷ that further work should be done in this area, the ARRG is not aware of any move to develop a comprehensive asset condition and cost picture for all local roads.

QUESTION 2:

IS THE WAY HIGHER GOVERNMENTS DISTRIBUTE ROAD FUNDS TO LOCAL GOVERNMENTS AN EFFICIENT ONE FOR RURAL AUSTRALIA?

Because the way in which road charging is developed in Australia does not concern itself with actual road costs, the way in which road funds are distributed from higher governments back to local governments has also suffered.

A Federal government assessment of the local road network in 1984 noted that there was also a broader failure to pursue efficient investments in the road network:

'History reveals...that expenditure on roads has consistently been at a level below that justified by projects showing (benefit cost ratios greater than one) and, furthermore, that the expenditure actually undertaken has not been distributed in such a way as to produce the maximum economic return by concentrating on those projects with highest benefit cost ratios'.^{viii}

How do rural local governments fund local roads now?

Funding for rural local roads is by and large sourced in one of two ways:

- council 'own source' revenue; or
- grant funding from higher government

Funding through council own source revenue: challenges for rural areas

Rural local governments have very little further ability to raise significant own-source revenue from their own council areas. This is because rural councils do not have access to the fines, parking fees and profitable land development revenues that many urban councils can generate. The 2006 *Inquiry into the Financial Sustainability of New South Wales Local Government* found that:

'(rural councils) are dependent on grant funding for almost a third of their total revenues. These councils own vast road networks, which they are failing to maintain and renew because their resident rating base is too small to do so'.^{ix}

This statement may well prove conservative: Gwydir Shire for example (the Shire which conducted these case studies) relies on higher grant revenue for two-thirds of its total revenue. Ironically enough, it is the very success of many rural regions that is exacerbating this situation. Larger-scale, more efficient farming techniques -using the latest labour-saving technology – are increasing farm productivity levels. These very productivity advances reduce the labour force required in these rural areas. This in turn reduces the rating base of these rural local governments, even as the

need for better rural local roads to accommodate larger, higher-productivity freight vehicles becomes more acute. It is not clear to the ARRГ that these 'population' losses (in road grant funding terms) are fully offset by improved land values in the current grant funding model.

Farming efficiency is placing even more stress on ageing road networks

There is also a geographic element to these productivity developments: major breakthroughs in transport and agricultural science in recent years are allowing land that a generation ago was considered unsuitable for intensive productive farming to become extremely profitable. Yet the remaining low standard of road networks in these same areas still represent the farming assumptions of an earlier time – civil engineers in the 1950s did not plan, for example, for high-intensity cropping operations west of the Newell Highway in northern NSW – the legacy of original soil roads which still dominate these areas reflect these earlier assumptions about the farming task – yet today, this is one of Australia's most productive hard grain zones. Such situations are occurring across Australia – as Australian agriculture becomes more productive, it places ever greater pressures on a broken local road funding system.



Higher grant allocations may be sending less road grants to local governments as their local farming population declines in direct proportion to their agricultural sector becoming technically more efficient. Is this the sign of an effective local road funding system?

QUESTION 2: CONTINUED

The current local government funding system is not addressing these important trends. Under current arrangements, smaller rural populations driven by farming efficiencies have to hope that their changing road funding needs will be picked up by statisticians through census data, and that public servants might then make appropriate minor changes to horizontal equity road funding grants for that area. This is hardly an efficient or timely way to respond to the efficiency needs of these road networks. Only a road funding system that explicitly seeks out efficient future road investments by concentrating on the actual cost pressures facing these roads can solve the problem.

Funding through higher government grant allocations

The ARRГ believes that Australia's equity-based grants system, which allocates grants with no concern for efficiency opportunities or actual cost pressures facing local roads, combined with a broken charging model, is harmful to the road network. This system has been retained as a road funding and distribution solution for too long, perhaps because governments have assumed it is too hard to do any better.

The higher government grants received by local governments are not designed or in any way required to meet the funding requirements of specific local roads – this is because those who design the grants, like those who calculate road user charges - have absolutely no visibility of the true road asset condition and cost requirements of the councils they are sending grants to.

Instead, local government grants are spread across all local governments through a system known as horizontal equity funding. Under this arrangement, a highly-complex averaging model takes into account the size of a local government's road network, its remoteness, its population size and many other factors to arrive at a fair and equitable distribution of limited road funds across all local governments, so as not to disadvantage any council.

Equity considerations are vital, but efficiency concerns are important too!

The ARRГ agrees that equity considerations are very important and must be retained to promote fair basic distributions across the network. But equally, the ARRГ

is very concerned that grants are not at all required to consider funding productive road networks, or channelling funding to the most efficient future road upgrades on specific road networks.



At present, Canberra funds Australia's rural road grants by dropping funding grants on all local governments. The main aim is to make these allocations fair in a relative sense, but funding efficient allocations – sending funds to the roads that need them most - is not a motivation at all.

QUESTION 3:

WHAT INHERITED ASSUMPTIONS DO POLICY MAKERS MAKE ABOUT RURAL LOCAL ROADS - AND ARE THEY CORRECT?

Rural local roads have traditionally been viewed by road policy makers as the least efficient of all road networks, unworthy of significant attention for funding or investment reform.

This attitude has been exacerbated by the poor road charging system that Australia's road agencies are employing (see above). For decades, local roads have only been examined in terms of broad averages, without enough attention to actual roads, and how efficient or not they might be, how important they might be to commerce and industry and what *actual costs* they face in order to be maintained to safe and efficient standards.

This lack of understanding of actual roads and their actual costs has led to clear bureaucratic prejudices about the efficiency of pushing additional funds to these networks. This attitude is summed up well in the Bureau of Transport *Economics' Assessment of the Australian Road System* in 1984, which drew on

an analysis of average outcomes across local roads to make the following statement:

'Analysis undertaken in the course of previous road studies has demonstrated that economic efficiency considerations would be best served by a smaller proportion of available funds being applied to local roads. This is primarily because the traffic volumes on local roads are much lower than on arterial roads and this depresses benefit cost ratios.'

Are these assumptions correct?

Clearly, these assumptions deserve to be challenged. They stem from the limitations of a highly-averaged and centralised pricing and charging system which does not rely on actual road asset condition and cost data and (this is the case for any specific roads, let alone any specific *rural local roads*). The assumptions are also perhaps partly driven by the experience of a road grant distribution methodology which explicitly

excludes efficiency from its distribution decisions. These structures may have bred general policy outcomes that do not sufficiently reflect the actual efficiency opportunities on offer for some rural roads under the right conditions – the case studies that follow bear out this assertion.

Hypothesis: 'some rural local roads can pay for themselves'

A balanced view of the total local road network is required: the ARRG does not dispute that many rural local roads are indeed provided on a subsidised, *community service obligation* basis, insofar as they do not support traffic levels (and therefore generate sufficient fuel excise) to pay for road upkeep. Access roads to remote farms are a good example of such roads: they are provided for basic ratepayer amenity and connectedness reasons.

Some local roads will never cover their total maintenance costs simply from the revenue generated by their annual vehicle traffic, but these roads do provide basic access to ratepayer properties and may be important access roads for community safety or amenity. It is appropriate that equity-based funding grants from higher government continue to subsidise such local roads.

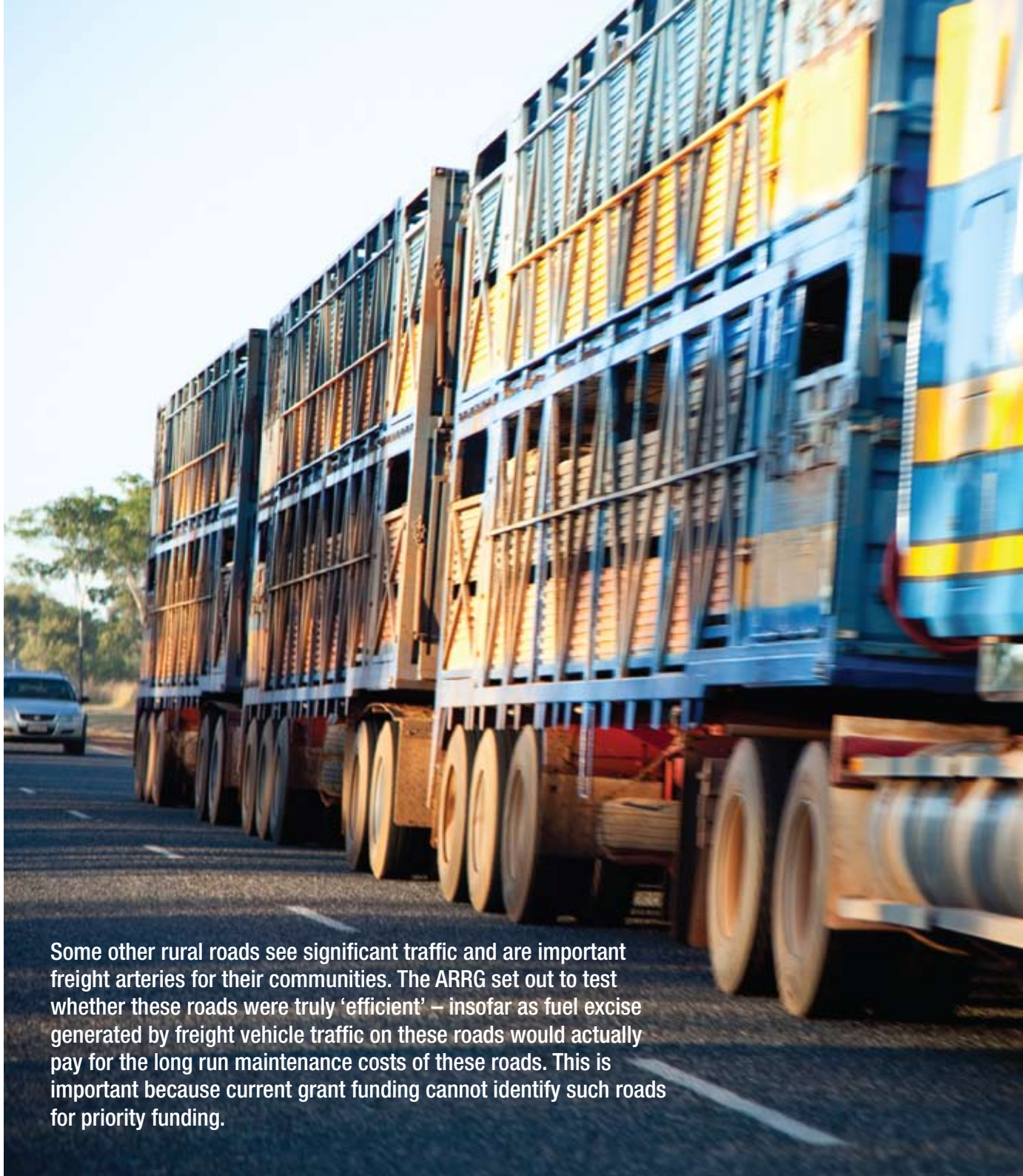


QUESTION 3: CONTINUED

But at the same time, Australia's agricultural freight task uses certain rural roads extremely intensively as the first part of the journey to market for farm commodities, and as the last mile of the journey of supplies back to these same agricultural areas. Increasingly, mining interests are traversing similar roads with greater intensity, for similar reasons. On this basis the ARRG felt confident that many rural local roads were not simply 'basket-case' candidates requiring taxpayer subsidisation.

Testing the assumptions

The ARRG is aware that this basic hypothesis has never been formally tested through a case study analysis of actual rural local roads and the actual vehicle traffic levels on these roads. This analysis, it was reasoned, would provide a good indication of actual fuel excise generated by activity taking place on these specific roads, and this could then be compared to actual, annual long-run maintenance costs for the very same stretches of road.



Some other rural roads see significant traffic and are important freight arteries for their communities. The ARRG set out to test whether these roads were truly 'efficient' – insofar as fuel excise generated by freight vehicle traffic on these roads would actually pay for the long run maintenance costs of these roads. This is important because current grant funding cannot identify such roads for priority funding.

'WORTH FEEDING': 4 CASE STUDIES OF RURAL LOCAL ROAD EFFICIENCY

Case study zone - Gwydir Shire

Gwydir Shire in northern NSW has a population of just over 5,000 people, an area of around 9,450 square kilometres and around 1,900 kms of local roads to maintain. Gwydir comprises the towns of Bingara and Warialda, with many smaller farming towns dotted across the shire. The shire's main industry is agriculture-based: very high-productivity dry and irrigated cropping and livestock production (including some of Australia's largest cattle feedlots) are the key farming pursuits in the district, along with tourism and increasingly, mineral resource exploration.

According to the 2006 census statistics, Gwydir produced \$140 million in gross annual agricultural product, putting it in the top 15% of most productive agricultural local government regions in Australia.



The town of Warialda in the Gwydir Shire, northern NSW
Photo courtesy <http://expressway.paulrands.com/>

Gwydir Shire has a very strong reliance on road freight and its local road network to transport its agricultural products from its farms to processing, domestic consumption and export destinations. It was therefore

seen to be a representative candidate for a rural local road case study where the focus was on establishing whether road activity alone could 'pay' for road maintenance.

'WORTH FEEDING': ROADS CHOSEN FOR CASE STUDY ANALYSIS

4 local roads in Gwydir shire were chosen for analysis

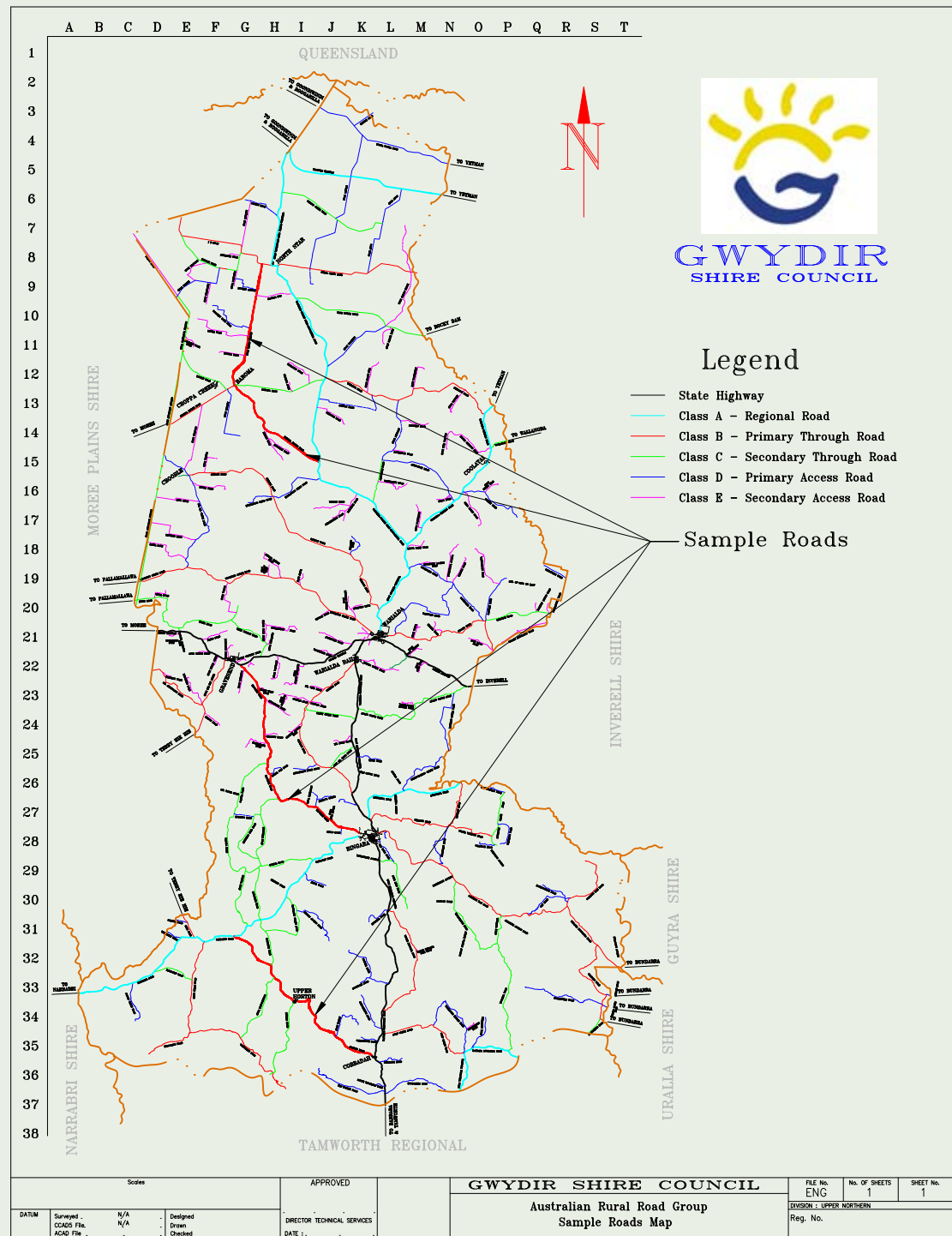
- A 49.92 km section of Elcome Road
- A 20.56 km section of Barooma Downs Road
- A 23.6 km section of Croppa Creek Road
- A 22.07 km section of Horton Road

Each of the 4 roads is rated for access by B-double heavy vehicles. The map on this page reveals the position of these roads relative to the wider road network in the shire.

Basis for road selection

The selection was carried out by ARRG consultants in consultation with the engineering staff of the Gwydir shire council. On the advice of engineering managers, these four roads were selected as being representative of the following characteristics:

- The roads were local roads under funding control of the shire; and
- The roads were each considered by local engineers to be representative of the shire's key roads for its freight task, in that they tended to be used quite intensively on a seasonal basis.





Could some rural local roads 'pay for' their own maintenance costs from the level of road user fees they already generate through current vehicle traffic levels? This question formed the basis of the ARRG's analysis

'WORTH FEEDING':

RESEARCH OBJECTIVES AND ANALYSIS ASSUMPTIONS

The case study analysis set out to compare the likely annual fuel excise generated by movements on these stretches of road with the annual maintenance budgets for these same sections, which incorporated

not only the annual maintenance work, but also reflected to cost of periodic resheeting and renewal of these roads over their life span.

The question asked was simple: *can these rural local roads 'feed themselves' simply through the fuel excise they generate already?*

'WORTH FEEDING': CASE STUDY RESULTS

Analysis found that 2 of the 4 roads were already more than 'funding themselves' by generating more than enough road user fee (*via* fuel excise) to cover ongoing long-run maintenance costs, as Table 1 reveals:

Table 1: Annual road use fee collection versus annual maintenance costs

Road	\$ Annual per km road use fee collected	\$ Annual per km maintenance cost
Elcome Rd (49.92 kms)	96,076	75,890
Barooma Downs Rd (20.56kms)	18,336	32,865
Croppa Creek Road (23.6 kms)	39,979	39,855
Horton Road (22.07kms)	19,298	57,059
TOTAL	173,689	205,669

Case study research methodology and assumptions

What road maintenance budget was estimated for the analysis?

Road maintenance costs were estimated using the actual costs committed to these roads by council over recent years. Added to this yearly maintenance budget, representative amounts were estimated for a number of 'life cycle' costs that faced these roads, comprising:

- An 8-year resheeting cycle (gravel) and 20-year reseal cycle (bitumen); and
- A 40-year renewal cycle;

The case studies thereby derived the annual cost by considering a 120-year maintenance cycle for each road. Annual long-run maintenance costs were then estimated as the annuity that when discounted over a 120-year period generated the present value of the above expenditures when discounted at a real social discount rate of 7%

This in effect gives as accurate as possible a picture of the cost of maintaining the road over its operational life.

Vehicle movement observation technology and approach

Vehicle movements were derived from traffic counts taken using Gwydir shire engineering department mobile traffic count technology, operated by council engineers. This technology measures the axle groupings of each vehicle, which establishes the precise category of the car or truck in question. The traffic count ropes were set up at the each end of each stretch of road. The traffic counted was expressed as a mean average figure of traffic counts at each end of the stretch of road. The average was calculated for both the harvest and non harvest period and the yearly count was found by multiplying the average by 365.

Through-traffic vehicle assumptions on case study routes

The traffic count technology distinguished between north and south-bound traffic, but an additional day of physical observations was conducted by council engineering staff on each of the 4 roads, to ensure that reasonable assumptions could be made about the number of vehicles travelling the full length of the case study road sections.

Actual observation periods and annualisation of the data

Observations were taken over a 1-month period in February-March 2011, as representative of the more intensive road usage pattern brought about by the summer harvest time in this area.

A second observation period of 3 weeks' duration was then conducted in April-May 2011, after the 'harvest period', to give a representative picture of likely traffic levels in less-intensive usage periods for these roads.

These two observations formed the basis for an annualised vehicle movement estimate. The estimate incorporated all Austroads classes of vehicles from cars through to B-double heavy articulated trucks.

Fuel excise assumptions

Fuel excise was calculated at the lower level for heavy vehicles, representing the effect of the 15.54 cent per litre on road diesel rebate available to commercial vehicles. For light vehicles, a 22.6 cent per litre road use fee has been assumed for modelling revenue generated – even though nominally cars pay a full 38.14 cents per litre in fuel excise.

The case study has employed this lower figure for cars as it wishes to avoid wider arguments that are sometimes advanced for the return of the full 38.14 excise from light vehicles to roads: arguments have been mounted for part of the full excise figure to be employed as a social tax to combat road externalities such as urban congestion and noise suppression. It was felt that the rural local roads being examined in these case studies were not relevant to such policy instruments and it would therefore be a more conservative

and appropriate approach to apply only a lower 22.6 cents per litre road use fee to light vehicle movements on these roads.

Fuel usage assumptions by vehicle class

The traffic count technology recorded different vehicle categories, consistent with Austroads vehicle identification classes. In order that the fuel usage across total traffic levels was as accurate as possible, the estimated average fuel usage per kilometre from each discrete vehicle class observed on the case study roads compared with average kilometres travelled per vehicle class in the most recent *National Survey of Motor Vehicles* report.

NOTE *Further relevant tables are included in the appendix to this report. The ARRГ is happy to be contacted to discuss the inputs and assumptions in further detail.*

'WORTH FEEDING': IMPLICATIONS AND OBSERVATIONS

The current averaging system of funding is inefficient for a portion of rural local roads. In 2 of 4 rural local roads subjected to close analysis, the excise charges derived from road patronage more than maintains the road to current levels. This means that these roads could 'feed themselves' on current vehicle traffic alone, if Australia only had a system that returned funds to precise roads.

Unfortunately, as outlined earlier, the challenge is in bringing any of these charges back to these roads; under current charging and grant funding arrangements, higher governments fail to concern themselves with the relative efficiency of local roads, and how smarter and more efficient allocations could be made with scarce taxpayer funds for maximum economic effect on these road networks, just by focussing on their actual condition and costs, relative to their traffic levels.

This more accurate information is not beyond reach!

The appendices to this case study show how Gwydir Shire engineers maintain this level of detail of long-run road maintenance costs and actual condition reports for all 214 roads that are the responsibility of the Gwydir shire.

This is the type of fundamental, practical information about the Australian road network that is vital for achieving a better national road pricing system and local road grant allocation mechanism. Unfortunately, there is no national requirement for it at present, meaning this sort of analysis is not performed centrally. Yet this is precisely the sort of information the Productivity Commission appears to have been referring to almost 6 years ago when it found that

'collecting disaggregated local road data would significantly improve the robustness of the cost allocation methodology'.

How local road funding and investment reform could work

- Under a better system, all local governments would be required to provide a simple, regular condition and cost report for their road networks;
- Provision of these reports should become a condition of receiving grant funding from higher governments;
- This information would then be collated, published and analysed by a **national road portfolio manager**, and would inform a better road pricing system and funding allocation approach;
- Basic own-source revenue and higher government grants would continue to flow to local governments on a horizontal equity funding basis, forming the 'rump' of local road funding; but
- A separate pool of grant funds would be set aside;
- Local governments, local industries and alliances of these groups would be encouraged to come forward with business cases for funding from this separate pool of funds on an efficiency basis, drawing on the road condition information available through the national road portfolio manager;
- The part of the network that was not identified for efficient funding opportunities could continue to be funded on a community service obligation basis, but the efficiency fund would start to allow road pricing and grant allocations to make more efficient and targeted future allocations in local roads, at higher levels of funding where greater funding outlays proved efficient.

'WORTH FEEDING': LINKING ROAD CHARGES TO INVESTMENT: THE BENEFITS

The ARRГ's proposed model would be a step towards linking the revenue collected on roads to more efficient reinvestment in these road networks where it made sense to do so, with the remainder of the network continuing to be grant-funded on an equity basis. The ARRГ believes that this is a progressive but balanced two-part road funding system for promoting effective road asset management and investment reform in Australia. It could achieve a number of important objectives:

- **Transparency** - Mandatory reporting would allow for a complete and publicly-available picture of the true state of maintenance requirements and productive investment opportunities across Australia's local roads
- **Equity** - Current grant funding would not be threatened and important horizontal equity considerations for local government would still be met
- **Efficiency** - A new fund would encourage efficient expenditure over and above traditional funding methods, with a focus on important new investment
- **Entrepreneurialism** - The availability of public asset condition reports through the national road portfolio manager would encourage industries

reliant on rural local roads to put forward targeted and efficient business investment cases

- **Encourage private sector involvement** - Potential private investors in road infrastructure would have an ability to identify efficient investments and consider investment proposals with relevant local governments and industries

Going further: what about private sector investment in rural roads?

The findings in this case study allow policy makers for the first time to consider that roads – or at least rural roads which are not generally exposed to urban road challenges such as congestion might be divided into one of two simple categories:

- **Some roads generate money that more than pays for their upkeep.** They do this because they carry a lot of freight. At present in Australia, most of this revenue is not captured by the market, but perhaps it could be in future: tolling freight vehicles on upgraded major freight corridors in return for use of higher productivity trucks is an example of how this works.
- **Many other roads do not make money.** They host less traffic, or at least not enough commercial traffic to cover their upkeep costs. These roads are

subsidised as *community service obligations* for valid equity reasons, such as access to ratepayers' properties and to promote social connectedness.

If (as the ARRГ case studies suggest) this distinction is correct, it would follow that it is efficient to establish reporting and analysis systems that would allow governments to distinguish between the two types of roads and apply different funding approaches to them. If this could be achieved - under a national road portfolio manager, for example - private sector investment in roads that are considered productive may be achievable in future, provided that private investors were allowed access to these roads to improve them and operate them.

Could roads begin to be managed and funded more like rail?

Such a system would begin to resemble the rail access and pricing arrangements that Australia has in place, where the private sector can invest in rail where it sees it is efficient to do so. In any event, this is a matter that the ARRГ believes deserves closer consideration on the basis of its case study findings, as it may present a reliable way of placing more funding where it is needed into the rural local road network overall.

'WORTH FEEDING':

LINKING ROAD CHARGES TO INVESTMENT: THE BENEFITS

No transparent road asset reporting locks out private sector road investment forever

In 2003 a Federal Government report into cost shifting on to local governments (*Rates and Taxes: A Fair Share for Responsible Local Government* Report of the House of Representatives Standing Committee On Economics Finance and Public Administration 2003 – known as '*The Hawker Review*') examined the challenges of funding local government infrastructure.

This report concluded that private sector involvement in local government infrastructure such as roads was 'very limited'. In the same report, the Federal Department of Transport (p.73) noted that the key challenges to attracting private investment into this infrastructure were:

- Offering the right infrastructure components to the private sector
- Transferring the appropriate risks to the private sector for the right price
- Pricing community service obligations if and where necessary

- Achieving all of this in a transparent, binding and, if required, a long-term contractual requirement

Almost a decade since this report was tabled, potential models for successful private sector investment in roads have advanced significantly in Australia. In 2008 Australian Transport Ministers agreed a *National Transport Framework* that considered several case studies of cost effective investments in local road bottlenecks. More recently, Infrastructure Australia in particular has done considerable work to examine profitable and sustainable private sector investment in roads. However, all such private investments rest on the ability of potential investors to access clear and accurate information about the current condition and costs facing the local roads that might interest them. Without this information, it is impossible for private investors to complete a professional cost-benefit analysis of the investment.

The ARRГ believes that private sector investment will almost inevitably play some role in future local road funding – public funding levels for assets like local roads are more likely to fall in future rather than increase, given all of the other pressures on higher government budgets, especially faced with

an ageing population and diminished tax base and a continuing move to urbanisation. For these reasons, the ARRГ sees private sector investment in local roads as an important potential part of the solution to road funding in future.

But the precursor to successful private investment in roads – just as for investment in any other asset – is for clear and transparent cost and condition information on roads to be made available to the 'market' for investment. Under the current system this is impossible to achieve. Without adoption of the ARRГ's recommendations for national road asset reporting through a national road portfolio manager, private road investment in local roads will almost certainly remain unachievable. The ARRГ believes that governments need to gain a better understanding of this fundamental point and act immediately to create the potential for private involvement in road investment in future, by mandating road asset condition and cost reporting and making this information available to all potential investors.



'WORTH FEEDING': LINKING ROAD CHARGES TO INVESTMENT: THE BENEFITS

Greater public funding is needed for rural local roads now - regardless of future private investment models!

In raising private investment in local roads here, the ARRГ in no way wishes to suggest that future private investment in roads would allow public funding of local roads to be relaxed – if anything, the accurate asset reporting recommended by this group will reveal a much larger funding problem than governments are at present willing to entertain. This funding shortfall demands a significant increase in public funds now and into the future if local rural roads are to even maintain their current productivity levels and contribute to acceptable levels of road safety.

The ARRГ does see a need to consider laying the ground for potential productive private investment in local roads in future. Many such roads may indeed require some level of public funding upgrade before they could become viable investments, but the key message is that without effective and mandatory national road asset management reporting, nobody will get to grips with local road condition and thereby create a transparent case for greater public funding - nor will any alternative and complementary funding sources for these roads ever be realised without such asset plans. It is important that policy makers in this area appreciate how poorly Australia understands the real cost pressures facing this class of roads. Only effective and mandatory asset reporting can address that.

'WORTH FEEDING': CASE STUDY FINDINGS IN THE BROADER REFORM CONTEXT

The ARRГ has undertaken its latest case studies mindful of related road infrastructure investment and pricing reform developments at the highest levels of Australian government. It believes that this case study has relevance to the following broader developments:

The review of Australia's tax system: the opportunities for road reform

In 2009 an important review of Australia's tax system ('Australia's Future Tax System', also known as the 'Henry Tax Review') asked the question:

'how can motor vehicle related taxes and road funding arrangements be designed to improve the efficiency of transport of people and goods in Australia?'^{xi}

It posed this question while also noting that:

'current road tax arrangements will not meet Australia's future transport challenges. Poorly functioning road networks harm the amenity, sustainability, liveability and productivity of society.'^{xii}

In light of this, the Tax Review eventually recommended (amongst other things) that:

'Governments should continue to reform road infrastructure provision, applying economic

assessment to investments comparable to that for other forms of infrastructure...COAG should nominate a single institution to lead road tax reform and ensure implementation of this agreement.'^{xiii}

The ARRГ believes that this research paper can be an important contribution to this matter and hopes that the Treasury, in pursuing road reform, will consider that there is merit both in national road portfolio management, but also in understanding that rural local roads are not simply funding 'basket cases' but that instead, there may be a great many 'efficient' rural local roads in Australia, just as no doubt there will be many other less 'efficient' rural roads which warrant continued funding on a community service obligation basis. The only way of distinguishing reliably between the two in pursuit of more efficient funding outcomes is through committing to better transparent road asset reporting.

COAG Road Reform Program

The ARRГ believes the case study findings in this report should prompt a change in approach from the current COAG Road Reform Project (CRRP) – at least in terms of how the case studies relate to heavy vehicles on rural local roads.

Several ARRГ members have taken part in CRRP briefings and information sessions. ARRГ understands

(both from these discussions and from the past two years of CRRP's interim publications) that CRRP proposes replacing the already 'highly-averaged' PAYGO system^{xiv} of road user charging – a system which, as discussed earlier in this paper, pays little attention to actual road asset condition or costs - with yet another averaged system of road pricing. The ARRГ understands from CRRP's literature to date that this might rely on more detailed expenditure pricing being made possible through fitting GPS telematics tracking devices to all heavy vehicles. But crucially – like PAYGO – this approach does not seem to concern itself with forming an accurate picture of the actual Australian road asset, its true costs or condition, through mandatory nationwide road asset cost and condition reporting of actual roads to form the base for a more accurate pricing system.

The ARRГ understands that CRRP seeks to derive a marginal cost price for different parts of the Australian road network using several discrete categories of roads as averages along with estimates of likely road damage caused by trucks on these broad categories. It appears that each different category of road would then pay a different average road access charge, with the likelihood that rural and regional roads may be charged far more highly per use, as these roads in the opinion of the CRRP are more costly and intensive to maintain than major interstate highways.

'WORTH FEEDING':

CASE STUDY FINDINGS IN THE BROADER REFORM CONTEXT/CONTINUED

The ARRГ is concerned about such an approach. It regards it as a missed opportunity, which, like the PAYGO system, would again fail rural roads, by not focussing on road asset cost and condition analysis as a fundamental input to better road user pricing. This apparent current direction of the CRRP process is particularly unsatisfactory in light of the case studies in this paper, which demonstrate that it is already practical for local governments to build accurate pictures of their complete local road assets, condition and costs.

The dangers of this proposed new approach particularly apparent in CRRP's most recent modelling research paper, which stated that:

'research by the NTC for CRRP has shown that, on average, local road travel as a proportion of total travel (in terms of kilometres travelled) is likely to be somewhere between 0-30%, depending on the vehicle class. This is a similar result to what was estimated in the NTC Estimation of Vehicle Kilometres Travelled on Arterial and Local Roads Information Paper May 2005'.¹⁰

Clearly, some rural vehicles will travel far more frequently than 0-30% of their time on local rural roads. Yet the CRRP averaging system, if applied, may well disadvantage these road users quite severely. As representatives of these road users and their roads, the ARRГ believes that it is important that to

the extent practical, Australia's road pricing and road asset management systems move away from arbitrary averaging approaches and build itself from the ground up: moving to obtain a more complete picture of the actual road network. Reform would also benefit from establishing a separate new local road fund where all interested parties can come forward and bid on merit for additional funds for productive upgrades to local road networks, above basic equity considerations.

In its calls for a national road portfolio manager and mandatory asset cost and condition reporting across local government, ARRГ has shown how this could be achieved. It would like to see the CRRP process adopt these core approaches. It would also like to see the CRRP's modelling assumptions about long run maintenance costs of rural roads (as opposed to big arterial roads) tested against ARRГ data about actual road maintenance costs. The ARRГ would welcome the opportunity to contribute to this important work.

Infrastructure Australia: calls for a single national road portfolio manager

In its 2012 Report to COAG *Communicating the Imperative for Action*, Infrastructure Australia drew attention to and fully endorsed the ARRГ's calls for a national road portfolio manager (Infrastructure Australia went a step further, suggesting that such a manager should have oversight of all Australian roads,

not just local ones). This report signalled a need for '*greatly improved asset management practices*' as a key underpinning of better road provision and more efficient road funding outcomes in future.

Infrastructure Australia outlined the role of a national road portfolio manager as follows:

*Independent high-level verification of asset management plans prepared by local government and other road agencies;

*Working with councils that are experiencing significant difficulty in their asset management systems to ensure they receive suitable engineering and other support with the development and implementation of their asset management plans;

*Analysis of asset management plans to identify emerging trends; and

*Providing advice to other bodies, including Infrastructure Australia, on policy matters and on potential investment decisions

The ARRГ hopes that the findings in this latest research paper will accelerate the move to a national road asset manager, and the accompanying reform to set funds aside for specific rural roads that can be shown to merit receipt of more efficient funding.

ENDNOTES

- i. Productivity Commission Inquiry into Road and Rail Infrastructure Pricing 2006 Chapter 4 Assessing Road Infrastructure Costs p.74
- ii. Ibid p. 86
- iii. See Australian Rural Roads Group 2010 Going Nowhere: The Rural Roads Crisis, Its National Significance and Proposed Reforms p.18 The ARRG figures were based on very detailed IPWEA road asset condition surveys of 135 NSW local government areas and extrapolated for a national figure based on proportional road lengths.
- iv. Engineers Australia Infrastructure Report Card 2011 Chapter 4 'Infrastructure Sectors' p.20
- v. Productivity Commission Inquiry into Road and Rail Infrastructure Pricing Report No 41 December 2006 'Attribution and recovery of road costs' pp 95-99
- vi. Independent Inquiry into the Financial Sustainability of NSW Local Government 2006 Are Councils Sustainable?
- vii. Productivity Commission Inquiry into Road and Rail Infrastructure Pricing Report No 41 December 2006 Finding 5.2 and preceding paragraphs pp. 98-99
- viii. Ibid p.130
- ix. Independent Inquiry into the Financial Sustainability of NSW Local Government 2006 Are Councils Sustainable? p. 225
- x. Bureau of Transport Economics Research Paper 56 Assessment of the Australian Roads System 1984 p. 134
- xi. Commonwealth of Australia Department of the Treasury Australia's Future Tax System Online Consultation Paper <http://taxreview.treasury.gov.au/content/ConsultationPaper.aspx?doc=html/publications>
- xii. Ibid
- xiii. Ibid
- xiv. Productivity Commission Inquiry into Road and Rail Infrastructure Pricing Report No 41 December 2006 p.347
- xv. National Transport Commission Modelling the Marginal Costs of Road Wear Research Paper 2011 p. 23
- xvi. Infrastructure Australia Report to COAG 2012: Communicating the Imperative for Action Chapter 6 'A National Freight Network' p. 56

APPENDIX

Full life- cycle road maintenance costs for all case study roads

	Length (km)	Maintenance (Actual)	Resheeting (8yr Cycle)	Resealing (20yr cycle)	Rehabilitation (40yr Cycle)	TOTAL	Long-run maintenance cost per km
Elcome Road	49.92	\$ 55,110.96	N/A	\$ 69,888.00	\$ 205,920.00	\$ 330,918.96	\$ 6,628.99
Barooma Downs Road	20.56	\$ 24,306.65	N/A	\$ 28,784.00	\$ 84,810.00	\$ 137,900.65	\$ 6,707.23
Croppa Creek Road	23.60	\$ 30,031.62	N/A	\$ 33,040.00	\$ 97,350.00	\$ 160,421.62	\$ 6,797.53
Horton Road	22.07	\$ 44,806.44	\$ 37,368.75	\$ 30,898.00	\$ 82,046.25	\$ 195,119.44	\$ 8,840.94

Note: All roads are full bitumen seal except part of Horton Road

APPENDIX

Elcome Road – Average daily traffic volume by vehicle class and direction – weekly summaries

Vehicle class	1	2	3	4	5	6	7	8	9	10	11	12	Average daily total
North end													
Week 1	126	12	11	3	0	0	0	0	0	0	0	0	159
Week 2	132	11	17	3	0	0	0	0	0	2	0	0	172
Week 3	134	9	16	3	0	0	0	0	2	2	0	0	170
Week 4	159	11	22	5	0	0	2	0	2	0	0	0	209
Week 5	137	10	16	4	0	0	0	0	0	0	0	0	173
Week 6	137	4	18	3	0	0	0	0	0	1	0	0	171
Week 7	132	7	14	2	0	0	0	0	0	0	0	0	161
South end													
Week 1	281	19	23	0	0	1	1	0	0	0	0	0	331
Week 2	218	15	20	2	0	1	0	0	0	0	0	0	263
Week 3	225	11	23	2	0	0	0	0	1	0	0	0	268
Week 4	287	17	20	1	0	0	2	0	1	0	0	0	334
Week 5	247	14	16	2	0	0	0	0	0	0	0	0	283
Week 6	243	10	18	2	0	0	0	1	2	1	0	0	280
Week 7	257	9	12	2	0	0	0	0	1	0	0	0	287

Note – There were 7 weeks of traffic monitoring – 4 in a harvest period, 3 in a non-harvest period. Assumptions surrounding these data were tested by 1 x 7-hr day of physical traffic observations (see below).

Elcome Road – 7-hour physical observation of traffic levels, through-travel vehicles and direction, by vehicle class

Vehicle class	1	2	3	4	5	6	7	8	9	10	11	12	Average daily total
North End	82	5	6	1	0	0	0	1	6	1	0	0	102
South End	119	1	6	0	0	0	0	0	4	1	0	0	131

APPENDIX

Barooma Downs Road – Average daily traffic volume by vehicle class and direction – weekly summaries

Vehicle class	1	2	3	4	5	6	7	8	9	10	11	12	Average daily total
North end													
Week 1	38	2	5	0	0	0	0	0	1	1	0	0	56
Week 2	47	3	6	0	0	0	0	0	2	5	0	0	67
Week 3	64	2	6	2	0	0	0	0	2	6	0	0	86
Week 4	67	2	7	0	0	0	0	0	3	7	0	0	92
Week 5	60	2	6	1	0	0	0	0	2	4	0	0	79
Week 6	63	3	6	2	0	0	0	0	7	4	0	0	92
Week 7	58	3	9	1	0	0	0	0	6	3	0	0	86
South end													
Week 1	68	5	13	2	0	0	0	0	1	2	0	0	96
Week 2	53	2	8	0	0	0	0	0	2	5	0	0	75
Week 3	66	3	10	1	0	0	0	0	4	5	0	0	94
Week 4	46	1	13	1	6	0	0	0	12	7	0	0	93
Week 5	45	1	10	0	0	0	0	0	2	5	0	0	70
Week 6	44	2	12	2	0	0	0	0	7	4	0	0	77
Week 7	45	2	12	0	0	0	0	0	6	3	0	0	74

Note – There were 7 weeks of traffic monitoring – 4 in a harvest period, 3 in a non-harvest period. Assumptions surrounding these data were tested by 1 x 7-hr day of physical traffic observations (see below).

Barooma Downs Road – 7-hour physical observation of traffic levels, through-travel vehicles and direction, by vehicle class

Vehicle class	1	2	3	4	5	6	7	8	9	10	11	12	Average daily total
North End	43	0	1	0	0	0	0	0	0	0	0	0	44
South End	35	0	1	0	0	0	0	0	0	0	0	0	36

APPENDIX

Croppa Creek Road – Average daily traffic volume by vehicle class and direction – weekly summaries

Vehicle class	1	2	3	4	5	6	7	8	9	10	11	12	Average daily total
North end													
Week 1	90	6	13	3	0	0	1	0	3	8	0	0	130
Week 2	80	5	10	1	0	0	0	0	6	17	0	0	126
Week 3	83	3	9	2	0	0	0	0	9	18	0	0	130
Week 4	66	1	9	2	2	0	0	0	9	20	0	0	115
Week 5	61	3	12	2	0	0	0	0	4	12	0	0	101
Week 6	70	3	11	2	0	0	1	0	8	15	0	0	115
Week 7	60	3	10	2	0	0	0	0	6	13	0	0	99
South end													
Week 1	90	5	22	3	0	0	0	0	9	10	2	0	150
Week 2	88	5	16	2	0	0	0	0	6	16	5	0	145
Week 3	107	3	20	5	0	0	0	2	12	16	0	0	173
Week 4	107	2	9	3	0	0	0	0	6	17	0	0	153
Week 5	98	6	6	2	0	0	1	0	5	12	0	0	137
Week 6	106	6	7	4	1	0	0	0	8	18	0	0	156
Week 7	91	3	4	2	0	0	0	0	3	15	0	0	124

Note – There were 7 weeks of traffic monitoring – 4 in a harvest period, 3 in a non-harvest period. Assumptions surrounding these data were tested by 1 x 7-hr day of physical traffic observations (see below).

Croppa Creek Road – 7-hour physical observation of traffic levels, through-travel vehicles and direction, by vehicle class

Vehicle class	1	2	3	4	5	6	7	8	9	10	11	12	Average daily total
North End	67	1	3	0	2	0	0	0	1	7	0	0	81
South End	69	0	3	0	2	0	0	0	1	7	0	0	82

APPENDIX

Horton Road – Average daily traffic volume by vehicle class and direction – weekly summaries

Vehicle class	1	2	3	4	5	6	7	8	9	10	11	12	Average daily total
North end													
Week 1	27	1	2	0	0	0	0	0	0	0	0	0	34
Week 2	26	1	3	0	0	0	0	0	0	0	0	0	35
Week 3	26	2	6	0	0	0	0	0	0	0	0	0	39
Week 4	30	0	1	0	0	0	0	0	0	0	0	0	36
Week 5	34	2	2	0	0	0	0	0	0	0	0	0	42
Week 6	40	2	4	0	0	0	0	0	1	0	0	0	52
Week 7	26	0	3	1	0	0	0	0	0	0	0	0	35
East end													
Week 1	89	2	14	0	0	1	1	0	0	0	0	0	114
Week 2	78	5	20	0	0	0	2	0	0	0	0	0	110
Week 3	76	5	18	0	0	0	1	0	0	1	0	0	107
Week 4	91	3	8	0	0	0	0	0	1	0	0	0	111
Week 5	106	8	8	1	0	0	0	0	1	0	0	0	131
Week 6	112	5	11	0	0	0	0	0	2	1	0	0	137
Week 7	97	3	7	0	0	0	1	0	1	0	0	0	116

Note – There were 7 weeks of traffic monitoring – 4 in a harvest period, 3 in a non-harvest period. Assumptions surrounding these data were tested by 1 x 7-hr day of physical traffic observations (see below).

Horton Road – 7-hour physical observation of traffic levels, through-travel vehicles and direction, by vehicle class

Vehicle class	1	2	3	4	5	6	7	8	9	10	11	12	Average daily total
North End	54	5	1	15	2	0	0	0	1	0	0	0	78
East End	22	3	0	0	0	0	0	0	2	0	0	0	27

APPENDIX

Austrroads vehicle classes and descriptions as employed in case study observations

CLASS	CLASS	LENGTH	NO. OF AXLES	DESCRIPTION
1	SV	Short up to 5.5m	2	Short Vehicle (eg car)
2	SVT	Short up to 5.5m	3,4 or 5	Short Vehicle Towing (eg car/caravan)
3	TB2	Medium 5.5m - 14.5m	2	Two Axle Truck or Bus
4	TB3	Medium 5.5m - 14.5m	3	Three Axle Truck or Bus
5	T4	Medium 5.5m - 14.5m	>3	Four Axle Truck
6	ART3	Long 11.5m - 19.0m	3	Three Axle Articulated
7	ART4	Long 11.5m - 19.0m	4	Four Axle Articulated
8	ART5	Long 11.5m - 19.0m	5	Five Axle Articulated
9	ART6	Long 11.5m - 19.0m	>=6	Six Axle Articulated
10	BD	Medium Comb 17.5m - 36.5m	>6	B - Double
11	DRT	Medium Comb 17.5m - 36.5m	>6	Double Road Train
12	TRT	Long Comb over 33.0m	>6	Triple Road Train