Guidelines for equitable funding of pavement maintenance for low volume roads

Road Controlling Authorities Forum (NZ) Inc. Special Interest Group on Low Volume Roads

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COLLABORATIVE DISCUSSION DOCUMENT

CONSULTATION DRAFT

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Executive Summary

A large proportion of pavement consumption on local roads occurs on low volume roads, caused almost entirely from commodity cartage. The Special Interest Group – Low Volume Roads (SIG-LVR) of the Road Controlling Authorities Forum (NZ) (RCA Forum) has sought to provide a process for:

- Calculating pavement consumption on low volume roads caused by industrial land-use.
- Allocating the cost to industrial ratepayers, in an equitable way, using rules prescribed by local government legislation.

The long-term pavement consumption by heavy commercial vehicles (HCVs) can be estimated in terms of Equivalent Standard Axles (ESA) per hectare of industrial land-use for the inputs and outputs of specific industries.

Local authorities can calculate rating charges for ratepayers corresponding to their proportionate share of pavement maintenance costs using the total ESA by industry in their district allocated pro-rata to the land area in production for each ratepayer.

This allocation is reasonable for primary industries where production and hence pavement consumption is proportional to land area. In general this occurs for forestry, dairy farming and sheep and beef farming. For impacts not associated with land area, the method allows this area-based allocation to be further adjusted to account for:

- Distance travelled on roads by HCVs from land in different locations.
- Intensity of production arising from farming types that differ significantly from a national average (such as for the five classes of dairy farming and eight classes of sheep and beef farming).
- Intensity of production, where this is influenced by factors other than land-area (such as for quarrying, processing of dairy, meat and wood, and port activities).

Alternatively, the method allows for allocations not associated with land area to be based on land value or capital value.

A stepped methodology is provided that shows equitable allocation of total roading costs, which is the sum of: (i) pavement consumption maintenance costs, allocatable as a targeted rate using these guidelines; (ii) fixed road maintenance costs, allocatable as a uniform general charge to each ratepayer; and (iii) other pavement maintenance costs, to be decided by Councils, allocatable as a uniform general charge to each ratepayer.

We recommend Councils use the method presented in this report as guidance to allocate long-term pavement maintenance costs for low volume roads. The method is not a prescription and there is no one “best” allocation formula for all.

It is important for Councils to be pragmatic and transparent. Hence we recommend that Councils emphasise simplicity when applying the method, as demonstrated in the worked example provided.

Councils must consider outcomes such as benefits for all ratepayers from maintaining low volume road pavements. This task should be done with regard to the materiality of the outcome for pavement maintenance costs of low volume roads.

We urge Councils to adopt a consistent approach to setting allocation formulae and recommend that Councils cooperate in setting allocation formulae.

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1 Introduction

1.1 Purpose of these guidelines

These guidelines provide a method for Councils to make rating allocation formulae. The formulae are to allocate to rating units the cost of pavement maintenance (including renewals) for low volume roads necessitated by the heavy vehicle traffic generated by industrial activity, including from primary industries. The equitableness of applying the allocation method is assessed as a "user pays" approach.

The traffic loading from production from each industry in a District can be calculated using engineering methods. Engineering formulae allocate costs to industrial ratepayers of different industries pro-rata to their level of traffic loading annually. For each ratepayer within an industry, the allocation is further influenced by the distance of the rating unit from a state highway and by the production intensity of land use.

The allocation formulae derived using the method are transparent because:

- Ratepayer types are defined according to Schedule 2 of the Local Government (Rating) Act 2002.
- Ratepayer charges are calculated according to Schedule 3 of the Local Government (Rating) Act 2002.
- Influences on charges that the Council decides, such as distance and production intensity are clearly specified using "policy weights".

The guidelines also provide:

- A method to reduce the rating charge by an amount to account for the benefits that the industry provides to the community.
- A method to levy charges on non-industrial ratepayers who enjoy these benefits.

A hypothetical worked example and a stepped methodology are provided to demonstrate how the allocation formulae work.

1.2 Background

Calls for guidance on issues relating to forestry, agricultural vehicles and heavy vehicles on rural or low volume roads have been repeated for several years. Individual Councils initiated investigations into policy development independently and there has been a recognised need for a consistent best practice response to accelerated pavement consumption from increasingly intensive land use by primary industries.

Although significant research had been done on quarrying and forest harvesting effects on rural roads and the best practice response, additional research was needed to ascertain whether similar mechanisms might be put in place for all sources of heavy vehicle impacts on low volume roads or whether available mechanisms were sufficient.

The Research and Guidelines Steering Group of the Road Controlling Authorities Forum (NZ) Incorporated (RCA Forum) recognised that there was a need to have robust and transparent processes to:

- quantify the cost of these effects
- agree equitable mechanisms to respond to this cost
- develop guidelines that would allow for a nationally consistent application of funding mechanisms, to provide greater certainty in investment decisions, for both road controlling authorities and forestry investors.

A Special Interest Group on Low Volume Roads (SIG-LVR) of the RCA Forum was established in 2015 to respond to this issue and develop guidelines.

1.3 The Working Group

The SIG-LVR comprises road controlling authorities with an interest in the impact of heavy vehicle activities on low volume roads. The following authorities were represented:

- Wairoa District Council
- Whanganui District Council
- Ruapehu District Council
- Whakatane District Council
- Whangarei District Council
- Kaipara District Council
- Waikato District Council
- South Taranaki District Council
- Southland District Council
- Far North District Council
- Waitaki District Council
- Tasman District Council
- Marlborough Roads
- Auckland Transport
- New Zealand Transport Agency

The SIG-LVR engaged with key sector representative groups with an interest in the impact of intensive heavy vehicle activities on low volume roads, which included:

- Road Transport Forum
- NZ Forest Owners Association
- Local Government NZ
- Aggregate and Quarry Association
- NZ Farm Forest Association
- Dairy Companies Association NZ
- Heavy Haulage Association

As a result of this engagement, the following sector representative groups have participated in the group in the development of these guidelines:

- NZ Forest Owners Association
- Aggregate and Quarry Association
- Dairy Companies Association NZ

1.4 Terms of reference for the working group

The SIG-LVR was established with the objective to:

- Respond to issues that particularly affect low volume roads with guidance as appropriate.

The group was to be responsible for:

- Developing national guidelines on best practice for practitioners to plan investment to meet the future freight demand on low volume roads.

The SIG-LVR was given four specific tasks:

1. Identify the likely freight demand on low volume roads in light of the Government's Business Growth Agenda for primary industries.
2. Provide a robust and transparent process to identify the cost impact of intensive heavy vehicle activities on low volume roads.
3. Determine an equitable mechanism to reflect the cost impacts of heavy vehicle activities on low volume roads.
4. Develop national guidelines on the best practice response to the future impacts of heavy vehicle activities on low volume roads that allow appropriate planning of investment by both road controlling authorities and primary sector investors, and provide all parties with greater certainty and consistency.

1.5 Referenced information

In completing these tasks the SIG-LVR considered the following references and research reports:

- *The economic value of good roads,* BERL (2014)
- *Drivers of economic growth in the Northland regional economy,* Infometrics (2009)
- *Analysis of key sectors and their road use,* BERL (2011)
- *Bay of Plenty situational analysis,* BERL (2013)
- *Otago Economic Overview,* BERL (2014)
- *Forest Sector Transport Analysis – Northland,* SCION (2015)
- *Northland Regional Forestry Framework Report,* Opus (2015)
- *Economic impact assessment of the forestry industry in the Gisborne-Tairawhiti region,* Institute for Business Research, University of Waikato (2013)
- *National Exotic Forest Description as at 1 April 2014,* MPI
- *New Zealand Milk Production to 31 March 2016,* DCANZ
- *Forestry effects on low volume rural roads,* Moore & Associates (2009)
- *Logging trucks on local roads – is forestry really having an unreasonable impact,* GHD (2011)
- *The damaging effect of overweight vehicles on Southland roads,* Laskewitz, J.; Hudson, K. and Wanty, D (2014)

The group also considered two relevant Australian references:

- *Guidelines for Assessment of Road Impacts of Development Proposals*, Queensland Department of Transport and Main Roads
- *Estimating the incremental cost impact on sealed local roads from additional freight tasks*, ARRB, Western Australian Local Government Association

In order to complete its tasks and prepare these guidelines the SIG-LVR commissioned three further reports:

- *The impact of land use on pavement wear*, TERNZ (2017)
- *The impact of heavy vehicle traffic on road pavements*, GeoSolve (2017)
- *Equitable funding of pavement maintenance for low volume roads*, BERL (2017)

1.6 Findings of commissioned research reports

The TERNZ (2017) report describes a basic methodology for identifying heavy commercial vehicle (HCV) traffic generated by a particular land-use, in terms of Equivalent Standard Axles (ESA) per hectare. It involves identifying the land-use and establishing an appropriate term for production. Using published data for inputs and outputs per hectare for the land use, together with the typical vehicle configurations, it is possible to determine the ESA per payload tonne of production associated with each input and output. Assuming that a national or regional average ratio of tonnes of production to area is applicable to all production, a corresponding average ESA per hectare for a district can be calculated.

The main shortcomings with using ESA per hectare values for estimating traffic impacts are:

- Production of certain land-use activities (eg quarrying and food processing) is not proportional to land area and needs to be assessed separately.
- Production of land-use activities that are generally proportional to land area may still differ significantly from average values due to farm type and location.
- Traffic impacts are proportional to the distance travelled on the low volume road, but are excluded from an ESA per hectare value.

The BERL (2017) report provides an allocation formula to apportion the pavement maintenance cost for each industry in a District as rates to the respective industry ratepayers. It reduces the overall cost by an amount that represents the benefit to the community of the industrial activity. A complementary allocation formula calculates rates for non-industrial ratepayer beneficiaries to meet this benefit. Together the two contributions cover the pavement maintenance cost for the industrial activity in an equitable way, where industrial land-users and non-industrial beneficiaries pay according to their use and benefit.

1.7 Scope of these guidelines

The Local Government Act 2002 (LGA) sets out the duties of local Councils when setting charges on ratepayers. The overarching principles of financial management set out in the LGA oblige Councils to act prudently, and to "promote the current and future interests of the community". The LGA also prescribes the specific financial instruments (rates and borrowing mainly) that empower Councils to charge ratepayers to meet these costs, together with other associated duties and powers. The Local Government Act (Rating) 2002, a companion enactment, provides further detail on how land is to be categorised for setting rates, together with the factors that Councils may use to calculate rates.

In developing their 30 year infrastructure plans, Councils are bound to ensure that road pavements are fit for purpose. In the main, Councils may levy rates and borrow to fund the maintenance cost of roads that are not met from other sources. There are other methods for raising funds, such as through contributions for new developments, financial contributions for environmental impacts, and public-private partnerships. These are not addressed by these guidelines, which are concerned only with equitable allocation of the local share of maintenance costs that are not covered by co-investment financial assistance rates (FAR).

There is no definition of equitableness in either enactment as far as setting rates is concerned[1]. There are, however, duties set out under s101(3) of the LGA. The funding needs of the local authority must be met from those sources that the local authority determines to be appropriate, following consideration of,—

(a) in relation to each activity to be funded,—

(i) the community outcomes to which the activity primarily contributes; and

(ii) the distribution of benefits between the community as a whole, any identifiable part of the community, and individuals; and

(iii) the period in or over which those benefits are expected to occur; and

(iv) the extent to which the actions or inaction of particular individuals or a group contribute to the need to undertake the activity; and

(v) the costs and benefits, including consequences for transparency and accountability, of funding the activity distinctly from other activities; and

(b) the overall impact of any allocation of liability for revenue needs on the community.

These duties oblige Councils to consider a number of outcomes associated with the setting of rates that can be interpreted as determining the equitable allocation of responsibility for funding.

The selection of a method for the equitable allocation of the local share of maintenance costs is for Councils to decide based on the current and future interests of their community. Councils are empowered to levy rates from those sources that they determine to be appropriate, having had regard to the considerations listed.

[1] The term 'equitable' occurs in s100(2), which requires a local authority, when setting a budget in cases where operating expenses differ from operating revenue (eg as in the case of borrowing), to have regard to the equitable allocation of responsibility (eg repayment of loan by future ratepayers), over the useful life of assets.

2 Pavement consumption maintenance

2

2.1 Introduction

The first challenge in identifying a method for the equitable allocation of the local share of pavement maintenance costs is to establish a process that uses data and known engineering formulae to allocate an average annual pavement consumption cost per hectare, for each type of land use, in a District. Once pavement consumption is estimated per hectare for each land use, in principle a corresponding average cost by rating unit can be estimated. Rating unit costs can then be totalled at an industry level to provide mean pavement maintenance costs for the District by industry.

2.2 Traffic generation from land use

For each land use activity, average annual transport requirements, in tonnes per hectare, over a long period (e.g. 30 or 35 years) can be determined for both outbound and inbound movements. These freight movements can then be converted into the standard measure of pavement loading, Equivalent Standard Axles (ESA) and calculated per hectare. The resultant values can be used to calculate annual pavement consumption costs from different industries. An average annual measure enables comparison of both short-term and long-term pavement consumption on a common basis. Average values for the District may not be available. In this case average values for the region or nation may be used as an approximation.

2.2.1 Basic methodology for assessing traffic generation

The HCV traffic generation from particular types of land use may be estimated by the following steps:

1 Identify the land use or activity to be considered i.e. forestry, quarrying, dairying, dry-stock beef farming, stock finishing, sheep farming, horticulture, viticulture, arable cropping, etc.

2 Determine the comparison period to be used to compare the HCV traffic generated by differing land uses.

3 Determine the average output values in tonnes per hectare for area-based land uses.

4 Determine the average input values for area-based land uses in tonnes per hectare.

5 Determine the average output and input values for non-area-based land uses in tonnes.

6 Determine the HCV traffic generated by the identified land uses:

   a. For each transport task, identify the typical vehicle configuration(s) that will be used and their payload capacity

   b. Determine the ESA per payload tonne associated with each input and output commodity

   c. Determine the ESA per hectare for the land use or activity being considered.

7 Determine the distance travelled on the affected roads.

2.2.2 Identify land use for assessment

Two types of land use are relevant to HCV traffic:

- Land-based activities such as farming and forestry, where the scale of the inputs and outputs is based on the area of land involved. These production rates and input rates may vary substantially around the country but within a District for a class of farm with a specific production intensity they are likely to be consistent and thus it is reasonable to use average values.

- Activities such as quarrying, where the output volumes are much less directly dependent on the land area and may be proportionately much higher than for farming or forestry activities. Typically, the number of quarries within a District is relatively small and thus it is appropriate and not too difficult to assess the traffic generated by them on an individual basis. A quarry will have a resource consent which specifies the permitted level of production and in some cases the maximum allowable number of truck movements per day.

This approach of considering individual quarries can also be applied to other significant generators or attractors of heavy vehicle traffic such as dairy factories, meat processing facilities, wood processing facilities and export ports. As with quarries, the input and output volumes of these land uses are not directly linked to their land area, but will usually be able to be obtained relatively easily.

2.2.3 Determine comparison period

Different land uses have different cycle times. While dairy farming operates on annual cycle and most beef finishing operations operate on a two-year cycle, radiata pine forestry typically has a 26-30 year cycle. One approach is to use the land use with the longest cycle time to determine the analysis period and then to calculate the traffic generated by other land uses over that same period. A difficulty with this approach is that the longest cycle time of the land uses that we are considering is that of forestry, but this period is not fixed. Trees may be harvested at anywhere between 25 and 35 years of age depending on market conditions and the business imperatives of the owners. The volume of wood extracted depends on the age of the trees.

An alternative approach is using a one year cycle for each land use activity determining average annual input and output levels and determining the traffic generated by these. The main limitation of using the average traffic demand over an analysis period of only a one year cycle as the measure of pavement wear is that it does not consider the timing issues associated with land uses that have long cycle times.

A one year cycle can be achieved for each land use activity by assessment of long-term maintenance needs within a Council's 30-year plan, deriving the average annual input and output levels and determining the traffic generated by these. This enables comparison of the impacts of different land use activities on a common basis.

2.2.4 Determine output and input values for area-based activities

For area-based production, the average output and input values need to be determined using the annual average output rates in tonnes or kg per hectare for the particular District or region under consideration. The intensity of pastoral and dairy land uses varies considerably over the three main classes of pastoral production systems and also within those classes, such as between the five levels of dairy production systems, and reflects land use decisions made in response to geological, metrological, topographical and demographic variables. Similarly, forestry yields per hectare vary significantly on a regional basis.

Therefore pavement consumption costs will vary with production intensity in a specific way that is not directly related to land area.

The average output values in tonnes per hectare for area-based land use should be determined using:

a. Regional or local stocking rates
b. Local milk production statistics
c. Local beef, sheep, wool production statistics
d. Local forest harvest statistics
e. Local or regional horticultural, viticultural or arable production statistics.

The average input values for area-based land use in tonnes per hectare should be determined as much as possible by using:

a. Regional or local fertiliser or lime application rates
b. Regional or local statistics for forest restocking rates
c. Regional or local statistics for feed supplement use
d. Regional or local statistics for fuel, fencing, etc.

2.2.5 Non-area-based land uses

Production intensity for land uses not associated with land area can be estimated using published data. One way to do this is to adjust a land area based allocation formula for production intensity, but as these types of land uses are generally few in number, a better way may be to estimate the HCV traffic volume separately for each business location. Statistics New Zealand define each of such business units as a geographic entity. This means traffic loading per hectare need not be calculated.

For production not associated with land area, substantial generators and/or attractors of heavy vehicle traffic where the volume of traffic is not directly related to the land area being used for the activity include: quarries; dairy processors; saw mills and pulp mills; meat processors; fertiliser plants and ports. For single large scale activities, the associated major input and output traffic volumes are often published. Quarries are usually subject to a resource consent which will usually specify how much material can be extracted per annum. In some cases the resource consent will also specify the maximum allowable levels of truck traffic. Similarly, large processing facilities will often publish their production volumes in annual reports and other publicity material.

2.2.6 Heavy vehicle traffic impacts for different transport tasks

The heavy vehicle traffic stream consists of a range of axle configurations and loadings. An estimate of traffic loading is calculated by converting all the loading from all the axle groups of heavy vehicles into a number of passes of an Equivalent Standard Axle (ESA). The ESA normalises the pavement consumption effect of the spectrum of axle loads and configurations expected on a pavement to the equivalent number of passes of a dual-tyred single axle loaded to 8.2 tonnes (80kN).

This method can be used to convert land use production in terms of tonnes per hectare (or tonnes per entity) for the different production intensities (farm classes, quarrying, food processing, etc) into a traffic loading in terms of ESA per hectare (or ESA per tonne).

2.2.7 Determining ESA

Transfund NZ Research Report 185 (2000) calculated ESA values for a range of commodity classes with respect to the number of axles involved in their transport, from 2 to 9, based on ESA values calculated for each heavy vehicle observed at four weigh-in-motion sites and the identified commodity being carried by 7511 vehicles. These values used exponents for axle damage (4^{th} power) and Austroads performance criteria for pavement components (5^{th} power for asphalt, 7^{th} power for subgrade soils and 12^{th} power for cemented layers).

The authors of this research, Bartley Consultants, observed variations in orders of magnitude between vehicles carrying the same commodity. For aggregates the ESA^4 data ranged from 0.05 to 5.5, while for timber and logs the majority of ESA^4 values were observed to lie between 2 and 7[2].

[2] Transfund NZ Research Report 185 Appendix B

Mean ESA values were also observed to vary markedly between locations. For aggregates the variation across sites for ESA[4] was from 0.96 to 3.46 (adopted mean: 2.9). For livestock it was from 0.94 to 2.63 (adopted mean: 1.49). For milk it was from 1.89 to 2.94 (adopted mean: 2.65) and for timber and logs it was from 2.80 to 6.69 (adopted mean: 5.18)[3].

Bartley Consultants calculated the mean ESA[4] value for timber and logs being carried on an 8-axle combination as 4.59[4]. GHD subsequently adopted a lower ESA[4] of 3.2 for a "typical logging truck configuration when carrying 28.5 tonnes", and an ESA[4] of 1.4 when unloaded.[5]

The TERNZ report has calculated ESA[4] values for a variety of commodities and heavy vehicle traffic that are significantly lower than the values found by Bartley Consultants or used by GHD.

2.2.8 Distance

The foregoing method to derive traffic loading in terms of ESA per hectare for various levels of production intensity does not account for distance of road travelled. That is, the amount of pavement wear that will result is determined by the loading effect multiplied by the length of road over which it is applied.

2.2.9 Selecting ESA values

It is clear that there is a range of estimates of ESA/ha and ESA/tonne values for a given commodity. Some data will be variously available at the District, regional and national levels. For practical purposes, in order to guide allocation of pavement maintenance costs, Councils may select an appropriate data point in the range. For example, this could be the midpoint, upper bound or lower bound.

[3] RR 185 Appendix B Table B1
[4] RR 185 Appendix C Table C1
[5] "Logging trucks on local roads – is forestry really having an unreasonable impact?" (2011)

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3 What Councils must consider

3.1 Introduction

Councils are obliged to consider outcomes under the Local Government Act 2002 (LGA). In meeting their obligations under s101(3)(a) of the LGA, Councils need to consider all of the following when funding pavement maintenance:

- The community outcomes to which the activity primarily contributes.
- The distribution of benefits between the community as a whole, any identifiable part of the community, and individuals.
- The period in or over which these benefits are expected to occur.
- The extent to which the actions or inaction of particular individuals or a group contribute to the need to undertake the activity.
- The costs and benefits, including consequences for transparency and accountability, of funding the activity as a separate item from other activities.

In deciding whether to fund pavement maintenance at all, the Council needs to consider s101(3)(b) of the LGA:

- the overall impact of any allocation of liability for revenue needs on the community.

This amounts to considering the variety of ways it can use funding instruments to allocate pavement maintenance costs across the community.

3.2 Duties of Councils under the Local Government Act (2002)

Pavement maintenance must be planned within a Council's infrastructure strategy. It must meet current and expected future levels of service. Councils must develop the most likely scenario of the future management of pavements. Once future infrastructure needs are signalled, the Council must complement the infrastructure strategy with a financial strategy. The financial strategy is a budget that is partly based on expected population and land use changes.

The Council implements its financial and infrastructure strategies using funds sourced from ratepayers, current and future, in a long-term plan that is required to:

- be prudent
- promote the current and future interests of the community.

4

4 Rates types available

4.1 Local Government Act (Rating) 2002

There are a number of funding instruments provided under Schedules 2 and 3 of the Local Government Act (Rating) 2002 (LGA (Rating)) to allow charges on ratepayers to provide Councils with revenue to meet their financial strategies. These are described in detail in Appendix B.

Those most useful in the context of pavement maintenance costs for low volume roads in rural locations, are set out below.

4.1.1 General rate

Uniform rate for all based on land value; capital value; or annual value.

Differential rate where rating units are according to different types of:

- Land use
- Activities permitted or proposed
- Land area
- Land location
- Annual value
- Capital value
- Land value.

The differential rate is calculated taking into account any of these factors: land value, capital value, annual value.

4.1.2 Uniform general charge

Essentially a fixed amount per rating unit.

4.1.3 Targeted rate

Uniform rate on rating unit

or

Differential rate on rating units where rating units are categorised by:

- Land use
- Activities permitted or proposed
- Land area
- Land location
- Annual value
- Capital value
- Land value.

The differential rate is calculated taking into account any of these factors

- Annual value
- Capital value
- Land value
- Value of improvements
- Area of land within the rating unit.
- Area of land within the rating unit that is sealed, paved, or built on.

4.2 Postponement of rates

Postponement policies may defer payment for a specific period, or defer until a particular circumstance or event occurs (e.g. significant level of forest harvesting, cessation of quarrying or mining). Postponement of rates may be desirable for industries where cash flows do not match annual cycles. This is the case for forestry where harvest cycles are very long. For quarrying and mining, cash flows are likely to fluctuate over long commodity cycles of many years. In such cases, firms may find it difficult to meet annual rates charges.

5

5 Allocation methods

5.1 Introduction

In this chapter we provide methods for Councils to allocate pavement maintenance costs to ratepayers. The allocation methods are based on a selection of rating instruments specified in the LGA (Rating), outlined in chapter 4. These methods account for:

- total pavement maintenance cost (PMCT) split out by pavement maintenance cost for each industry (PMCI)
- the benefits to the beneficiaries identified in chapter 3.

Local authorities are required by LGA (Rating) to calculate rating charges using two steps:

(1) define different categories of rateable land using one or more of the categories in Schedule 2 LGA (Rating) (refer Appendix B)

(2) calculate each category's share of the PMCT using factors in Schedule 3 LGA(Rating) (refer Appendix B).

Assuming Councils can estimate local benefits from each industry over the 30 year term of the infrastructure strategy, annualised "Net PMCI" (net of benefits) is:

Net PMCI = PMCI – net benefits from the industry to the community

The method allocates the net PMCI over rating units of that industry. The formula to calculate the rating charge for each rating unit accounts for:

- the rating unit's share of total land area (or the total production volume in the case of quarrying, food processing, etc) for the industry in the District
- variation in distance travelled on local roads
- variation in production intensity per hectare (such as from different farm systems).

There is an important piece of preliminary work for the Councils to guide their definition and selection of allocation formulae. This is based on the duties of Councils described in chapter 3.

Each Council must estimate (using methods described in chapter 2) average annual pavement consumption per industry (PMCI) in dollar terms, for each land use in the District for materially significant pavement consumption. Typical industries include: dairy farming; forestry; sheep and beef cattle farming; and horticulture. The tourism industry also impacts on pavement maintenance, but accounting for its impact is beyond the scope of this work. As it is generally impractical for a Council to include factors for actual distance and production intensity in the calculation of pavement consumption by industry the allocation method includes factors to account for variations between rating units in terms of distance and production intensity.

Each Council must also estimate the magnitude of the locally retained benefits that accrue from land use activities that generate pavement consumption over the 30 year infrastructure strategy. This is something Councils will have to deal with on a case by case basis. Pragmatism is important. For some Councils a broad estimate may suffice. In some cases, Councils may prefer to have a detailed estimate for a particular industry. Industries may also produce detriments to the community in the form of pollution; dust; and noise.

For different Councils, different pavement consumers produce different benefits and detriments to the community. For example, forestry harvesting and fruit harvesting may utilise temporary workers who reside outside the District and processing plants or mills based in other Districts. Consequently, the benefits from the

harvesting side of forestry for social, environmental and cultural outcomes may be limited. By contrast the production side of forestry, involving planting, thinning and pruning, can have substantial community economic benefits. In this case, silvicultural teams including their managers and owners are often located in small District centres. Land stabilisation can also be a local benefit of forestry on marginal lands. Other industries, such as dairying and sheep and beef cattle farming, which may employ many people over the long-term, can provide substantial community benefits also. At the same time, shearing and wool collection is now done by professional teams that can work internationally. Similarly, beef and lamb processing and milk processing often occur in plants located outside of the producer District.

5.2 Targeted rate – category of rating unit

The attributes of low volume road pavement consumers are best described by:

- Land use, indicating ESA per vehicle
- Production intensity, indicating number of, and types of vehicles for inputs and outputs
- Distance travelled on such roads.

As required by the LGA (Rating), Schedule 2 categories (Appendix B) can be used to define types of low volume pavement consumers for the purpose of levying differential charges:

- Land use category as a proxy for land use attribute
- Land area as a proxy for production volume relevant to land area
- Land value or capital value as a proxy for production volume not associated with land area
- Land-location category as a proxy for distance.

Using Schedule 2 categories of land use, land value or capital value, and land location, permits land users to be grouped according to their characteristic pavement consumption by industry, production scale and distance travelled.

Distance levels can be defined by a specific distance limit or some other measure. Similarly, varying categories for production intensity can be defined. In the stepped methodology in chapter 8 two categories of distance and three categories of production intensity are defined.

5.3 Targeted rate – calculation of charge

Once Councils differentiate types of pavement consumers, it is necessary to allocate a charge to them that reflects their pavement consumption. Pavement consumption varies markedly by industry and different engineering formulae are developed on an industry basis. Hence land use is a useful way to calculate rates.

A targeted rate provides an option to use land area to calculate the charge, whereas a general rate does not.

Schedule 3 of the LGA (Rating) (Appendix B) provides the list of factors able to be used to calculate each rating unit's share of the total pavement maintenance cost for the relevant industry.

It is assumed that the Council has first estimated the PMCI for each industry from the technical methods described in chapter 2 and that it has reduced this by the benefits of the industry to the community to beneficiaries described in the next section. The result is that the Council has an estimate of the 'net PMCI' of the industry. This is the net cost of pavement maintenance required for each industry, for the pavement maintenance set out in the 30 year infrastructure plan.

The formula to calculate the rating charge for each rating unit is given in equation 5-1:

Rating charge for rating unit = Net PMCI x Sh x Wt (5-1)

Sh is the rating unit's share of total production area (or production volume for quarrying, food processing etc.) for the industry in the District.

Wt is a "policy weighting" applied by the Council to account for:

- Variation in distance
- Variation in production intensity (such as from different farm systems).

Wt can be used to include other matters relevant to pavement consumption and its benefits that the Council deems appropriate.

In the hypothetical worked example in chapter 8, to account for distance for each rating unit, two levels of distance ("near" and "far") and three levels of production intensity (high, average, low) are arbitrarily selected. Councils can themselves define actual metrics for these levels and may also define more or less levels. In the hypothetical worked example, for each industry, there are six pavement consumption types (two distance types for each of three production intensity types) and six corresponding policy weights.

Six policy weight variables applied to equation 5-1 result in six differing allocation formulae. The formulae apportion PMCI in different ways. The equitableness of these apportionments is assessed in chapter 6.

When all the (Wt) weights are 1, the models assign a charge to each rating unit in the category that reflects its share by land area (if land area is used) of the pavement consumption cost calculated by the methods in Chapter 2. When the weights are different from 1, they reflect the local authority's discretion to distribute the burden of cost in a different way across different combinations of distance and production intensity. The Council can easily scale the policy weights with a constant scaling factor to ensure that the sum of the adjusted costs remains equal to the sum net PMCI for each industry.

A Council may elect to vary the policy weights further because it feels that it is a more equitable allocation of responsibility for funding the provision of assets to place more of the burden on some (e.g. higher value) rating units than others.

5.4 Targeted rate - charging for benefits

Where a ratepayer is a beneficiary of industrial activity and is not itself associated with low volume pavement consumption, it may enjoy monetary and non-monetary benefits which it can be charged for, and which reduce the PMCI to a net PMCI as discussed above.

A Council may recover all such amounts from ratepayers who benefit. To do this the Council may levy differential charges on non-land-production beneficiaries to cover the sum of these amounts for all industries.

There are many ways to do this. A targeted rate provides flexibility for calculating charges. If considering a targeted rate, a Council must assess whether the cost of setting the rate outweighs the benefits of doing so and the benefits that each pavement consumer industry provides the community over the 30 years of the infrastructure plan. Having made this assessment, the Council may:

(1) do nothing, since the cost of setting targeted rates outweighs the benefits of doing so

or

(2) levy a targeted rate:

- assess the benefits that each pavement consumer industry provides the community over the 30 years of the infrastructure plan (for pragmatism, the Council may make a reasonable estimate)
- reduce each PMCI by this amount to produce the net PMCI (above)
- total the value of benefits from all industry pavement consumers
- allocate this total as charges to rating units
- as a percentage measure of allocation to beneficiaries (such as residential ratepayers), use proportionate capital value of the rating unit of the total capital value of all non-pavement consumer rating units.

As with the land use rating units, Councils are required to use the categories in Schedule 2 to group rating units for charges. The "land use" category differentiates residential and various commercial types of beneficiary ratepayers from pavement consumers.

Councils are required to use the factors in Schedule 3 to calculate charges for the rating units. Capital value is a proxy for asset wealth of rating units. Asset wealth can include some contribution from the industrial activity of some or all pavement consumer industries in the District. Capital value of a rating unit is potentially a reasonable indicator for economic development produced by industrial activity.

6

6 Equitableness of impact

6.1 Introduction

A Council must "promote the current and future interests of the community". In doing this, there are many standards of equitableness, depending on the social norms or preferences of the District.

The Council achieves equitableness by imposing different charges on different ratepayers. Using the model in chapter 5, a Council can model different charges on different ratepayers by adjusting the policy weights (Wt) in the rates calculation formulae.

6.2 Standards of equitableness

To promote the current and future interests of the community, the Council can select different rate types to differentially levy its ratepayers. These, together with an assigned standard of equitableness in parentheses, are:

- uniform charge (all pay the same amount)
- user pays (identifiable user pays cost at market value)
- beneficiary pays (beneficiary pays for market and non-market value)
- ability to pay (charge should be proportional to the beneficiaries ability to pay).

There is nothing in the LGA 2002 that requires the Council to explain how it decides that an allocation method achieves "promoting the current and future interests of the community". These guidelines have separated the "beneficiary pays" principle from "user pays". The two are usually combined into one "benefit" principle, but it is necessary to separate them to emphasise the importance of recognising the substantial benefits that accrue to non-land use ratepayers from land-based production that is reliant on rural low volume roads.

6.3 Assessment of equity

6.3.1 Uniform charge

A Council may simply decide to levy a uniform charge on all rating units based on land value or capital value. Annual value, though optional, is not useful in this context. Essentially, a uniform charge does not explicitly account for who bears the benefits and costs, both market and non-market, of pavement consumption.

This is a simple measure to calculate. It does not target equity in any way. However, because it is based on a value that increases with increase in asset wealth, the distribution of cost it achieves has an "ability to pay" equitableness. That is, those more able to pay, do so.

Land value, however, may be an inappropriate factor since low land value pavement consumers, such as forestry firms have a high ability to pay and will be high pavement consumers, yet when using land value as a rating basis, they will have a proportionately lesser charge than some lesser pavement consumers.

6.3.2 Targeted rate - charging industry for pavement consumption

If a Council decides to set the policy weights (Wt) all equal to 1, the net effect generally accords with the user pays principle to an approximation. However, better knowledge from the engineering reports suggests that using different Wt to account for "distance" and "production intensity" may provide a closer fit to the "user pays" principle.

7

7 Methodology

7.1 Introduction

This chapter provides a step by step methodology that Councils can use for the equitable allocation of total roading costs to ratepayers.

The total roading maintenance cost (RMT) is the sum of:

(i) total pavement consumption maintenance costs (PCMT) - these include pavement maintenance and renewals costs associated with different land uses, and allocatable using these guidelines;

(ii) fixed road maintenance costs (RMF) - these include non-pavement operations and maintenance costs, such as traffic services, structures and environmental maintenance, and are allocatable uniformly to all ratepayers; and

(iii) other pavement maintenance costs (POM) that are not attributed to pavement consumption from specific land use. These are to be decided by Councils and are allocatable uniformly to all ratepayers.

Hence:

$$RMT = PCMT + RMF + POM \quad (7\text{-}1)$$

An example of a fixed maintenance cost is the cost of repair of signage, from which all ratepayers benefit. Hence allocation of this cost can be easily made with a uniform general charge to each ratepayer. An example of other pavement maintenance costs is the cost associated with periodic grading of unsealed roads, again from which all ratepayers benefit. Allocation of other costs can also be made with a uniform general charge to each ratepayer.

The methodology presented in the following is concerned only with calculating the equitable allocation of PCMT.

Step 1: Defining users, impacts and timing, and materiality

The first step is to define who causes the pavement consumption, the extent of the consumption , who it impacts, when it impacts and whether it is pragmatic to fund its maintenance with a targeted rate. The Council can ask the following questions, with typical answers in parentheses.

1. What is the period that pavement consumption is being considered? (30 years)
2. Over this period, who are the main types of primary industry ratepayers whose business involves using local roads for the movement of freight and commodities and the provision of services? (forestry; quarrying; dairy; pastoral, horticulture; milk processors).
3. Which of these land uses will mainly cause pavement consumption in this period? (forestry, quarrying; dairy; pastoral, horticulture; milk processors).
4. At what frequency in this period will pavement consumption occur? (annually, 5 yearly, 30 yearly).
5. Is the expected pavement consumption of different land uses in the period sufficiently different to warrant a different rating charge for each? (Yes – the District has many dairy farms of different types, a few pastoral and three forestry blocks).

6. What are the main kinds of benefits or detriments that these land uses will provide for the community over the period and what is a reasonable reward or penalty to the industry for providing these? (Benefits can include: supporting economic growth; providing employment; appreciation of land values; supporting community activities; providing for environmental improvement. Detriments can include producing: noise; dust; pollution; traffic congestion).

Step 2: Calculate traffic impact

Calculate:

i) ESA/ha for each land use type – where production is proportional to land use area; and

ii) ESA/tonne for each land use type – where production is not proportional to land area.

It is clear that there is a range of estimates of ESA/ha and ESA/tonne values for a given commodity. Some data will be variously available at the District, regional and national levels. For practical purposes, in order to guide allocation of pavement maintenance costs, Councils may select an appropriate data point in the range. For example, this could be the midpoint, upper bound or lower bound.

Step 3: Calculate PCMT and PCMI

PCMT consists of the sum of the pavement consumption maintenance costs for each industry (PCMI), i.e.:

$$PCMT = PCMI(forestry) + PCMI(dairy) + PCMI(pastoral) + PCMI(quarrying) + \ldots \quad (7\text{-}2)$$

Step 3a: PCMT is known

If PMCT is known (eg from a prior budgeting procedure), the PCMI for each industry can be calculated using its ESA proportion of total ESA for the PCMT:

$$PCMI = (ESA(PCMI)/ESA(PCMT)) \times PCMT \quad (7\text{-}3)$$

For example:

$$PMCI\ (forestry) = ((ESA(forestry)/ESA(PMCT)) \times PCMT \quad (7\text{-}4)$$

where

$$ESA(PCMT) = ESA(forestry) + ESA(dairy) + ESA(quarrying) + \ldots \quad (7\text{-}5)$$

Step 3b: PCMT is unknown

If PCMT is unknown, then the Council can use available data, such as from regional or national averages to calculate the PCMI for each industry.

If the production output volume is proportional to land area, such as for forestry, dairy farming and pastoral farming, the PCMI for each industry is calculated as the dollar cost of the traffic impact per hectare for that industry multiplied by the area of land in production.

The traffic impact per hectare is measured by the Equivalent Standard Axle (ESA) loading per hectare. ESA/ha varies by: (i) region; (ii) farm type (eg classes of pastoral and dairy farms); and by farm management practices; etc.

The TERNZ report provides some guidance on the calculation of the average ESA/ha for each industry. The Council can use a reasonable estimate of the average cost of ESA/ha for the industry. We will define this cost as $ESA/ha.

For the present purpose, use an ESA/ha that best represents the average production volume per hectare for the particular industry in the District. Further adjustments (below) will account for differences in production intensity of different land users within the same industry in the District. These adjustments are refinements of the definition of the use of land.

Hence:

PCMI = $ESA/ha (industry) x area (ha) of production for that industry in the District (7-6)

So that:

PCMT = PCMI(forestry) + PCMI(dairy) + PCMI(pastoral) + … (7-7)

is measured using:

PCMI(forestry) = $ESA/ha(forestry) x area of forestry production in District (7-8)

PCMI(dairy) = $ESA/ha(dairy) x area of dairy production in District (7-9)

PCMI(pastoral) = $ESA/ha(pastoral) x area of pastoral production in District (7-10)

If the production output volume is not proportional to land area, such as for quarrying and food processing, the PCMI for each industry can be calculated as the product of: (i) the cost of the traffic impact per tonne for that industry, which we label as $ESA/tonne and (ii) the estimated production in tonnes of that industry in the District, over the period.

The traffic impact per tonne is measured by the Equivalent Standard Axle (ESA) loading per tonne. ESA/tonne varies by: (i) region; (ii) economic conditions; (iii) management practices; etc.

The Council can use a reasonable estimate of the average cost of ESA/tonne for the industry. We will define this cost as $ESA/tonne.

For the present purpose, use an ESA/tonne that best represents the average production volume per tonne for the particular industry in the District. If District level data are not available, regional or national level data may be appropriate. Further adjustments (below) will account for differences in production intensity of different land users within the same industry in the District. These adjustments are refinements of the definition of the use of land.

Hence:

PCMI = $ESA/tonne (industry)

x volume (tonnes) of production for that industry in the District (7-11)

As an example of where PMCT consists of both production associated with land area and production not associated with land area is:

PCMT = PCMI(quarrying) + PCMI(milk processing) + PCMI(meat processing) + … (7-12)

Where PCMT is measured using:

PCMI(quarrying) = $ESA/tonne (quarrying) x volume of quarrying production in District (7-13)

PCMI(milk processing)

= $ESA/tonne (milk processing) x volume of milk processing production in District (7-14)

PCMI(meat processing)

= $ESA/tonne (meat processing) x volume of meat processing production in District (7-15)

Step 4: Adjusting PCMI for benefits and detriments of industry

If the industry benefits (detriments) the community in some way over the period, the Council may recognise this by a reward (penalty) that reduces (increases) the PCMI. The net result for each industry after such rewards and penalties is a net PCMI. This can be calculated by applying a simple multiplier to the PCMI. For example, if forestry in the District was caculated to have a detriment and milk processing was calculated to have a benefit:

Net PCMI (Forestry) = 1.1 PCMI (Forestry) (7-16)

where the detriment is recognised by 10% of the PCMI

Net PCMI (milk processing) = 0.80 PCMI (milk processing) (7-17)

where the benefit is recognised by 20% of the PCMI.

Step 5: Allocating net-PCMI to land user ratepayers – base case

For land use where production is associated with land area, the base case allocation of PCMI to each ratepayer is the product of the average $ESA/ha times the area of production over the period times the number of cycles of production.

Hence:

Net-PCMI-base (dairy ratepayer)

= $ESA/ha (dairy) x area of annual production (ha)

x number of years of production within the period (7-18)

Net-PCMI-base (pastoral ratepayer)

= $ESA/ha (pastoral) x area of annual production (ha)

x number of years of production within the period (7-19)

Net-PCMI-base (forestry - annualised)

= $ESA/ha (forestry) x area of production (ha)

x number of harvest cycles within the period (7-20)

For land use where production is not associated with land area, the base case allocation of PCMI to each ratepayer is the PCMI pro rata to the capital value as a proportion of the total capital value of all rating units for that industry in the District.

Hence:

Net-PCMI-base (quarrying ratepayer)

= PCMI (quarrying)

x capital value of rating unit/ sum of capital values of all quarrying rating units (7-21)

Net-PCMI-base (milk processing)

= PCMI (milk processing)

x capital value of rating unit/ sum of capital values of all milk processing rating units (7-22)

Net-PCMI-base (meat processing)

= PCMI (meat processing)

x capital value of rating unit/ sum of capital values of all meat processing rating units (7-23)

Step 6: Adjusting net-PCMI-base for distance travelled

The Council can levy a higher rate for land users whose HCVs use proportionately more of the local road network than others. It can define an arbitrary distance from state highways (not maintained by the Council), beyond which the higher rate will apply. In this methodology two types of zones are defined, but the Council can define more. This policy categorises rating units in terms of location.

Pavement wear is assumed to be relatively less for cartage of production to and from rating units within the distance than for those outside the distance.

To account for this difference in pavement wear and therefore in pavement maintenance cost, the net-PCMI-base for each industry is multiplied by a distance factor.

The distance factor is greater than 1 for rating units outside the zone ("far") and is less than 1 for rating units inside the zone ("near"). The choice of factors is at the discretion of the Council. Together their impact is to shift the burden of the net-PCMI-base more onto rating units whose HCVs travel greater distances on low volume roads.

For example:

Net PCMI-dist(near) = 0.8 x net PCMI-base (7-24)

Net PCMI-dist(far) = 1.3 x net PCMI-base (7-25)

This distance adjustment can be done with or without the adjustment for production intensity described next.

Step 7: Adjusting net-PCMI-base for production intensity

The Council can have a policy that accounts for different production intensities of rating units within the same industry in the District. This policy categorises rating units in terms of land use. Different production intensities can occur for many reasons:

- different farm types than described using the average ESA/ha or ESA/tonne value
- different productivity arising from farm management practices or business management practices, than described using the average ESA/ha or ESA/tonne value.

Pavement consumption is higher for cartage of production to and from rating units with relatively higher production intensities.

To account for this difference in pavement wear and therefore in pavement maintenance cost, the net-PCMI-base for each industry is multiplied by a production intensity factor. In this methodology three types of production intensities are defined ("high"; "average" and "low") but the Council can define less or more.

The average intensity corresponds to the net-PCMI-base and so the multiplier is 1. Otherwise, the production intensity factor is an arbitrary number decided by the Council being greater (less) than 1 for high (low) production intensity land uses. Together the impact of the production intensity factors is to levy a higher rating charge for higher production intensity.

For example:

Net PCMI-prod (high) = 1.1 x net PCMI-base (7-26)

Net PCMI-prod (low) = 0.9 x net PCMI-base (7-27)

Net PCMI-prod (average) = 1.0 x net PCMI-base (7-28)

This production intensity adjustment can be done with or without the adjustment for distance described above. When done together we can label the new adjusted net PCMI as:

Net PCMI-dist-prod.

Step 8: Scaling the adjusted net-PCMI

Making the distance and production intensity adjustments in steps 6 and 7 above will result in an assortment of net-PCMI values for each rating unit for each industry. While the relative value of each net-PCMI between different rating units will reflect the adjustments made, the sum of the values for all rating units will differ to the sum of the total net-PCMI that the Council has to fund.

It is this total net-PCMI that is the relevant cost that needs to be allocated, but in the proportions of the new adjusted PCMIs for each rating unit.

Hence, it is necessary to scale each adjusted net PCMIs for each rating unit to make their sum equal the total net-PCMI to be allocated for each industry.

This is achieved by the following scaling:

Net-PCMI (rating unit) = net-PCMI-dist-prod x scale factor (7-29)

Where

scale factor = net-PCMI/(sum of all net-PCMI-dist-prod) (7-30)

8

8 Hypothetical worked example

Weka District Council

The following is a hypothetical case to illustrate the application of the equitable allocation methods presented in this report.

Weka District Council is introducing a differential targeted rate to fund the local share of pavement maintenance costs for Council roads. The maintenance will be needed annually over the next 10 years and is generally necessary because of the impacts of heavy vehicles of forestry, dairy, and pastoral land use.

The total of targeted rates will cover the expected pavement maintenance cost. The District relies on these industries to underpin its community. We assume that Weka understands the benefits of each industry for the non-industrial ratepayers over the next 10 years and can estimate these in a pragmatic way. Weka has a policy that: (i) non-industrial land users should be charged for the benefits they receive and (ii) industrial land users should meet net costs, being pavement maintenance costs less the benefits they provide.

The annual pavement maintenance cost for each industry has been calculated with projections of likely industrial activity. The maintenance has also been costed in current dollars.

Weka will allocate the net cost for each industry, using differential targeted rates for rating units with that particular industrial land use. Weka will aggregate the cost of the benefits of all industries. It will allocate this total benefit cost to non-industrial ratepayers, using a differential targeted rate.

Weka estimates annual pavement maintenance costs of $4m. Calculations attribute this to forestry ($2m); dairy ($1m); and sheep and beef ($1m). Weka has decided that non-industrial ratepayers benefit from industries in many ways and that a suitable deduction in allocatable cost for each industry is forestry (nil); dairy ($0.9m); and sheep and beef ($0.5m). Weka has made this estimate of benefits in a pragmatic way in consultation with policy and finance teams in its administration.

The total benefit reward is therefore $1.4m annually to be allocated as a cost to non-industrial ratepayers. The net PCMI allocated to industrial land uses are: forestry ($2m); dairy ($0.1m); and sheep and beef ($0.5m).

Weka Policies

Weka has the following policy for pastoral and dairy rating units.

“Apply the following policy weights to account for higher pavement consumption and more distant and more production-intensive rating units.”

Distance	Distance factor	Production intensity	Production intensity factor	Policy Weight
Near	1.0	High	1.20	1.20
		Average	1.00	1.00
		Low	0.80	0.80
Far	1.2	High	1.20	1.44
		Average	1.00	1.20
		Low	0.80	0.96

Weka has the following policy for forestry rating units.

"Apply the following policy weights to accounts for higher pavement consumption and more distant and higher production intensity rating units."

Distance	Distance factor	Production intensity	Production intensity factor	Policy Weight
Near	1.0	High	1.50	1.20
		Average	1.00	1.00
		Low	1.00	1.00
Far	1.2	High	2.25	2.25
		Average	1.00	1.50
		Low	1.50	1.50

Weka has a policy of charging residential and other non-industrial land uses for the benefits they receive from industry. The annual charge is pro-rata the capital value share of their land.

Rating charge - pastoral land use

Woolly Farm is a pastoral rating unit that is classified with a 'far' distance and a 'high' production scale. Hence its policy weighting factor is 1.44. It has a rating unit land area of 140ha. Weka's total pastoral land area is 197,566ha. Hence its productions share (Sh) is 140/197,566.

The industry net pavement cost for pastoral industry is $0.5m. Woolly Farm's annual targeted rate for low volume pavement consumption is calculated as:

Net PCMI x Sh x Wt

= $0.5m x 140/197,566 x 1.44

= $510

This calculation is repeated (in excel spreadsheet) for all pastoral rating units. The sum of the charges (Z) will be different to the total net PCMI, because of the impact of policy weighting.

To get the actual rating charge, all the approximate charges have to be scaled by the same factor:

Net PCMI/Z = $0.5m/Z

Rating charge - forestry land use

Pine Hill is a forestry rating unit that is classified with a 'near' distance and a 'low' production intensity. Hence its policy weighting factor is 1.0. It has a rating unit land area of 605ha. Weka's total forestry land area is 75,044ha. Hence Pine Hill's production share (Sh) is 605/75,044.

The industry net pavement cost for forestry industry is $2.0m. Pine Hill's annual targeted rate for low volume pavement consumption is approximately:

Net PCMI x Sh x Wt

= $2.0m x 605/75,044 x 1.0

= $16,123

As for pastoral, to get the actual rating charge, scale the approximate charge by:

Net PCMI/Z = $4.0m/Z

Where Z is the sum of the approximate individual charges.

Rating charge - dairy land use

Muse Farm is a dairy rating unit that is classified with a 'near' distance and a 'high' production intensity. Hence its policy weighting factor is 1.2. It has a rating unit land area of 169ha. Weka's total dairy land area is 2,025ha. Hence its production share (Sh) is 169/2025.

The industry net pavement cost for dairy industry is $0.1m. Muse Farm's annual targeted rate for low volume pavement consumption is approximately:

Net PCMI x Sh x Wt

= $0.1m x 169/2025 x 1.2

= $10,015

As for pastoral, to get the actual rates charge, scale the approximate charge by

net PCMI/Z = $0.1m/Z

Where Z is the sum of the approximate individual charges.

Rating charge - non-industrial land use

Ms. Myth owns a residential rating unit with a capital value of $174,854.

The total capital value of all non-industrial, non-forestry, non-dairy and non-pastoral land is $901,722,700.

The total reward for benefits of industry to the community is $1.4m.

Ms. Myth's annual rating charge for the benefits of land use industry is:

$1.4m x $174,854/$901,722,700

= $272.

9

9 Variation of policy weights

9.1 Wt for distance and production intensity

The hypothetical worked example above shows how a targeted rate for pavement consumption is calculated with Net PCMI, Sh and Wt. While the impact of Net PCMI and Sh on the targeted rate is clear, the impact of the policy weight, Wt, is not immediately obvious. This chapter presents three examples where production intensity and distance scale are changed and the resulting policy weights (Wt) are shown in tables and plotted in figures for illustration of the impact of production scale and distance scale on the policy weights (Wt).

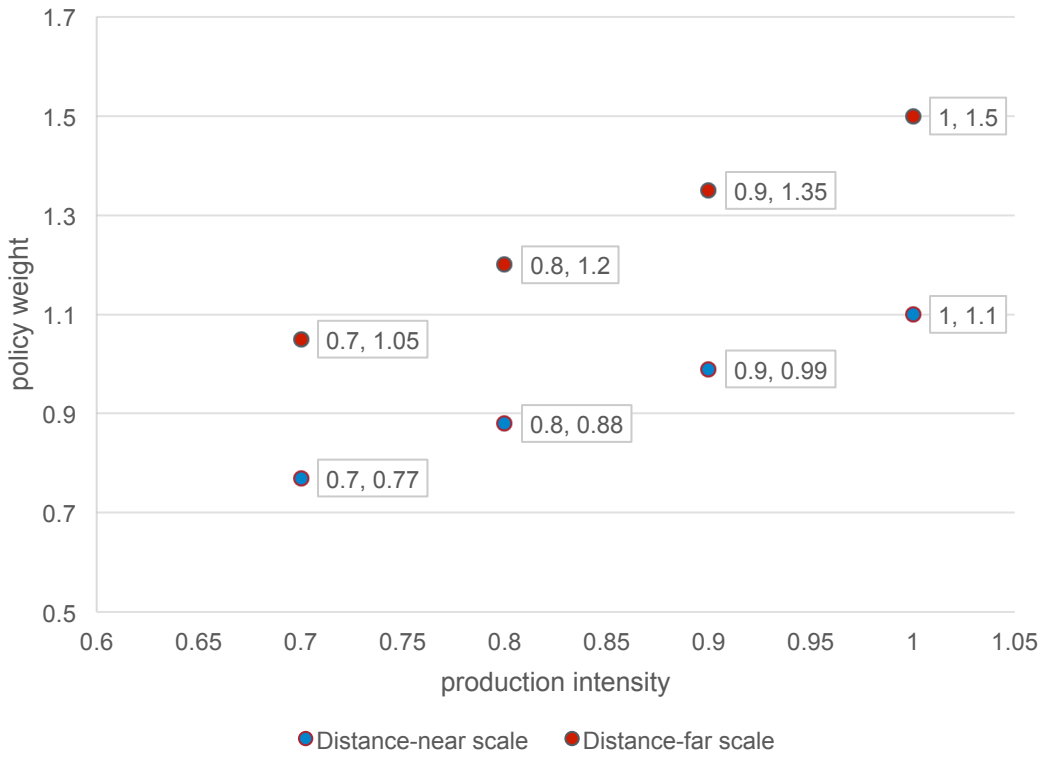
These examples demonstrate the kinds of results that Councils can achieve by changing Wt by changes in both distance and production intensity to give effect to policy decisions.

Example 1

Table 1 Example 1 Policy weights for production intensity and distance

Production Intensity	Wt (Distance = near)	Wt (Distance = far)
1.00	1.10	1.50
0.90	0.99	1.35
0.80	0.88	1.20
0.70	0.77	1.05

Figure 1 Example 1 Policy weights for production intensity and distance



In example 1 two levels of distance and 4 levels of production intensity produce eight policy weights (Wt). The difference between the Wt for each distance level increases as the production intensity increases and this illustrates the combined effect of production intensity and distance.

Example 2 differs from Example 1 because the distance = far level is greater than before, while the production intensity levels are unchanged. The divergence of the Wt for each distance level is greater than before.

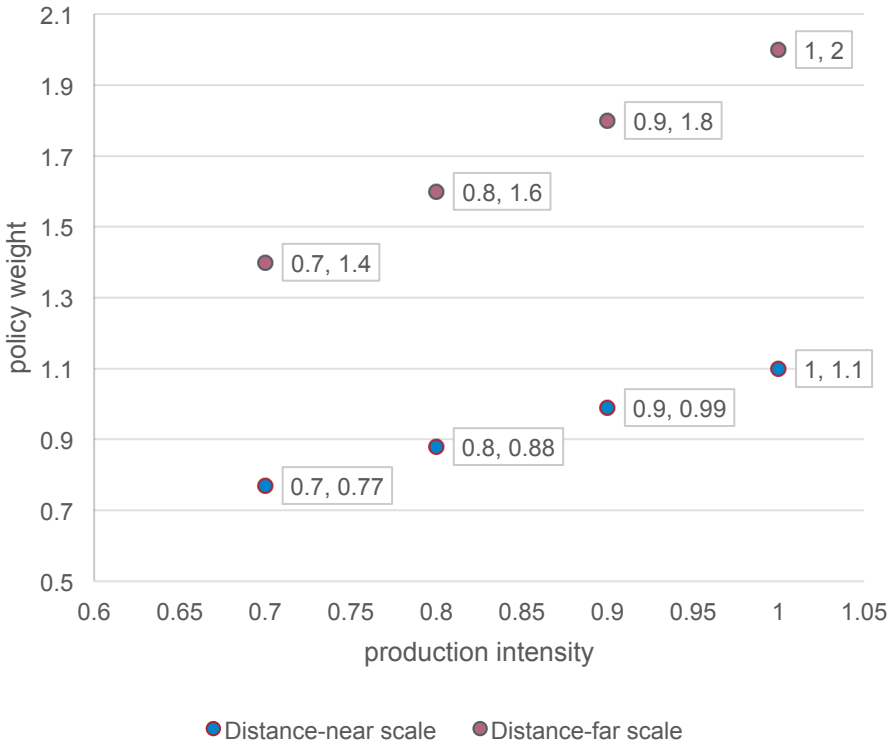
Example 3 differs from Example 1 because the two highest and two lowest production intensity levels are more spread out than before. The divergence of the Wt for the two groups of production intensity levels is illustrated In Figure 3.

Example 2

Table 2 Example 2 Policy weights for production intensity and distance

Production Intensity	Wt (Distance = near)	Wt (Distance = far)
1.00	1.10	2.00
0.90	0.99	0.99
0.80	0.88	0.88
0.70	0.77	0.77

Figure 2 Example 2 Policy weights for production intensity and distance

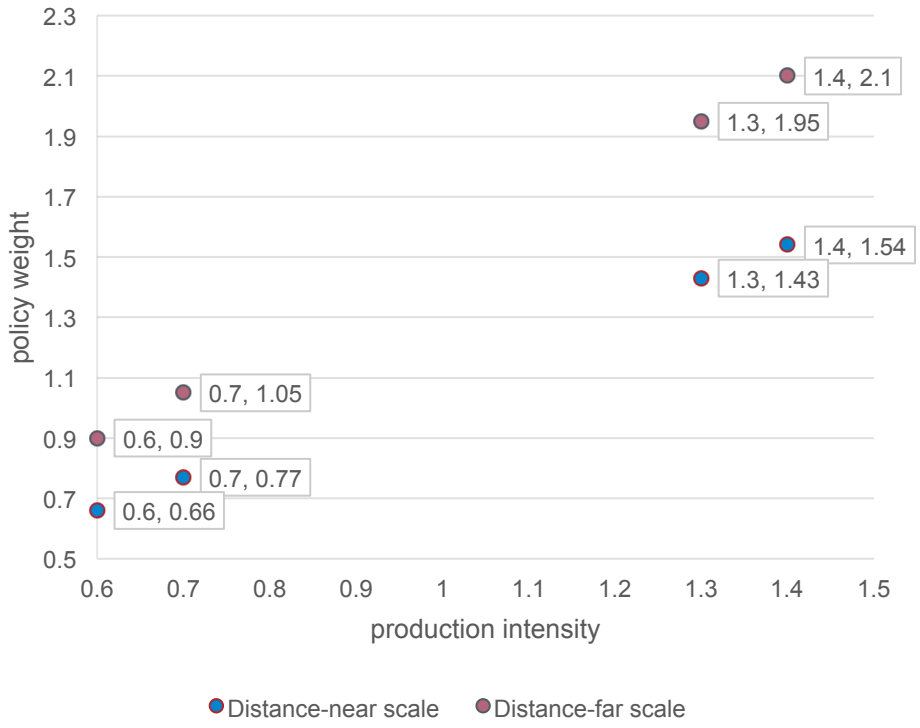


Example 3

Table 3 Example 3 Policy weights for production intensity and distance

Production Intensity	Wt (Distance = near)	Wt (Distance = far)
1.40	1.54	2.10
1.30	1.43	1.95
0.70	0.77	1.05
0.60	0.66	0.90

Figure 3 Example 3 Policy weights for production intensity and distance



Appendix A Financial and infrastructure obligations

A

Financial management obligations

In planning for future pavement maintenance needs and costs, Councils must meet financial management obligations under the LGA 2002. These are set out in LGA s101(1) to s101(3). In summary, a Council must exercise prudent financial management to promote the current and future interests of the community. It may draw funding from rates, borrowing and other sources taking into account the main outcomes to be funded, who causes the funding to be incurred, who benefits and when they benefit.

Future desired outcomes for social, environmental and cultural states will also influence funding needs and the appropriate sources of funds for them. Councils will need to be informed of scenarios including for employment status, age, ethnicity, home ownership, and location.

Financial strategy obligations

Councils must prepare a financial strategy under s101A of the LGA 2002. This strategy is phased annually, and it provides a budgeted guide for considering future expenditure, and for showing the impact on rates and charges to ratepayers. Importantly for pavement maintenance, the financial strategy must describe factors set out in s101A(3)(a), including expected changes in land use and in population numbers, together with their implications for infrastructure expenditure.

Infrastructure strategy obligations

Councils must prepare an infrastructure strategy (at least 30 years) under s101B of the LGA 2002 that describes significant infrastructure issues and the principal options to address them.

Under s101B(3), the infrastructure strategy must outline how the Council intends to manage its infrastructure assets, taking into account such matters as future demand and level of service required.

Under s101B(4) the infrastructure strategy must outline the most likely scenario for the management of the Council's infrastructure assets over the period of the strategy and, in that context, must show indicative estimates of the projected capital and operating expenditure.

Appendix B Local Government (Rating) Act 2002

B

Schedule 2

Matters that may be used to define categories of rateable land

1. The use to which the land is put.
2. The activities that are permitted, controlled, or discretionary for the area in which the land is situated, and the rules to which the land is subject under an operative District plan or regional plan under the Resource Management Act 1991.
3. The activities that are proposed to be permitted, controlled, or discretionary activities, and the proposed rules for the area in which the land is situated under a proposed District plan or proposed regional plan under the Resource Management Act 1991, but only if—
    a. no submissions in opposition have been made under clause 6 of Schedule 1 of that Act on those proposed activities or rules, and the time for making submissions has expired; or
4. all submissions in opposition, and any appeals, have been determined, withdrawn, or dismissed.
5. The area of land within each rating unit.
6. The provision or availability to the land of a service provided by, or on behalf of, the local authority.
7. Where the land is situated.
8. The annual value of the land.
9. The capital value of the land.
10. The land value of the land.

Schedule 3

Factors that may be used in calculating liability for targeted rates

1. The annual value of the rating unit.
2. The capital value of the rating unit.
3. The land value of the rating unit.
4. The value of improvements to the rating unit.
5. The area of land within the rating unit.
6. The area of land within the rating unit that is sealed, paved, or built on.
7. The number of separately used or inhabited parts of the rating unit.
8. The extent of provision of any service to the rating unit by the local authority, including any limits or conditions that apply to the provision of the service.
9. The number or nature of connections from the land within each rating unit to any local authority reticulation system.

10. The area of land within the rating unit that is protected by any amenity or facility that is provided by the local authority.
11. The area of floor space of buildings within the rating unit.
12. The number of water closets and urinals within the rating unit.

Notes:

1. For the purposes of clauses 1 to 5, 8, and 10, rating unit includes part of a rating unit.
2. For the purposes of clause 4, value of improvements is the value calculated in accordance with the following formula:

   c – l

   where—

   c is the capital value of the rating unit

   l is the land value of the rating unit.
3. For the purposes of clause 8, the extent of provision of a service to the land must be measured objectively and be able to be verified.
4. For the purposes of clause 12, a rating unit used primarily as a residence for 1 household must not be treated as having more than 1 water closet or urinal.

Appendix C What Councils must consider

C

Local Government Act 2002 s101(3)(a)

Councils are obliged to consider outcomes under the LGA 2002.

In meeting their obligations under s101(3)(a) of the LGA 2002, Councils need to consider all of the following when funding pavement maintenance:

- The community outcomes to which the activity primarily contributes.
- The distribution of benefits between the community as a whole, any identifiable part of the community, and individuals.
- The period in or over which these benefits are expected to occur.
- The extent to which the actions or inaction of particular individuals or a group contribute to the need to undertake the activity.

The costs and benefits, including consequences for transparency and accountability, of funding the activity as a separate item from other activities.

Market and non-market outcomes

It is helpful to use a framework of total economic value to assess benefits and burdens of pavement maintenance to ratepayers in a District. Total economic value encompasses all the value attributable to market and non-market transactions.

In market transactions:

- profits accrue to land-based producers as well as to other firms, such as primary processors, retail and wholesale suppliers, and service providers
- households benefit from earnings of workers employed in all industries
- firms also benefit from the purchases of households from them.

The economic value of market transactions can be estimated using economic models and official statistics. It is argued that pavement maintenance has allowed land-based production to occur and economic value to accrue. This type of economic value is particularly important in rural Districts where urban service centres rely on the business generated by land-based primary production.

In non-market transactions, economic value accrues because pavement maintenance enables recreation, capital value, the appreciation of residences and businesses, the conservation of the natural estate, and enables future generations to benefit from future employment opportunities and the quality of the environment. In a sense, these benefits are public goods for the District, since they are provided similarly to all and without exclusion.

In non-market transactions burdens are also produced where economic value diminishes because pavement maintenance causes such detriments as environmental degradation, even if temporarily. This would not have occurred without the pavement maintenance.

Some market and non-market transactions can have benefits that accrue outside of the District, although pavement maintenance costs are incurred by the District. Such benefits arise, for example, in the case of tourism, where pavement maintenance is required to maintain tourist roads, while tourists do not stay or shop in the District, but do so elsewhere in the country.

Tourism within a District also provides recreation, amenity and other non-market benefits to ratepayers.

Materiality

A Council needs to consider whether it is sensible to fund pavement maintenance as a distinct charge to ratepayers.

For some Councils, pavement maintenance costs for low volume roads are not sufficiently large or sufficiently different from other costs to warrant separate accounting treatment. For others, it is important enough to budget and fund separately.

The main point is that a Council has a discretion to select separate accounting treatment for both current and future pavement maintenance.

Causation

A Council needs to consider the identity of the ratepayers, over the 30 year infrastructure plan, who engage in, or refrain from, activities so that pavement maintenance can provide levels of service for ratepayer activities.

The most commonly cited ratepayers are land use producers who frequently use heavy commercial vehicles for forestry, dairying, sheep and beef cattle farming; and horticulture production. In addition, primary processors produce pavement consumption through the transportation of milk, fruit and other produce.

Timing of pavement maintenance

A Council needs to consider the timing of pavement maintenance. For dairying; sheep and beef cattle farming; and horticulture, pavement consumption is generally accepted to be seasonal, but continuous over the long-term. Forestry, by comparison, has the greatest impact on pavement consumption in the years around harvesting time. Forestry companies have some discretion when to harvest and will seek to achieve optimal global log prices at harvest time.

Who benefits

Land use ratepayers

Land use producers who cause the need for pavement maintenance, directly benefit from it. These benefits are market-based and can be quantifiable using economic models and economic projections.

Primary processing industries, such as milk processers and fruit processors, cause pavement consumption through the use of tankers and other transportation to take primary produce to plants.

Non-heavy vehicle owners of low productivity land, such as for lifestyle blocks, derive benefits, through increases in property values, due to high productivity production in their vicinity.

Non-land–use ratepayers

Primary production and tourism continue to underpin the New Zealand economy. Urban centres of rural Districts are reliant on primary production industries which cause pavement maintenance. Rural town are centres for rural finance, primary processing, fuel supplies, and the provision of other goods and services

Network operators such as air, rail, postal, and sea transportation rely in part on land-based production in their Districts, and are associated with low volume roads. Network and utility operators may use low volume roads as corridors for infrastructure, including for electricity supply, postal, and cellphone.

The market-value benefits, such as employment and economic activity that flow indirectly from primary production are measureable using economic assessment tools.

The non-market benefits are largely derived from the economic growth that occurs in the District as a result of primary production. These are difficult to quantify, but can be assessed using social assessment models and qualitative analysis of future scenarios. The non-market benefits that accrue to non-land users include:

- The appreciation of land values
- Improved lifestyle quality from improved amenities
- Health, social services and recreation
- Providing opportunities for future generations
- Increased capacity, from higher District income
- Conservation of the natural estate and protecting biodiversity
- Future generations will benefit from infrastructure and community development supported by current land use production.

It is also important to underpin new growth industries such as tourism that can provide jobs and new opportunities for economic activity. The benefits of tourism cannot be captured in Districts that lack the infrastructure and networks to develop it.

There are market and non-market burdens to beneficiaries as well. These include: a decline in the demand for goods and services needed because of unmaintained roads (e.g. 4 WD vehicles and servicing) and adverse environmental impacts (e.g. increased contamination of land). In the remainder of this report, for simplicity, we have focused on the benefits.

Main community outcome

The discussion above contributes to our understanding of the community outcomes that Councils are required to focus on.

For some Councils, community outcomes largely depend on the economic activity that is derived from the reliable movement of primary goods and freight, such as in rural Districts. In comparison, the community outcomes of Councils that include large population-centres are focused on the movement of people and goods for light commercial activity.

Low volume rural roads therefore underpin the main community outcomes of rural Districts. This conclusion underpins the significant beneficial outcome of pavement maintenance for non-land users in rural Districts.