Assessment of the Australian Road System: A Case Study in Gunning Shire, NSW

Occasional Paper

This Paper presents the results of a study on the performance of roads in a small and therefore more simply analysed region. A road user's view was adopted for performance evaluation during the study and the report's structure represents a methodology for similar future evaluations. For the purpose of the study 'performance' was taken to mean the extent to which requirements are satisfied.

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Assessment of the Australian Road System:

A Case Study in Gunning Shire, NSW

A.J. Emmerson

J.E. Miller

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FOREWORD

This study has examined in detail the road system in the Shire of Gunning NSW. By selecting a small region, the study team has been able to comprehend and analyse most user objectives for the entire road system. The Shire proved an excellent base for the study as it is relatively small, has had no recent changes in boundaries, involves only one major industry, but in other respects presents a representative range of individual and community activities and of the various types of roads and road management responsibilities.

The determination of user objectives, which in turn allowed the performance of the road as viewed by those users to be assessed, was a significant feature of the study. From such objectives an understanding of the importance of existing road conditions can be obtained, to assist the evaluation of road construction and maintenance priorities.

The study has concentrated on the use made of the local roads and highways in the Shire. It has benefited from thoughts and ideas supplied by road users, obtained not only by survey techniques, but more significantly through lengthy discussion with the users themselves at community meetings, on road sides, from truckers in cafes and hotels, on school buses, and at many other localities.

The design of this study recognised from the outset that the adequacy of any road system is a value judgment. For this reason, the study's approach was to provide relevant data and discussion to assist readers to form their own assessment of the adequacy of the road system in Gunning Shire.

This study provides a methodology which could be applied to other regional road studies. Whilst each new region will have a different population structure, historical development, land form, economic base, and so on, it is expected that when generalised, many characteristics will exhibit useful similarities.

The Gunning Case Study is the work of Messrs J. Miller and A. Emmerson of the Planning and Technology Branch of the Bureau of Transport Economics. The research and documentation of Shire finance was supervised by Mr J. Maclean and the accessibility survey was devised and supervised by Mr K. Loong, both of the BTE.

Assistance was obtained from many individuals and organisations during the course of this study. I wish to acknowledge specifically the assistance of the Gunning Shire Clerk Mr A. Stringer and his staff, the Gunning Shire Engineer Mr J. Bliss, the Apex Club of Gunning, the St. Edmund's Churchwomen Union, the NSW DMR Traffic Accident Research Unit, NSW DMR Engineer Mr L. Dowling, and the road users in Gunning Shire.

R. W. L. WYERS
Assistant Director
Planning and Technology Branch

Bureau of Transport Economics
Canberra
June 1982

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SUMMARY

This report presents the results of a study on the performance of roads in a small and therefore more simply analysed region. A road user's view was adopted for performance evaluation during the study and the report's structure represents a methodology for similar future evaluations. For the purpose of the study 'performance' was taken to mean the extent to which requirements are satisfied.

The study showed that it is possible to make a reasonably objective statement about road performance when reviewing a small region. The form of statement that seems most useful is a list of user objectives for the road system that are satisfied or unsatisfied, ranked in order of the importance of each objective to the users. The report proposes a rank ordering scheme and a methodology for deriving and presenting performance statements.

In particular, the study showed that it is possible to:

- identify and codify user objectives;
- describe the extent of user satisfaction and the sources of dissatisfaction;
- identify constraints on performance improvement; and
- identify past road work costs of achieving present levels of performance.

The study suggests that it is not possible to quantify summarily the *level* of satisfaction or performance, though the factors contributing to existing performance can largely be quantified, nor does it seem possible to identify past rates of change of performance, though changes in satisfaction that have resulted from road projects in the recent past may be assessable.

A substantial part of the report is devoted to describing to geographic, demographic and economic aspects of Gunning Shire—since it is that context which determines the road users' needs and influences their perceptions of the road system. This part of the report serves, in particular, to highlight the dependence of Gunning Shire on road transport, for the supply and internal distribution of goods and services, and for the movement of agricultural produce.

The Shire's finances and its road system are examined in some detail. Of the funds available to the Shire Council for disbursement at its discretion some 58 per cent is seen to have been spent on roads. The report shows that total expenditure on roads in the Shire has remained roughly constant since 1972.

There is significant, perhaps undue, complexity in the prevailing categorization of roads, of roadworks and of expenditure. It is clear that the role of the Commonwealth Government in roads funding is not well understood by road users and the report attempts to clarify the complexity of present road funding responsibility.

Comment is made on the roadwork planning procedures used by the Shire Council and the State road authority. Some of the particular difficulties experienced are briefly discussed where these are likely to be experienced in other local government areas.

For the purpose of assessing road user satisfaction, the study identifies four major user groups broadly defined by the economic function of their travel. The report describes the routes used by each of eight sub-groups and derives the relative importance of each route. By combining this with a rank order of generalised objectives, the report derives a set of priorities for road performance improvements for each user sub-group.

Significantly, the highest priority requirement for all users was either a reduction in the state of road closure or a reduction in driver stess, on a route of special importance. This applied particularly to the Hume Highway and to Trunk Road 52 North—the principal arterials in the Shire.

The driver stress referred to results from a combination of traffic conflict, difficult road geometry and poor pavement condition.

The current rate of road closure is a result of the immediate effects of wet weather on roads with weak pavements used by heavy vehicles in difficult terrain. Reducing this closure rate is part of the Shire Council's chief road problem, that of maintaining the condition of the many gravel roads in the Shire.

Because assessment of the adequacy of road systems is in the end a value judgment, the report does not attempt to make a definitive statement on the adequacy of roads in the Shire of Gunning. However, the level of user satisfaction is expressed in a form amenable to further analysis and, together with descriptions of the road system and the social and economic factors which in aggregate lead to that level of satisfaction, may assist readers to form more robust conclusions than previously possible.

CHAPTER 1—INTRODUCTION

BACKGROUND

As a contribution to decision-making in the allocation of road funds, the Bureau of Transport Economics is currently undertaking a variety of studies of Australian roads. Among these studies are assessments of road performance over recent years, with an emphasis on the degree to which roads meet the requirements and aspirations of users.

THE GUNNING SHIRE CASE STUDY

This particular study was an attempt to make a detailed examination of some aspects of road performance. In particular it was to examine the degree to which a road system of a given nature and state met the requirements of its users, and the priorities which might be assigned in allocating resources to the correction of any deficiencies.

An important purpose of conducting the study was to provide insight which could assist in the development of future studies.

The large number of persons concerned with roads and the many factors influencing road performance produce so much multiple interaction as to dictate that, to be manageable, such a study should be conducted in a small area. The study area should be well documented and defined sufficiently accurately to provide unambiguous data. For these reasons the Local Government Area was chosen as the basis for the study.

The Shire of Gunning was selected because of its proximity to the Bureau's office, in consideration of the repeated visits that would be necessary while exploring methodology, and because that Shire appeared generally representative of the range of issues expected to be encountered in future studies.

REPORT FORMAT

This report on the study is in effect composed of two parts. The first, consisting of Chapters 2 through 5, describes the substantially invariant context which influences the users' perception of their roads, which determines their needs, and which has led to the extent and quality of the existing roads. The second part, Chapters 6 through 9, discusses and assesses road performance in Gunning Shire from the viewpoint of the road users. The report begins, accordingly, with a description of the Shire's geography, its people and their activities.

CHAPTER 2—OVERVIEW AND PERSPECTIVE

LOCATION

The Shire of Gunning lies astride the Hume Highway in NSW, midway between Yass and Goulburn, with Gunning township at the centre of the Shire some 200 kilometres south-west from Sydney and 60 kilometres north from Canberra (see Map 2.1).

From its southern boundary near Lake George the Shire extends some 65 kilometres northward. The greatest distance between its eastern and western boundaries is about 50 kilometres. The Shire, having an area of 2200 square kilometres, is slightly smaller than average in this region of NSW and is approximately the size of the Australian Capital Territory (see Maps 2.2 and 2.3).

Gunning Shire is divided between the Commonwealth Electoral Divisions of Eden Monaro and Hume, and the NSW State Electoral Divisions of Burrinjuck and Goulburn. The Shire lies in the NSW Department of Main Roads Southern Division, and in Australian Statistical Division 9 'South Eastern NSW', Subdivision 9C 'Southern Tablelands'.

TOPOGRAPHY

Forming part of the Southern Tablelands region of the Australian Eastern Highlands, Gunning Shire is centred on the Lachlan River valley which, running north-west, links the Tablelands with the Western Slopes of the Highlands and opens into the Western Plains.

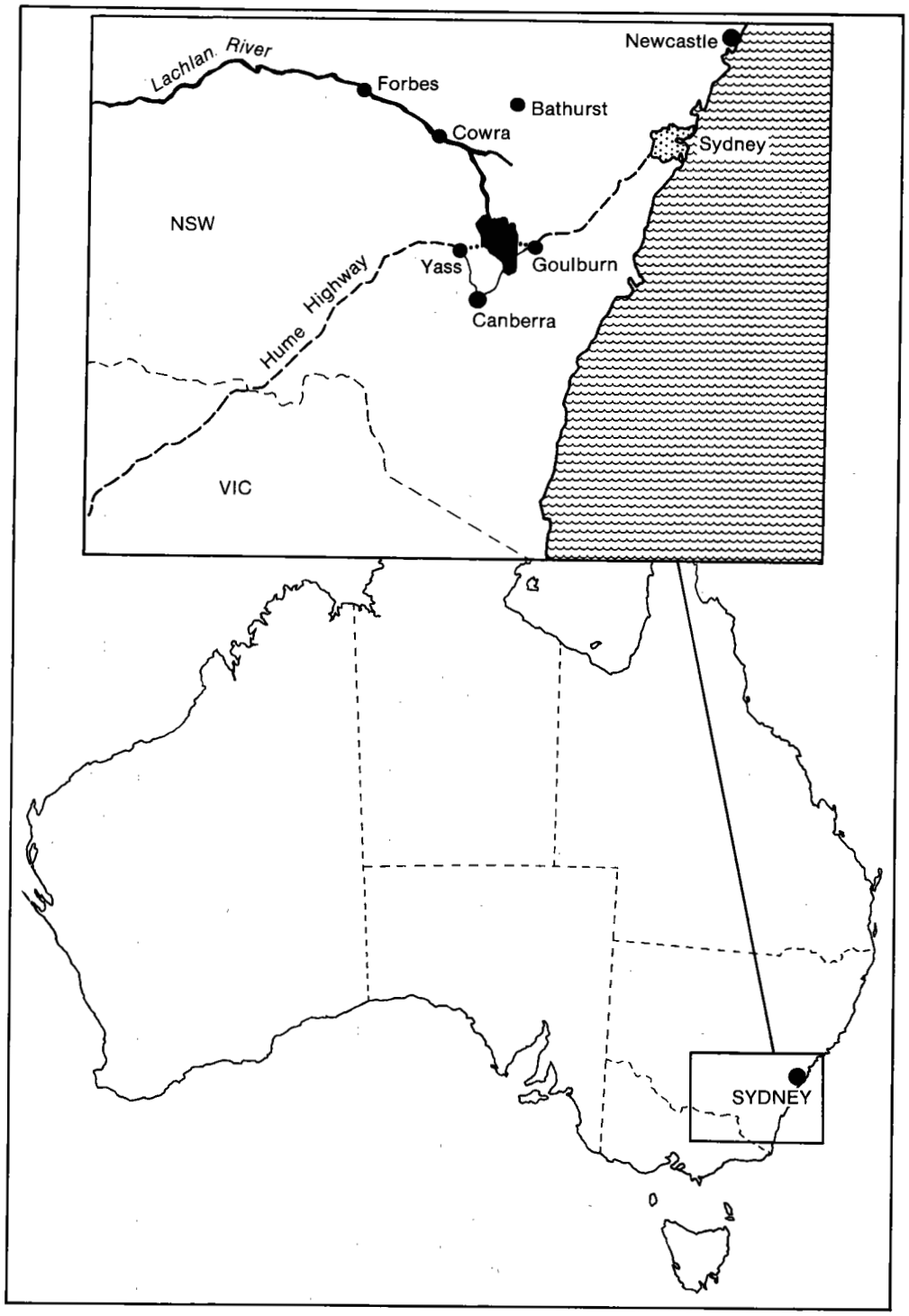
From the floor of the Lachlan valley the terrain rises quickly through some 450m to form minor ranges in the east, west and south, with peaks to 900m above sea level. In earlier times these ranges, shown on Map 2.4, constituted a significant impediment to transport.

The terrain below 750m, through which most of the Shire's roads pass, is broken by numerous hills and gullies. In the south-eastern corner of the Shire lies the elevated Breadalbane plain which the Canberra-Goulburn Federal Highway traverses.

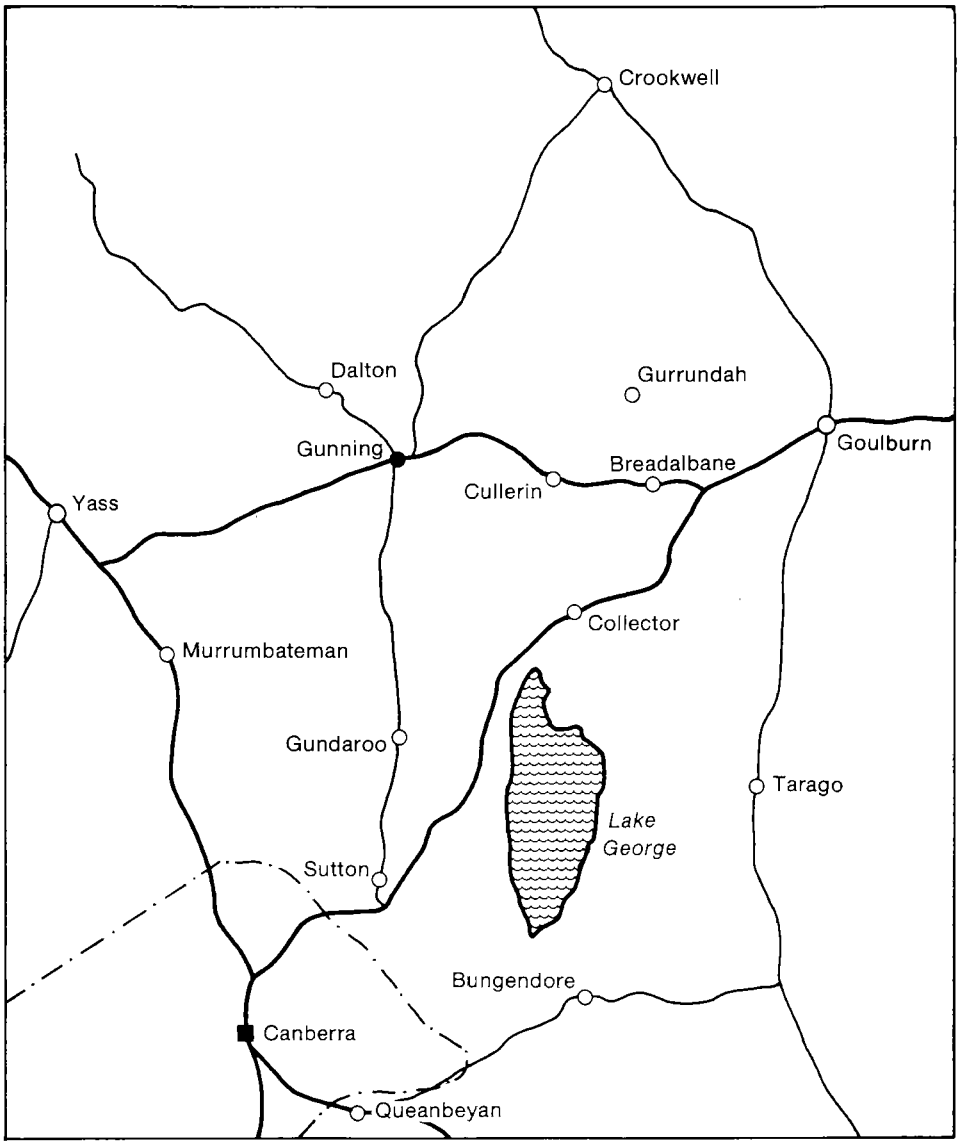
The western side of the Lachlan valley is based on silty sandstone and shales, and porphyry dykes are frequently encountered. The Mundoonen range overlooking this half of the Shire is composed of sandstone with shale and limestone. The predominant feature of the eastern side of the valley is a granite batholith, about 100 kilometres in north south extent and some 10 kilometres wide, which penetrates the sandstone and shale slopes of the Cullerin Range. Further variability in road earthworks is caused by the presence of basalt and dolerite extrusions in the north of the Shire. These features are shown on Map 2.5.

The Gunning-Dalton region has been identified as one of the most active sources of earth tremor activity in Australia.

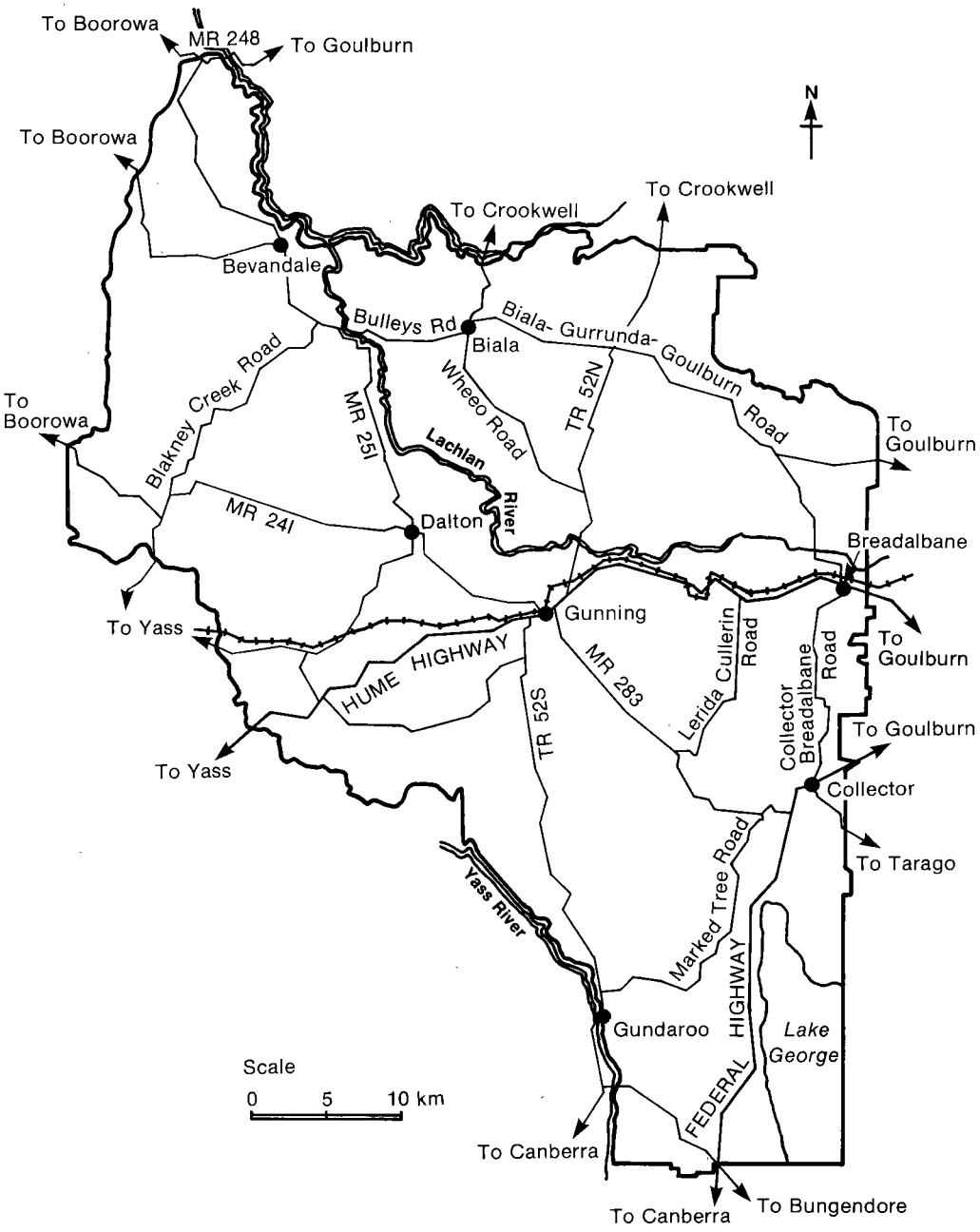
The principal drainage feature of Gunning Shire is the Lachlan River flowing from the central east of the Shire to the north-west, fed by numerous creeks and streams. The water courses are sharply defined gullies and valleys experiencing marked and rapid changes in water level with rainfall. The Yass River forms part of the Shire's southern boundary, while Lake George and the senile drainage system of the Breadalbane-Wologorong plain are features of the eastern boundary of the Shire. These features are illustrated on Map 2.6.



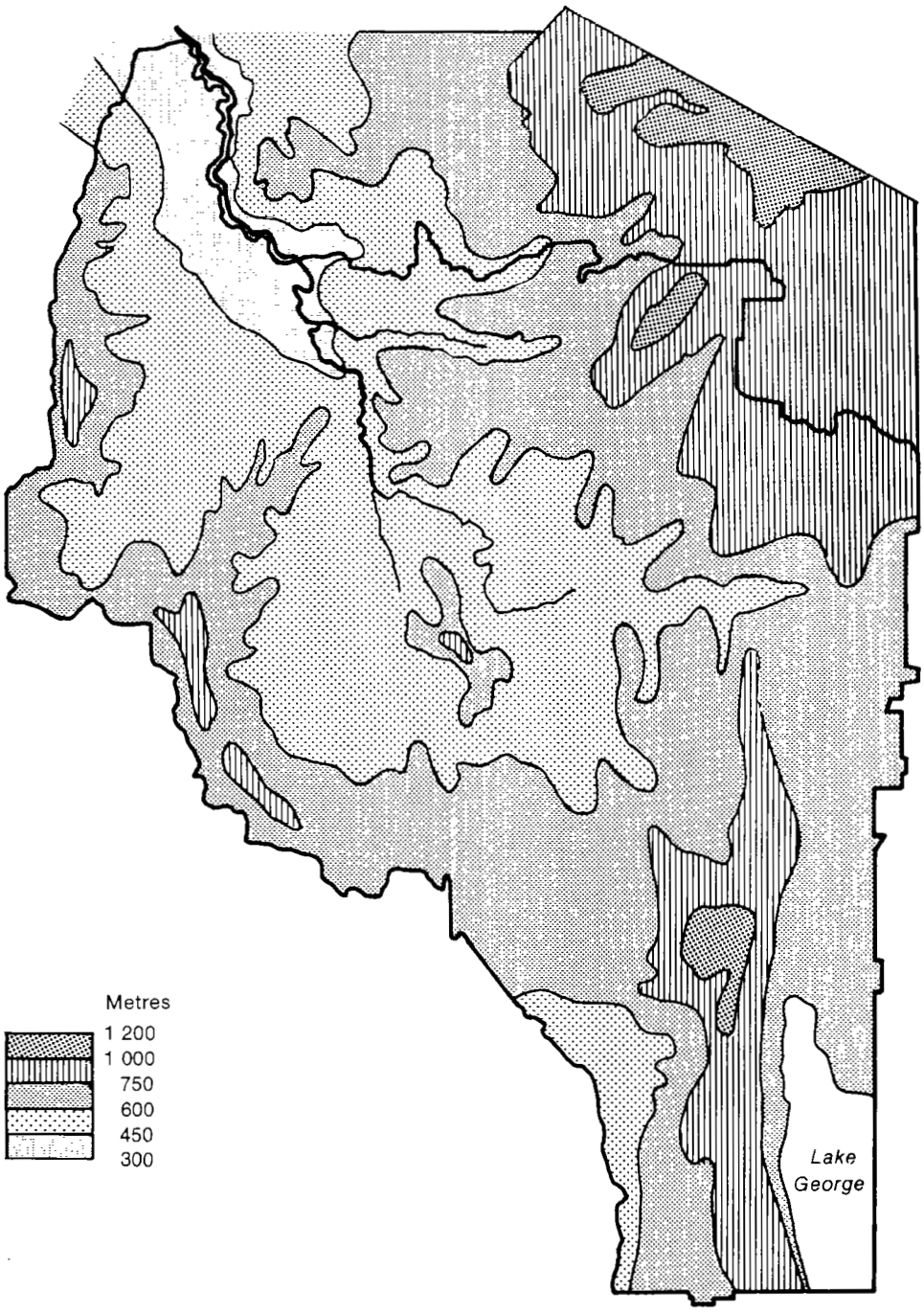
Map 2.1. Location of Gunning Shire.



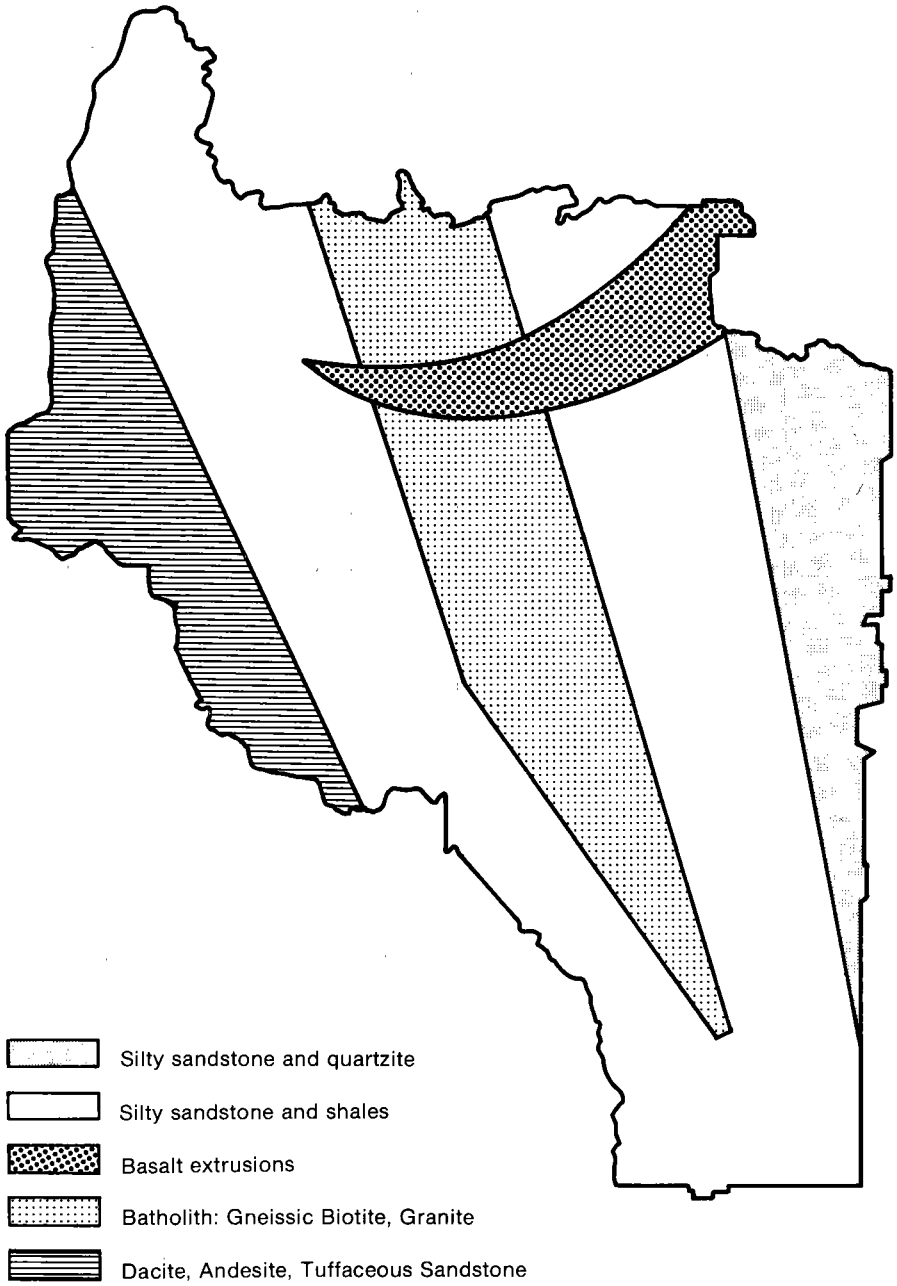
Map 2.2. Gunning and Environs



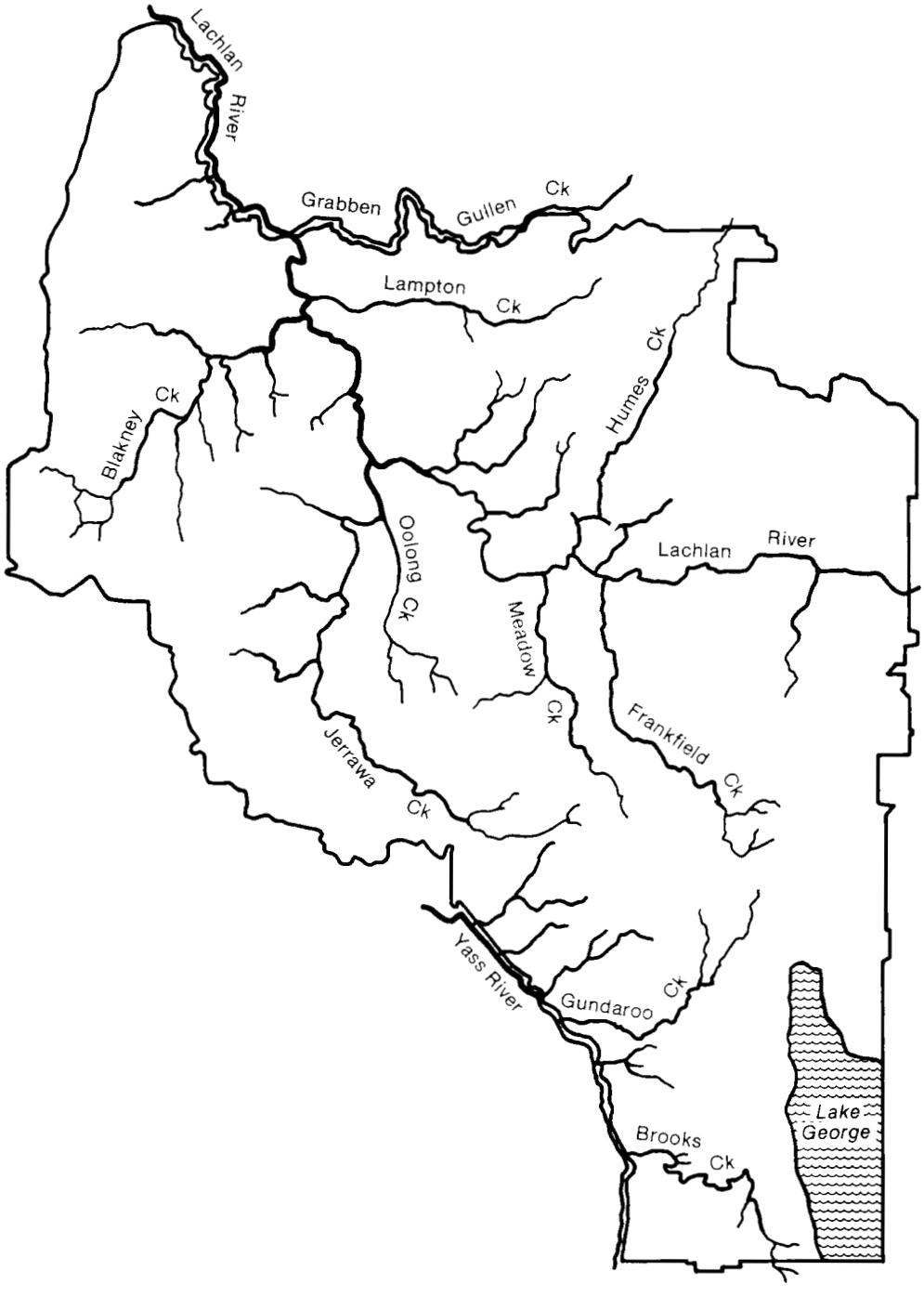
Map 2.3. The Shire of Gunning



Map 2.4. Gunning Shire topography (Contours indicative only)



Map 2.5. Gunning Shire basic geology



Map 2.6. Natural drainage system

Natural vegetation in the lower regions is good pasture in the form of grassland or savannah and areas cleared from dry sclerophyll woodland on the slopes. Higher and steeper country is still dense bush, but in general the vegetation density may be described as open parkland. The dominant tree type is the eucalypt.

CLIMATE

The region's basically temperate climate is modulated across Gunning Shire by local elevation above sea level. The moderate rainfall is distributed uniformly throughout the year, varying from a total of some 850mm per year on the north-east ranges, through 680mm in the Lachlan valley in the north, to 650mm per year at Gunning township itself. Summer is warm to hot and winter cool by Australian standards. The usual temperature variation with altitude is evident. Detailed climatic data may be found in Appendix I.

Extremes of rain and snowfall have in the past caused the lower regions of the Shire to be inundated—notably in 1870, 1928 and 1959. Typically these floods have covered the Hume Highway, dislocated the railway between Gunning and Yass and between Gunning and Goulburn, severely damaged Main Road 283, and washed away major bridges on Trunk Road 52.

EARLY EUROPEAN SETTLEMENT

Motivated mainly by practical needs for more cropland to feed the isolated colony of NSW, and then for pastures for increasing herds, NSW colonial exploration to the west of the Blue Mountains gained a sense of urgency in the drought year of 1813. In that year Blaxland, Wentworth and Lawson crossed the Mountains and Hume walked south-west to Berrima. The Lachlan River was discovered by Evans in 1815 and its course investigated by Oxley and Evans in 1817.

In 1818 Hume led Throsby to the Mulwaree plains, later named the Goulburn Plains, and the following year Throsby found a pass northward over the mountains from Goulburn to the Lachlan. In 1821 Throsby traced the Molonglo River to its junction with the Murrumbidgee, while in the same year Hume discovered the Yass River and beyond it the Yass Plains.

The land so revealed was ideal for grazing and from 1814 ambitious free settlers and emancipated convicts who, with the proving of the Merino sheep, were anxious to exploit such pastures and trekked inland following the routes of the explorers. They went by way of Bathurst to the Darling and the northern Lachlan and threaded their way through the Eastern Highlands to Goulburn, Yass, the Molonglo and the Murrumbidgee.

> Throughout the eighteen twenties the pioneer squatters grazed their flocks and herds even farther westward down the lush valleys of the Macquarie, the Lachlan and the Murrumbidgee, and on the plains and in the hilly watersheds between these streams (Clune 1950).

Their bullock-drawn wool wagons returning to Sydney required a full month for the journey. The en route garrison and convict town of Goulburn was laid out in 1828, followed by the development of Yass (Durack 1971).

Alarmed at squatters 'illegal' occupation of Crown land, Governor Darling in 1829 proclaimed limits of location beyond which no land could be sold or leased. The territory within these limits was divided into the Nineteen Counties of which the Counties of Argyle and King covered the Yass-Goulburn district.

Much of the land in the vicinity of Gunning was promised during the 1820s and formally granted from 1836 onwards. A village reserve was surveyed in 1829, subdivided into building allotments in 1836, and presented for sales in 1838 (Longmire 1981).

Acts passed in 1836 and 1839 changed the status of squatters from trespassers to licensed graziers on Crown land—conditional upon their payment of an annual licence fee and a tax per head of stock. In 1839, squatters' stock in the County of Argyle

amounted to 7000 horses, 370 000 cattle and 1 300 000 sheep. By 1846, 165 000 people lived in the counties where land could be bought and sold, and 25 000 dwelt in the licensed squatting districts. The squatters permanence of tenure became more certain with the introduction of a system of fourteen-year leases by the *Land Act* of 1847.

In 1847 there were only 95 residents in Gunning Village. However, the various discoveries of gold between 1851 and 1866 in the area encompassing Araluen, Kiandra, Gundagai, Young, Grenfell, and Forbes brought further migratory and commercial traffic to the Goulburn-Yass route. Between these two towns, a good day's ride from either, there now grew up a busy township of Gunning. It was strategically located on the main north south road, at the head of a valley providing access to the gold fields and grazing land of the northern Lachlan, and at the turn off to the Monaro plains and the Snowy River diggings.

The Lachlan valley also provided an escape and transit route for bushrangers, and the roads a source of plunder. John Kennedy Hume, brother to the explorer, was murdered by Scotchy, Witton and Reynolds in Gunning on 20 January 1840. Later accounts tell of Ben Hall, Johnny Dunn and Johnny Gilbert at Kimberley's Inn (Collector), at Gunning and at Geary's Gap, at Wheeo and at Blakney Creek.

An inevitable result of accumulating population in the region was a considerable demand for, and expropriation by selection of, land for small farm holdings. Robertson's *Land Act* of 1861 eventually provided for 'free selection before survey' and legalised the selector's trespass.

In the years that followed, drought and depression emphasised the economic fragility of the smaller holdings and they gradually reverted by agglomeration to intermediate sized pastoral holdings.

LAND TENURE AND SHIRE DEVELOPMENT SINCE 1900

In 1821, Hamilton Hume squatted some five kilometres west of what is now Gunning but did not develop his 120 acre holding. When his brother John was the first to receive a land grant in the area, his holdings were in the order of 6000 acres. The farm activity which followed such pastoralist squatter development was based largely on 40 acre blocks. Soon after Gunning Shire was proclaimed in 1906, it became apparent that the minimum economic holding was at least 640 acres[1]. This then was the average size of lot transferred from the larger holdings to the soldier settlers who moved to the Gunning area following World War I.

A process of farm consolidation continued through the 1920s and 1930s consistent with a realisation, by the time of World War II, that the minimum economic holding was nearer 1000 acres. Never the less, land allocated to returning Servicemen after that war was still allotted in 640 acre blocks—too small for their owners to make a full living from the land (Gunning Shire Council 1972).

After World War II, an upsurge in Australian rural development boosted by the wool boom led to an increase in the Shire's population which stood at 2388 in 1947 and reached 2610 in 1954. A number of factors then combined to reduce the local demand for labour and led to a decline in Shire population. These factors were:

- increased mechanisation in farming;
- falling markets for primary produce;
- rapid rises in labour costs;
- faster road communication; and
- other technological changes reducing the demand for services previously located in the Shire's towns and villages.

1. 1 acre = 0.4 hectare approximately.

Improved efficiencies in the pastoral industry (which remained the major economic activity in this Shire) and increases in the range and speed of road vehicles which reduced the traditional significance of Gunning township as a transport node and way point, prompted further decline of the Shire's population during the 1960s and 70s. However, an increasing number of people wishing to commute to Canberra from rural residence partially offset that decline by fostering the exploitation of underdeveloped land in the south of the Shire.

The development of Canberra influenced Gunning Shire in a number of ways during the 1960s and 70s. During this period there was an increasing demand for 40 acre residential blocks within rural settings. The Shire Council initially submitted to this demand by the approval, in 1969, of several urban type subdivisions. There has been little development in these subdivisions and the Council's policy now permits only lots of 200 acres or more. There are approximately 1250 rateable properties in the Shire some 350 of which are held by landowners resident outside the Shire.

Canberra's increased population has resulted in an increase in vehicular traffic in and through Gunning Shire. While this traffic is concentrated on the Canberra-Goulburn route, it includes both recreational and commercial travel to other parts of the Shire.

FUTURE LAND USE AND DEVELOPMENT

The pastoral industry is likely to remain the economic backbone of Gunning Shire. The Shire Council believes any development which supplements or supports that industry must be recognised and encouraged.

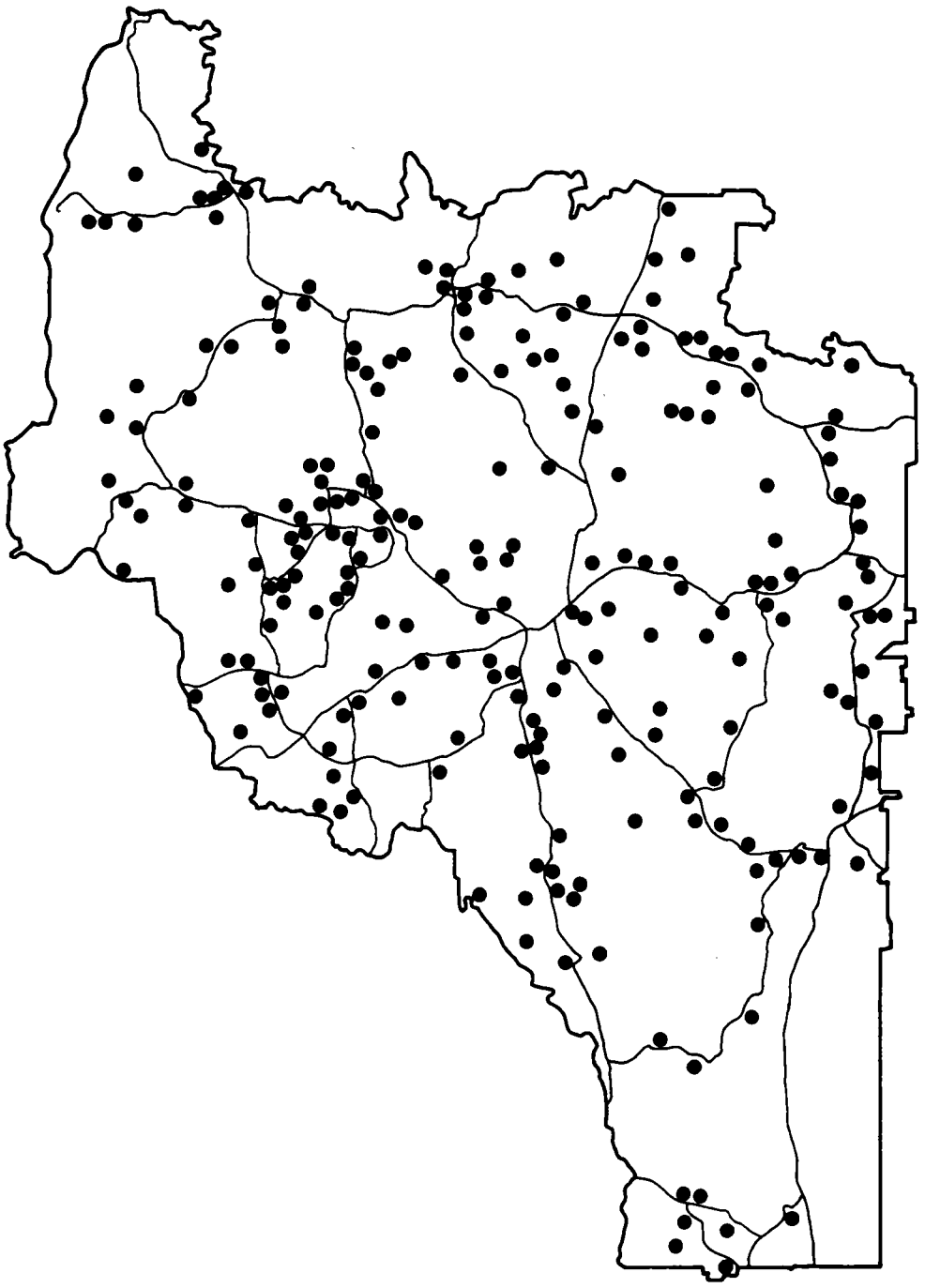
Depending upon the future prosperity of the population of the ACT, there may be a gradual increase in the number of those small, high quality, rural holdings and village developments which do not create a demand for services that are uneconomical for Gunning Shire to provide.

DEMOGRAPHY

The present estimated population of Gunning Shire is 1950 persons. Their distribution of ages and their educational and ethnic background as revealed by the 1976 census are listed in Appendix I, together with a variety of other social data related to transport issues.

Significant points are as follows.

- Migration to the Shire in the period 1971-76 amounted to 22 per cent of the Shire's population. There has been no significant increase in the Shire's population since 1976.
- There are proportionally fewer persons in the Shire in the 12-25 years age group than is average for Australia and proportionally more than average in the 55-70 years age group.
- Some 60 per cent of the Shire's population live on rural holdings (see Map 2.7). The remaining 750 persons live predominantly in the Shire's four townships as shown on Map 2.8.
- One half of the labour force of about 900 persons is engaged in agricultural activities and a further quarter are employed supporting that activity either directly or indirectly. The Shire Council reports that some 25 per cent of the Shire's ratepayers work in the ACT.
- During 1975-76 a proportion of the Gunning population greater than the Australian average had personal incomes below $6000. Proportionally more residents than the Australian average had incomes above $12 000. Price and seasonal influences on these incomes must be recognised.



Map 2.7. Locations of representative selection of homesteads

LOCAL GOVERNMENT

The local governing body is the Gunning Shire Council consisting of six Councillors elected on both a property and a parliamentary franchise basis—two from each of the Ridings shown on Map 2.8. Some 1950 persons, including about 650 absentee owners, were entitled to vote in the September 1980 election of Councillors. The President of the Shire Council and Deputy President are elected from within the Council by the Councillors. The Shire is represented on the Southern Tablelands County Council, the Joint Councils Planning Committee, the South East Regional Council for Social Development, and other similar committees.

The Shire Clerk, a Deputy Shire Clerk, the Shire Engineer, a Noxious Plants Inspector and a Health Surveyor/Building Inspector comprise the Shire's senior staff. There are 28 other permanent employees and currently 3 casual employees of the Council.

The Council is responsible for the following activities in the Shire:

- most roadworks;
- street lighting and ancillary road facilities;
- water supply;
- drainage and sewerage;
- noxious weed control;
- building control;
- fire fighting and similar public services; and
- health, welfare, recreational and like cultural and community amenities.

Electricity supply within the Shire is the responsibility of the Southern Tablelands County Council.

Local government activities are financed by Commonwealth and State appropriations, by rates and by charges, fees, and loans. The Shire's 1980 General Fund expenditure is expected to be $1.6m. Shire finance is treated in more detail in Chapter 3 of this Study.

There are no proposals to amalgamate the Shire of Gunning with any other Municipality or Shire.

INDUSTRY

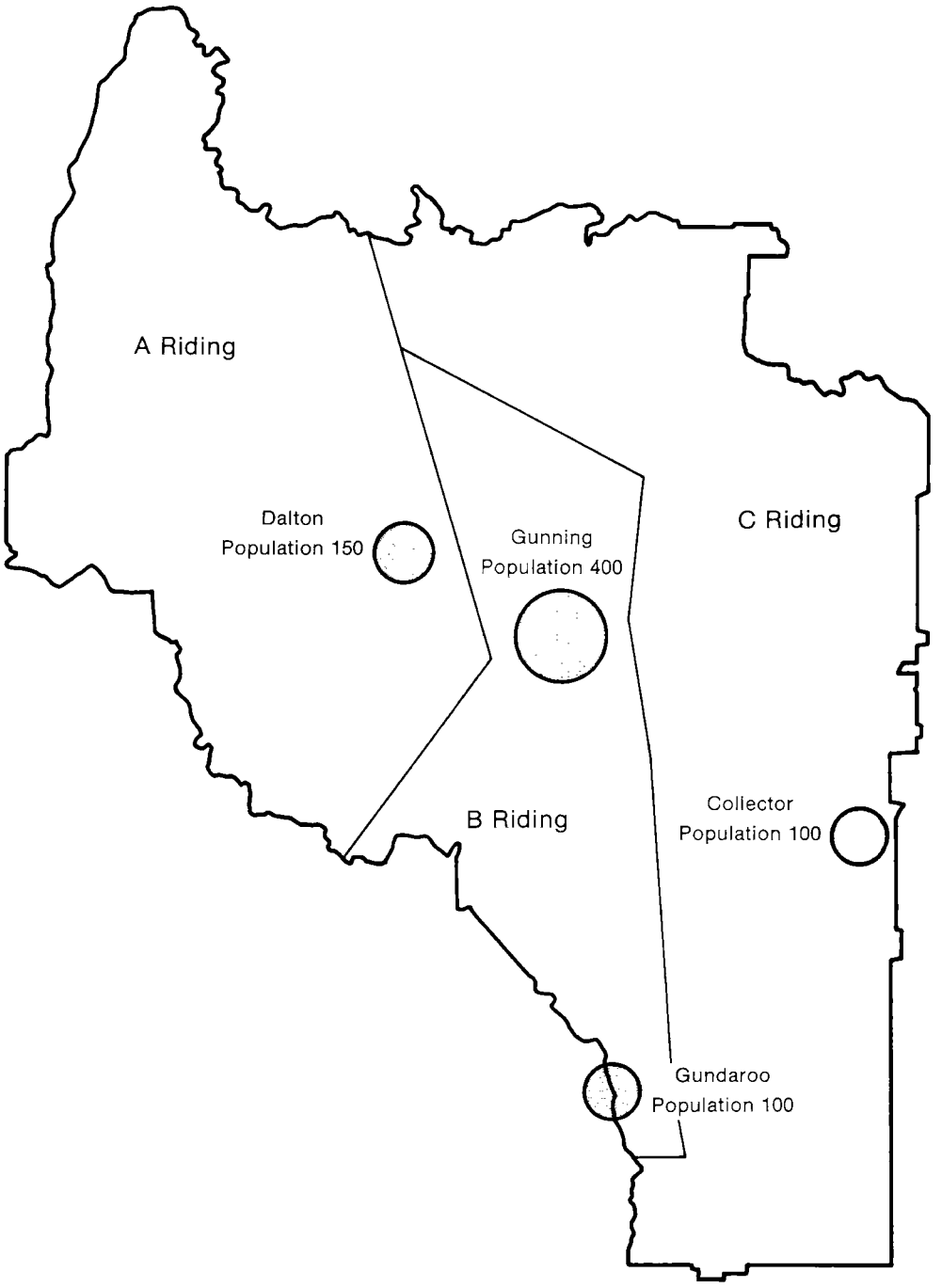
Agriculture

The principal pastoral product of the Gunning Shire is fine Merino wool. The quality of wool grown in the Shire sells at a price which is among the highest realised in Australia. During 1979, the 500 000 sheep in Gunning produced wool to the value of $7.3m (Goulburn Farmer's & Graziers Cooperative 1980).

Fat lamb and beef cattle production has increased in recent years, under the influence of higher prices and the introduction of pasture improvement. Lamb and beef price fluctuations and the high cost of transport result in an unstable profitability that discourages the expansion of this industry whilst a more attractive alternative is available. The values of Gunning cattle and sheep sold during 1979 were $3.4m and $1.1m respectively.

Gunning Shire Council believes there is considerable scope for increasing the area of pasture and improved pasture by employing land that is now fallow, heavily timbered or covered with noxious weeds.

Because of the limitations imposed by the climate, terrain and soils, cereals and other crops are grown in a few areas only—mainly along major river valleys and on isolated alluvial flats. The principal commodities grown are wheat, oats, hay products and fodder potatoes. From some 2000 ha sown, the return to growers from produce sold



Map 2.8. Population centres and Ridings

during 1979 was about $350 000 (BAE 1980). A seed growing and wholesaling enterprise is operating successfully in the Gurrundah district of the Shire.

Forestry production in Gunning has declined and is now limited to the intermittent extraction of naturally occurring species on demand to satisfy essentially local requirements.

Manufacturing, processing and construction

There are no manufacturing or processing industries within Gunning Shire, although small enterprises have been established from time to time. There is no private construction industry based in the Shire. Several small agricultural construction contractors sink tanks and construct dams.

Council road plant and labour is used to construct earthworks for private industry and on projects such as the installation of radio links for the Department of Aviation and work for the Pipeline Authority. The resultant return to the Council is some $9000 per annum but up to $30000 has been earned this way in one year.

Mining

Known mineral deposits in the Shire include:

- building stone at Biala and Gunning;
- gold at Dalton;
- iron at Jerrawa and Cullerin; and
- tin at Bevendale.

Exploratory drilling for minerals is being conducted at Breadalbane, while gemstones are found in the creeks flowing down from the Cullerin Range. None of these deposits has yet been proven to be economically exploitable. The white granite deposits once used for specialty concrete products are no longer quarried.

A quarry yielding good quality aggregate for road making is located at Ladevale within the Shire. This quarry is operated by the NSW Department of Main Roads (DMR) and the material is not readily available to the Shire Council. Other deposits of basalt for ballast and road works are available but are not exploited.

Sand for road making is mined at the northern end of Lake George, and road making gravel is obtained from 11 pits within the Shire.

Service and retail

There are fewer than 25 retail establishments in the entirety of the Shire. These are mainly located in Gunning township. The villages of Collector, Gundaroo, Breadalbane and Dalton have a motor vehicle service station and a general store. Apart from a chartered accountant and a doctor there are no professional or technical services available in the Shire.

Tourism

No recognisable tourist industry exists in Gunning unless the Gundaroo Pub frequented by Canberra residents and the hotel at Collector with its small museum are so classed. Day trippers from Canberra picnic in the Shire and engage in sport fishing and gem-seeking. Gunning township provides some way-point facilities for travellers on the Hume Highway. Tourism contributes to the through traffic volume on that highway and on the Federal Highway, while traffic through the south of the Shire is augmented by tourists travelling from the Hume Highway to the NSW South Coast.

SUPPLY OF GOODS AND SERVICES

Gunning Shire's dependence on transport is highlighted by the range and volume of basic commodities with which it must be frequently supplied from external sources.

As well as emphasising the transport dependence of the Shire, external supply has attendant forward supply times and unpredictable delays which significantly influence scheduled resupply frequencies and consumer stock holdings. Detailed information on the supply of goods to Gunning shire is presented in Appendix IX, however in summary, Gunning is dependent on warehouses and depots outside the Shire for all basic foodstuffs, for petroleum products, for fertilizers and stock feed, for pharmaceuticals and for machinery, vehicles, and building materials.

UTILITIES AND PUBLIC INSTITUTIONS

Schools and school buses

There are five primary schools in Gunning Shire with a total enrolment of 276 children. The high school which previously existed in Gunning is now closed. A pre school play group is operating. Some 300 children are transported to and from primary and high schools by private buses operating under contract to the NSW Department of Education. This topic is treated in more detail in Chapter 7.

Hospitals and ambulance

Gunning Shire has neither a hospital nor an ambulance service. Shire residents use the hospitals at Yass, Goulburn and Canberra and employ private motor vehicles in medical emergencies. Occasionally special use is made of Goulburn and Yass based ambulances. District home nursing services are available and the Gunning District Medical Services Fund maintains a surgery and emergency facilities located in Gunning township.

Churches

There are 16 church buildings in Gunning. These are located in 10 of the villages in the Shire.

Police and law courts

Police officers stationed in Gunning township undertake traffic duties and general police duties. A Highway Patrol operates on the Hume Highway. A Court of Petty Sessions convenes monthly in Gunning township.

Firefighting

There is a bush fire danger in the Shire, particularly between October and March, and land owners are urged to take all action necessary to keep land free of fire hazard and to safeguard their own and other property. The Shire has a reasonably well equipped voluntary firefighting service subdivided into 18 brigades each with a vehicle and associated equipment.

The fires of 13 February 1979 illustrate the scale of this danger. On that day a fire burning on a 16 kilometre front swept from Yass to Dalton, almost engulfed that town and caused $1 020 000 worth of damage to private property in the Shire. On the same day, a second fire burnt out some 20 000 ha to the northwest of the Shire causing $1 600 000 worth of damage, and a third, racing north from Canberra, caused the evacuation of Gundaroo.

Garbage and sewerage

The Shire Council provides a garbage collection service to Dalton and Gunning townships. Only the town of Gunning is sewered.

Noxious weed control

Control and eradication of various weeds, serrated tussock in particular, is a particular concern of the Shire Council whose officers point out that ready access to the infested areas is most important to their program.

Electricity

The supply of electricity to Gunning Shire is arranged by the Southern Tablelands County Council. The County Council purchases bulk supplies from the NSW Electricity Commission and distributes these into the Shire through 11kV lines from Crookwell, Goulburn and Queanbeyan, and via a 22 kV line from Yass to a substation in Gunning township. Transformers throughout the Shire convert the 11 kV supply for subsequent domestic consumption.

Service organisations

A number of community service clubs and organisations are represented in the Shire. They contribute significantly to minor public works, cultural and recreational activity, and dissemination of public information.

COMMUNICATIONS AND TRANSPORT

Public information

The means of dissemination of public information in Gunning Shire are limited in terms of both variety and local relevance. Newspapers are printed in Yass, Crookwell and Goulburn, and these are distributed to general stores in each village by existing road transport services such as those of the mail contractors. Canberra and Sydney newspapers are distributed in the same way and are available on the day following the date of publication. There is no ready source of interstate newspapers in the Shire. A Shire news sheet containing public notices is published by the Lions Club and is distributed to a variety of community centres fortnightly. A monthly newspaper is circulated in the Gundaroo district.

Television broadcasts are received from Canberra or Wagga Wagga, and radio transmissions from a variety of stations, all outside the Shire.

There is no convenient source of Government publications in the Shire.

Post and telephone services

Mail is delivered in bulk to Gunning township from Goulburn and is then distributed to residents by local contractors who also collect articles that residents want despatched. There are six Post Offices in the Shire providing the usual range of services. Telegrams submitted at these Offices are passed to Canberra by telephone for re-transmission on the main north-south land line. There are nine telephone exchanges in the Shire and a further two just outside its boundaries. These are automatic exchanges to which 725 subscribers are connected. Amplifying data appear in Appendix I.

Air transport

There are no airfields in Gunning Shire capable of supporting public air transport operations. Several private airfields exist and these are suitable for light aircraft and aerial agriculture. None of the residents hangar aircraft locally but agencies such as The Pipeline Authority and the NSW Electricity Commission use aircraft for transport and surveillance in the Shire.

Water transport

Waterways in the Shire are unable to provide a useful or reliable form of transport; in general, they are a barrier to transport.

Rail transport

The railway reached Goulburn from Sydney in 1869 but a further six years elapsed before it was extended to Gunning. The present railway station at Gunning is on the main Sydney-Melbourne line. The annual volume of rail cargo handled at Gunning

station is only a small fraction of that handled ten years ago. Typically some 18 livestock wagons are loaded at Gunning annually and perhaps three wagons carrying mechanical plant and equipment are unloaded. The stock and freight sidings associated with the station are now seldom used and rail cargo is often transported by road between Gunning and Goulburn. Although 25 passenger trains stop at Gunning each week, passenger volumes are also low. As Appendix I illustrates, the train timetable is not suited to the passenger travel most needed by the Shire.

The main rail line through Gunning handled 3 million tonnes of freight and 455 000 passengers in 1978-79.

Road transport

The road network in Gunning shire and the way in which it is used is the basis of the remainder of this report. It suffices to say here that there is no public road passenger transport in the Shire. There are several common carriers based in the Shire but they operate only eleven vehicles of which four are semi-trailers. This situation prevails despite the Shire's dependence on road transport for supply, for the distribution of goods and services, and for the movement of agricultural produce.

The road transport function in the Shire is performed by the private individual. by several small contractors making mail and bread deliveries for example, or operating school buses, and by freight carriers and parcel couriers based in the centres from which supplies are received and to which produce is sent.

This general situation may well be a reflection of the efficiency of vehicles of various sizes in performing the roles involved and of the capital demands of enterprises owning larger vehicles. Whatever the cause, there are implications for the present and future appropriateness of the Shire's road network which will be discussed in Chapter 5 of this report.

Because of this use of external carriers and the frequencies of trips to and from places outside the Shire, it is difficult to obtain a single measure which provides a scale and perspective for the volume of road transport movement in the Shire.

There are 1746 registered vehicles normally garaged in the Shire and the number of cars and station wagons per head of population is the same as the national average. Transport fuel sales in the Shire in 1979-80 amounted to 2.8 million litres. Amplifying data appear in Appendix I.

For a wider examination of intrastate freight transport issues see the *Report of the Commission of Inquiry into the NSW Road Freight Industry 1978-80.* For analysis of wool transport in particular see *Transport and Handling of Australia's Wool Production,* (BTE 1971).

CULTURAL AND RECREATIONAL ACTIVITY

There is neither a theatre nor a cinema in the Shire. Community halls or those of groups such as the Country Women's Association are used for this purpose from time to time as they are for a variety of recreational activities ranging from handicraft instruction to euchre and contract bridge. In partnership with the Goulburn City Council, the Shire Council provides a public library at Gunning—although with restricted borrowing hours.

An annual gymkhana is held at Dalton and a range of sporting tournaments are conducted throughout the Shire. Tennis, cricket and football venues have been established at several locations. The provision of facilities such as these *vis a vis* the need for roads expenditure is but one of the many decisions the Shire Council must make in the appropriation of its limited financial resources—a subject to which this paper will now turn.

CHAPTER 3—FINANCIAL OVERVIEW

Within any local government area there is always a variety of community needs which compete with one another for a share of the limited funds available. The provision of adequate roads is one of these.

In order to understand why a community may, for example, regard their existing roads as adequate for the time being, it is necessary to comprehend the relative significance of prevailing community pressure for expenditure on other requirements. An historical review of that relative significance will in part explain why roads are in their present state. A contemporary review will indicate what proportion of a future increase in general funding is likely to be directed toward road performance improvement.

To illustrate broadly the range of competing community requirements, and to demonstrate community preferences, this chapter presents an overview of Gunning Shire finances.

The Bureau was able to examine a set of the Shire of Gunning's *Statement of Accounts* for the forty year period 1939 to 1978. Each year's statement had been prepared in a format specified under State Government legislation relating to Shire accounting requirements. Each statement provides, for the calendar year in question, in a double entry accounting style, a record of the Shire's annual income and expenditure.

Appendix II provides a brief overview of Shire financial operations, and comments on the major income and expenditure components. This chapter provides a brief summary of the financial trends, drawing on the data presented in Appendix II.

CURRENT INCOME AND EXPENDITURE

Shire income and expenditure are presented in the statements of accounts under each of the following broad functions:

- general purposes;
- public works—in Gunning Shire these were roads only;
- health administration—mainly sanitation and garbage services and parks;
- public services—mainly bush fire fighting facilities, libraries, noxious weed control, cemeteries and public baths;
- shire property; and
- utility operations—water, sewerage and electricity.

Additional information is provided in the statements for rate assessments, fixed assets, loan money transactions, sundry debtors and creditors, reserves, bank balances, trust accounts etc, but comment in this paper is limited to the financial transactions as recorded in the Shire general and utility sectors of activity. A number of adjustments were made to the accounts to provide data for this study. The methodology and reason for these changes are set out in Appendix II.

In 1978 the Shire accounts, as adjusted for the purposes of this study, recorded total expenditure of $1 126 500 and total income of $1 137 900. Tables 3.1, 3.2 and 3.3 show, in percentage terms, the shares of the major income and expenditure items for 1978.

It is evident that in 1978 the Shire received almost 50 per cent of its income in the form of grants from the Commonwealth and State Governments. Roads accounted for some 54 per cent of its 1978 expenditure. In approximate terms, expenditure on water and

TABLE 3.1—GUNNING SHIRE INCOME, 1978

	(per cent)
General purpose grants	8.0
Rates (general)	27.4
Road grants	29.6
Health services	0.9
Public services	6.1
Shire property	8.5
Miscellaneous	5.7
Water and sewerage rates charges and grants	9.1
Other	4.2
Total	100.0

Source: BTE analysis of Gunning Shire accounts.

TABLE 3.2—GUNNING SHIRE INCOME BY BROAD PURPOSE, 1978[a]

	(per cent)
General purpose grants	8.0
Specific purpose grants	39.1
General purpose other	32.2
Specific purpose other	11.9
Water & sewerage (rates & charges)	3.9
Sale of Assets	3.1
Expenditure from loans	0.9
Repayment of advances to employees etc	0.8
Total	100.0

a. Totals may not add due to rounding.

Source: BTE analysis of Gunning Shire accounts.

TABLE 3.3—GUNNING SHIRE EXPENDITURE BY BROAD SOURCE, 1978

	(per cent)
Roads	54.2
Water and sewerage	8.3
Health services	2.2
Public services (noxious weeds 5.7 per cent)	8.2
Shire property	9.8
General administration	8.6
Advances to employees etc	1.9
Loan repayments (principal)	0.6
Other	6.2
Total	100.0

Source: BTE analysis of Gunning Shire accounts.

The income shown in Table 3.2 can be categorised in the following ways:

	(per cent)		*(per cent)*
Grants	47.1	General purpose	44.1
Charges and loans	16.7	Specific purpose	55.8
Other	36.1		100.0
	100.0		

sewerage works, shire property and general administration were each about 10 per cent and expenditure on the control and eradication of noxious weeds about one half that.

COMPARISON WITH OTHER LOCAL GOVERNMENT AREAS (LGAs)

A recently released report, *The Rural Local Government Study* (Secretariat to the Joint Officers' Committee of the Local Government Ministers' Conference 1980), provided aggregate data on the financial characteristics of Harris Category Class 7 LGAs (rural LGA associated with a small town of 1000 to 2499 people) and Category Class 8 (no rural town of over 999 people). As at 30 June 1975 the average population for these LGAs was 2820 compared with 1950 in the Shire of Gunning. The Shire of Gunning is classified under Harris Category Class 8.

In NSW, 54 per cent of Category Class 8 LGAs provided water supply facilities and 15 per cent sewerage facilities both of which are supplied by the Shire of Gunning. For NSW only, that study gave the average expenditure and income shares for 1974-75 shown in Tables 3.4 and 3.5. The figures were derived from the Australian Bureau of Statistics, Australian Municipal Information System, but excluded financial transactions related to the supply of water, sewerage, electricity and gas.

TABLE 3.4—AVERAGE EXPENDITURE; NSW RURAL LOCAL GOVERNMENT AREAS, 1974-75[a]

	(per cent)
Roads	58
General administration	9
Shire property	15
Debt redemption	7
Health	2
Other	9
Total	100

a. Excludes expenditure on water, sewerage, electricity and gas.

Source: Australian Bureau of Statistics, Australian Municipal Information System.

TABLE 3.5—AVERAGE INCOME NSW RURAL LOCAL GOVERNMENT AREAS, 1974-75[a]

	(per cent)
Rates and penalties	33
Charges	10
Loans	10
Grants	20
Reimbursements for work done[b]	18
Other	9
Total	100

a. Excludes water, sewerage, electricity and gas.
b. This chapter treats both grants and reimbursements as grants.

Source: Australian Bureau of Statistics, Australian Municipal Information System.

It can be seen from Tables 3.3 and 3.4 that the Shire of Gunning 1978 roads expenditure approximates the NSW 1974-75 average as do its general administration and health expenditures. The greatest difference is with expenditure on debt redemption. On the income side, Tables 3.2 and 3.5 show there is similarity in the proportionate shares of general rates and grants but again a wide disparity for loan income.

HISTORICAL TRENDS

The longer term trends of expenditure in Gunning Shire are discussed in Appendix II. Table 3.6 presents a summary of those trends and reveals a small but steady diversion of funds away from public works to public services, utility operations and general purposes.

TABLE 3.6—APPORTIONMENT OF EXPENDITURE; GUNNING SHIRE, TEN YEAR AGGREGATES

Function	*Expenditure as percentage of total expenditure*			
	1939-48	*1949-58*	*1959-68*	*1969-78*
Public works	72	69	63	62
Health administration	5	4	5	4
Public services	3	3	5	8
Other	20	24	27	26

Source: BTE analysis of Gunning Shire accounts.

CHAPTER 4—ROADS FINANCE IN GUNNING SHIRE

The financial overview in Chapter 3 has indicated the nature and scale of community preferences in Gunning Shire, showing that some 54 per cent of the Shire expenditure is at present directed towards roads. However, that is an incomplete description of the situation as it does not show the extent to which that expenditure was incurred at the discretion of the Shire. Nor does it reveal the extent to which the Shire was prepared to contribute locally raised funds to roads. This chapter provides further information on those topics and takes the opportunity to attempt to clarify the complex arrangements for funding roadwork.

DIVISION OF RESPONSIBILITIES

Roads in Gunning Shire are administered by the New South Wales State Government through the Department of Main Roads (DMR), and by the Gunning Shire Council. Broadly there are three groups of roads in the Shire: National and State Highways, Trunk and Main Roads and local Shire Roads. The classification of these roads is discussed more fully in Chapter 5 and in Appendix IV. There are no Commonwealth Government or private roads (other than on private property) in Gunning Shire. Roadworks are funded from Commonwealth, State and local sources. Expenditure on roads is incurred by the DMR and the Council; the actual roadworks also being carried out by these two bodies.

The maintenance, construction and reconstruction of the Hume and Federal National Highways is undertaken by the DMR. Almost all work on Trunk and Main Roads in the Shire is done by Shire employees, the cost being reimbursed by the DMR using Commonwealth and NSW State Government funds. All work on local Shire Roads is performed by the Shire using Commonwealth, State and local funds. Roadworks in this context include bridges, kerbing and guttering and traffic or safety associated works.

ROADS FUNDS SOURCES

Throughout this chapter, moneys are expressed in 'then-year' (current) dollars unless otherwise specified, and the items cited are those shown in Figure 4.1 at the end of this chapter.

For example, Item a in Figure 4.1 represents Commonwealth Government grants to the NSW State Government for unspecified roadworks. These amounts are supplemented by the State Government from its own sources and are in part used to reimburse Gunning Shire Council for work done on Trunk and Main Roads (Items d and e). From Gunning Shire's viewpoint Items d and e are funds provided by the State Government.

In contrast, Items j and k and l represent funds which are specifically allocated by the Commonwealth for works in designated local government areas. The NSW State Government administers these funds but does not control their application. From Gunning Shire's viewpoint these funds are provided by the Commonwealth Government.

Commonwealth Government

Commonwealth funds are provided under various Acts (both routinely and as *ad hoc* special allocations) to the NSW State Government.

Proportions of these Commonwealth grants to the State are redistributed by the State Government for use in local government areas and are designated by the Commonwealth for use on either roads or other specific purposes, or allocated for general purposes.

Two classes of end use designation by the Commonwealth are of particular relevance to Gunning Shire. The first of these is for National Highway maintenance and construction (Item b). The second is the designation of funds for use in local government areas, by which means the Commonwealth contributes more directly to local government revenue, both routinely (Items l and k), and on particular occasions (Item j). A portion of these funds for local government are hypothecated for local roads (Items k and h), and some of the general purpose funds are used on roads (Item p and n). The scale of this 'direct' Commonwealth funding of Gunning Shire is illustrated in Table 4.1. Table 4.2 shows the Commonwealth contribution via the NSW State Government to National Highways in Gunning Shire.

The terms and conditions of Commonwealth funding of Shire Roads are described in *General Conditions of Assistance to Councils for Works on Rural and Urban Local Roads* (NSW DMR 1979).

TABLE 4.1—DIRECT COMMONWEALTH FUNDING OF SHIRE; FUNDS AVAILABLE FOR ROADWORKS

($'000)

Year	General[a] purpose grants (Item l)	Annual[b] road grants (Item k)	Special[c] road allocations (Item h)	Total[d]	
				Current prices	1980 prices
1972	nil	131.4	30.5	162	455
1973	nil	91.7	18.0	110	288
1974	nil	82.9	13.3	96	223
1975	20.0	85.4	57.5	163	293
1976	33.0	94.8	1.7	130	202
1977	103.0	117.4	17.4	238	327
1978	79.2	97.4	10.9	188	235
1979	91.8	216.8	17.6	326	378
1980	118.2	160.5	1.3	280	280
Total					2 680

a. Income received as grants to local government under revenue sharing arrangements.
b. States Grants (Roads) Act, Rural Local Roads annual construction and maintenance—Shire Roads.
c. States Grants (Roads) Act, Rural Local Roads flood and bushfire damage restoration, bridge subsidies, miscellaneous grants—Shire Roads; plus grants for unemployment relief through roadworks.
d. Adjusted by BTE 1981 Road Construction Input Price Index—Overall Activity (BTE 1982a).

Source: Gunning Shire Council Statements of Annual Accounts.

NSW State Government

Gunning Shire Council routinely receives funds from the NSW State Government for general purposes (Item i) and for specific non-roadworks use. Roadworks in the Shire are funded by the State both rountinely and on an ad hoc basis. The ad hoc special allocations (Item f) are provided for works of an urgent nature such as the restoration of damage due to flood or fire. The State Government's routine funding of roadworks in the Shire is made up of expenditure on National Highways (Items b and r), which does not pass through Gunning Shire Council, and the reimbursement of the Council for work the Council performs on Trunk and Main Roads in the Shire (Items d and e).

The funds used by the NSW State Government for these purposes are drawn from Commonwealth Government grants to the State and from the State's other revenue.

TABLE 4.2—COMMONWEALTH CONTRIBUTION TO NATIONAL HIGHWAYS IN SHIRE

($'000)

Fiscal year	Contribution	
	Current prices	1980 prices[a]
1972-73	170.9	480
1973-74	243.1	688
1974-75	500.6	1 159
1975-76	784.4	1 411
1976-77	980.7	1 528
1977-78	1 141.1	1 567
1978-79	1 004.1	1 257
1979-80	1 322.9	1 533
Total		9 573

a. Adjusted by road price index (BTE 1972) applicable at beginning of fiscal year.

Source: NSW Department of Main Roads (Goulburn).

Except for National Highways and some special allocations, it is not possible to determine from which of these sources the funds for Gunning Shire are drawn. In recent years National Highway expenditure has been met entirely by Commonwealth funds (ie Item r=0).

The method by which the State Government funds works on Trunk and Main Roads is described in General Conditions of Assistance to Councils (NSW DMR 1981). Broadly, funds are made available to meet the previously agreed cost of approved works in the categories of maintenance and construction.

For this purpose, 'construction' is defined as all works of every description which are required to:

- construct a road or its associated works, or both, where none existed before; or
- reconstruct an existing road or its associated works, or both, so that new, supplementary or substantially improved traffic service is provided and/or significant geometric or structural improvements are effected.

Specific works regarded by NSW DMR as being 'construction' include:

- bituminous sealing or resealing 40mm or more in thickness; and
- gravel resheeting 75mm or more in thickness.

For the same purpose, 'maintenance' is defined as all works of every description which are required for the preservation and upkeep of a road or its associated works, or both, so as to prevent the deterioration of quality and efficiency to a noticeable extent below that which applied immediately after construction (NSW DMR 1981).

Specific works regarded by NSW DMR as being 'maintenance' include:

- bituminous resealing less than 40mm thick;
- gravel resheeting less than 75mm thick; and
- reconstruction work less than 500 square metres in area.

Note then, that the principal definitions of maintenance and construction are not set in terms of the type of work done, but in terms of the quality of the road at the completion of the work compared with the initial quality. However, note also that the subsidiary examples define maintenance and construction in terms of the type of work carried out.

This contradiction is confusing when attempts are made to determine whether funds

are allocated for restoring initial road quality or for improving upon initial quality.

Routine funds for work on Trunk and Main Roads are provided in two programs known as 'construction' and 'annual maintenance and improvement'. 'Improvements' in this context are easily prepared and controlled jobs which provide a higher standard of facility than existed previously and which, broadly, may be implemented during maintenance and cost less than $20 000. Thus works which are 'construction' in nature may be funded under the annual maintenance and improvement program and not appear in the construction program.

NSW State Government funding of the Shire for general purposes and for roadworks is shown in Table 4.3.

TABLE 4.3—NSW STATE GOVERNMENT FUNDING OF SHIRE; FUNDS AVAILABLE FOR ROADWORKS

($'000)

Year	General[a] purpose grants (Item i)	Reimbursement[b] for work on Main and Trunk Roads (Items d+e+m)	Total[c]	
			Current prices	1980 prices
1972	10.2	102.4	113	316
1973	11.5	121.1	133	348
1974	12.9	149.3	162	375
1975	13.6	170.9	185	332
1976	15.7	196.8	213	331
1977	11.5	162.8	174	239
1978	13.3	248.3	262	327
1979	14.0	368.1	382	443
1980	13.6	276.9	290	290
Total				3 003

a. General grants, Local Government Assistance Fund plus Pensioner Rates Subsidy.
b. Annual Maintenance and Construction Programs, plus special allocations for flood damage restoration and unemployment relief, plus commissions to Council for planning and design work.
c. Adjusted by road price index (BTE 1982).

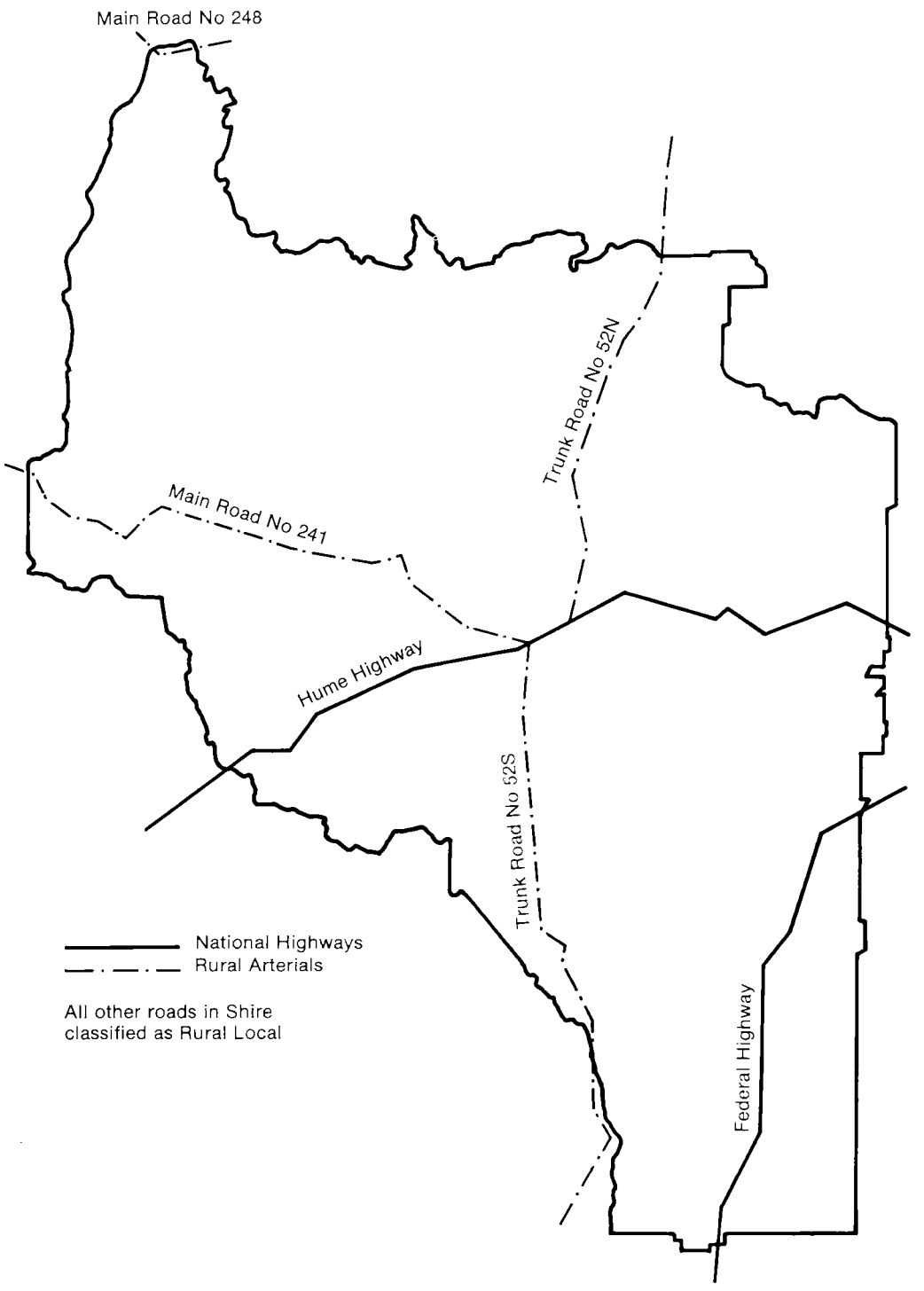
Source: Gunning Shire Council Statements of Annual Accounts.

The Bureau experienced considerable difficulty in reconciling the various available financial records of Shire/State roads transactions. The causes of these difficulties included:

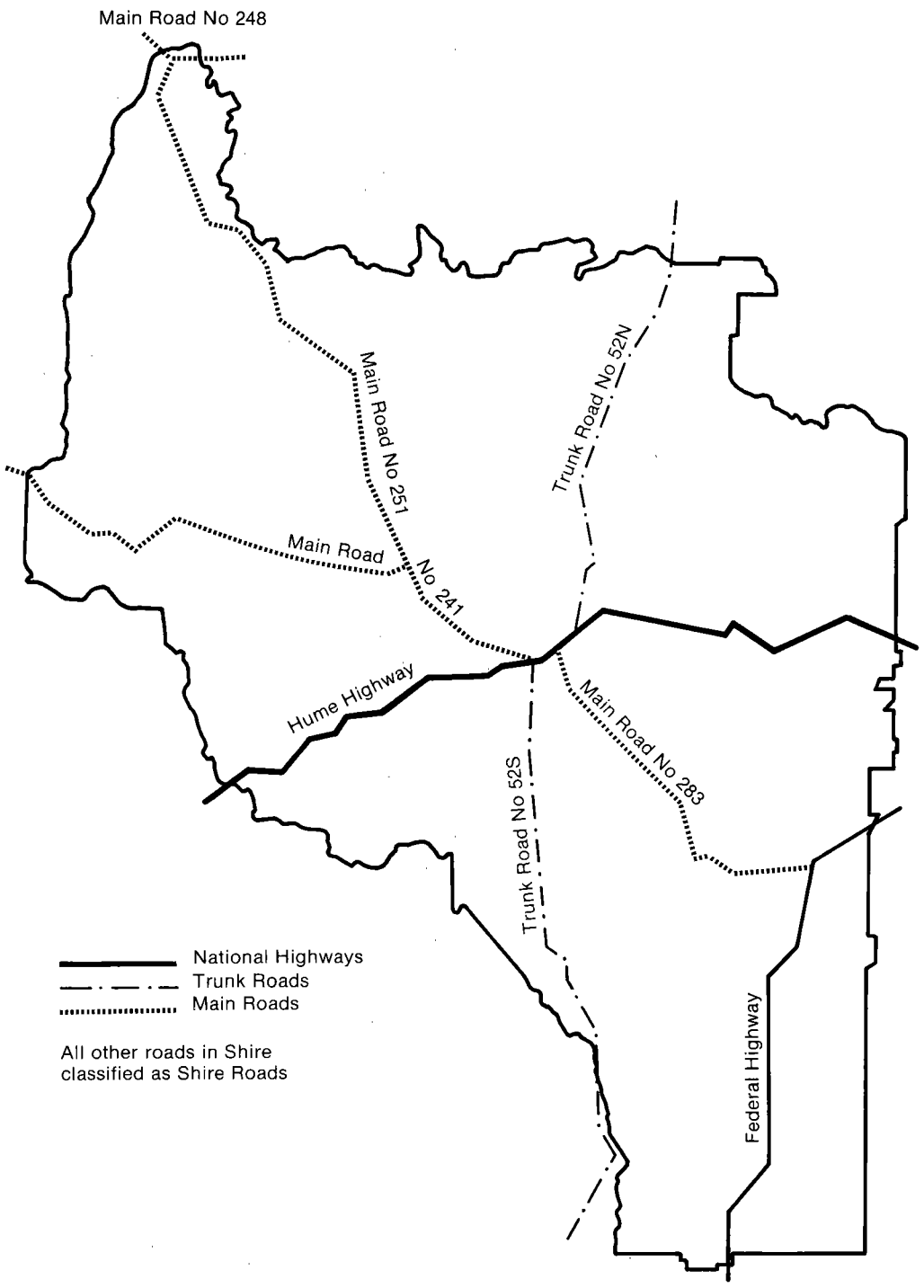
- differences in accounting periods;
- aggregate data with inadequate specification of its components;
- abbreviated data descriptions omitting specification of funds source or end use; and
- differences in the classification schemes under which roads are funded[1].

To illustrate the differences in classifications Maps 4.1 and 4.2 show that the NSW State classification 'Main Road' includes some roads which Commonwealth authorities fund as Rural Arterial Roads and some funded as Rural Local Roads. The designation Rural Local also embraces roads not classified by the State as Highways, Trunk Roads or Main Roads, that is those roads known as Shire Roads. Further information on this subject is presented in Appendix IV.

1. As a further example of this difficulty, note the prima facie discrepancy between recorded expenditure on Main and Trunk Roads shown in Tables 4.7 and 4.8 which were taken from different sources.



Map 4.1. Commonwealth classification of roads.



Map 4.2. State classification of roads.

Local sources

Gunning Shire Council's principle local source of funds which can be used for work on public roads is the general purpose income derived from general rates levied on Shire landowners. A small additional general purpose income is derived from sundry charges and sales. This revenue is shown in total in Table 4.4 together with income derived from direct charges on residents for public roadwork and ancilliaries.

TABLE 4.4—LOCALLY RAISED FUNDS AVAILABLE FOR PUBLIC ROADWORKS

($'000)

Year	*General purpose funds*	*Roadwork[a] charges*	*Total[b]*	
			Current prices	*1980 prices (Item g)*
1972	242.1	2.0	244	686
1973	237.8	3.5	241	633
1974	266.0	0.2	266	616
1975	303.7	0.0	304	546
1976	307.0	17.0	324	505
1977	298.8	0.7	300	411
1978	321.7	6.2	328	410
1979	336.4	0.7	337	391
1980	367.8	1.1	369	369
Total				4 568

a. Contributions for roads, footpaths, kerbing and guttering etc, excluding income from work on private roads.
b. Adjusted by road price index (BTE 1982).

Source: Gunning Shire Council Statements of Annual Accounts.

From time to time the Council's roadmaking plant and labour is used, under contract, for roadwork on private property. The value of this work is shown in Table 4.5. For the purpose of this paper, income from this source is not considered to be available for work on public roads.

TABLE 4.5—VALUE OF PRIVATE CONTRACT ROADWORK UNDERTAKEN BY SHIRE COUNCIL

($'000)

Year	*Value*	
	Current prices	*1980 prices[a]*
1972	3.2	9
1973	6.4	17
1974	6.2	14
1975	13.3	24
1976	17.9	28
1977	17.1	23
1978	6.1	8
1979	31.5	37
1980	13.6	14
Total		173

a. Adjusted by road price index (BTE 1982).

Source: Gunning Shire Council Statements of Annual Accounts.

EXPENDITURE ON ROADS

Maintenance versus construction

Tables 4.6 to 4.9 show the distribution of expenditure between maintenance and construction, for each of the three road systems in the Shire—National Highways, Trunk and Main Roads and Shire Roads—and the total expenditure on each system.

TABLE 4.6—DIRECT EXPENDITURE ON NATIONAL HIGHWAYS IN SHIRE

($'000)

Fiscal year	Maintenance and improvement	Construction[a]	Total[b]	
			Current prices	1980 prices (Items b and r)
1972-73	139.5	31.3	171	480
1973-74	166.9	76.2	243	638
1974-75	309.7	190.9	501	1 159
1975-76	205.9	542.4	748	1 346
1976-77	252.2	728.3	981	1 528
1977-78	258.9	882.2	1 141	1 567
1978-79	377.8	626.3	1 004	1 257
1979-80	381.5	941.4	1 323	1 533
Total				9 507

a. Total construction funds expended on reconstruction.
b. Adjusted by road price index (BTE 1982) applicable at beginning of fiscal year.

NOTE: During the period, 51 per cent of maintenance and improvement expenditure and 60 per cent of construction expenditure was on the Hume Highway with the remainder being spent on the Federal Highway.

Source: NSW Department of Main Roads.

TABLE 4.7—DIRECT EXPENDITURE ON MAIN AND TRUNK ROADS IN SHIRE

($'000)

Fiscal year	Maintenance and improvement[a] (Items d + m)	Construction[b] (Items e + p)	Total[c]	
			Current prices	1980 prices
1972-73	65.2	46.7[e]	112	314
1973-74	68.1	64.6	133	348
1974-75	90.8	68.5	159	369
1975-76	109.1	102.0	211	380
1976-77	141.0	66.4	207	323
1977-78	141.5	79.7	221	304
1978-79	139.9	187.9	328	410
1979-80[d]	137.2	154.1	291	338
Total	892.8	769.9	1 663	2 786

a. Flood and fire damage restoration was less than 10 per cent of maintenance and improvement totals, except fiscal year 1975-76 28 per cent, and fiscal year 1976-77 13 per cent.
b. All construction expenditure allocated to reconstruction of Trunk Road 52 South.
c. Adjusted by roads price index (BTE 1982) applicable at beginning of fiscal year.
d. Expenditure to 31 May 1980.
e. The source for this element was Gunning Shire Council statement of annual accounts.

Source: NSW Department of Main Roads.

Tables 4.7 and 4.8 separately report the expenditure on Trunk and Main Roads from 1972 to 1980 as recorded by NSW DMR and by Gunning Shire Council. Differences in the categorisation by those two bodies of essentially the same expenditure are evident. No complete explanation can be given for the differences in total expenditure recorded by those bodies over the period.

The tables follow the NSW State Government definitions of improvements, construction and maintenance set down earlier in this chapter, with restoration of fire

TABLE 4.8—DIRECT EXPENDITURE ON MAIN AND TRUNK ROADS IN SHIRE[a]

($'000)

Year	*Maintenance*	*Construction*	*Total*[b]	
			Current prices	*1980 prices (Items p+m+d+e)*
1972	67.4	54.3	122	342
1973	67.3	52.6	120	315
1974	77.6	79.2	157	363
1975	95.8	74.2	170	306
1976	105.7	76.8	183	284
1977	105.2	55.6	161	221
1978	126.6	105.6	232	291
1979	128.0	261.3	389	451
1980	174.5	92.4	267	267
Total	948.1	852.0	1 800	2 840

a. Excludes expenditure on ancilliaries (such as signs, footpaths, drainage outside formation width) which fell outside carriageway maintenance and construction program.
b. Adjusted by road prices index (BTE 1982).

Source: Gunning Shire Council Statements of Annual Accounts.

TABLE 4.9—DIRECT EXPENDITURE ON SHIRE ROADS[a]

($'000)

Year	*Maintenance*	*Construction*[b]	*Total*[c]	
			Current prices (Items n+h+k+s)	*1980 prices*
1972	88.1	133.1	221	621
1973	67.7	84.0	152	398
1974	112.9	61.0	179	403
1975	179.7	64.1	244	439
1976	118.9	81.0	200	311
1977	120.3	103.2	224	307
1978	230.5	56.6	287	359
1979	144.1	216.2	360	417
1980	180.5	270.0	450	450
Total				3 706

a. Excludes expenditure on ancilliaries which fell outside of carriageway maintenance and construction programs (see Table 4.10).
b. Sixty-four per cent of construction expenditure, in constant prices, was on reconstruction. New construction took place in 1972, 1973 and 1980 only.
c. Adjusted by roads prices index (BTE 1982).

Source: Gunning Shire Council Statements of Annual Accounts.

or flood damage being treated as maintenance. Direct expenditure means total expenditure less staff salaries and like overheads.

TABLE 4.10—DIRECT EXPENDITURE ON ANCILLIARIES; ALL PUBLIC ROADS

($'000)

Year	Maintenance	Construction	Total[a]	
			Current prices	1980 prices
1972	2.5	4.2	6.7	19
1973	3.9	6.8	10.7	28
1974	3.8	nil	3.8	9
1975	5.1	18.2	23.3	42
1976	5.1	6.9	12.0	19
1977	3.5	nil	3.5	5
1978	4.2	3.9	8.1	10
1979	4.5	0.5	5.0	6
1980	4.9	1.8	6.7	7
Total				143

a. Adjusted by road prices index (BTE 1982).

Source: Gunning Shire Council Statements of Annual Accounts.

Annual variation in expenditure

The trends in direct expenditure on all public roads in the Shire are shown in Table 4.11.

TABLE 4.11—TOTAL DIRECT EXPENDITURE ON PUBLIC ROADS IN SHIRE, 1980 PRICES

($'000)

Year	Expenditure
1972[a]	1 702
1973	1 379
1974	1 934
1975	2 133
1976	2 142
1977	2 100
1978	1 917
1979	2 407
1980[a]	1 474
Total	17 188

a. Six months expenditure data on National Highways unavailable, estimated values $240 000 for 1972 and $750 000 for 1980 (in 1980 prices included).

Source: Tables 4.6 to 4.10.

Expenditure from general funds

The extent to which general funds have been expended on roads in the Shire is detailed in Table 4.12. In this context 'general funds' is taken to mean funds raised locally for roads or general purposes, plus general purpose grants from the Commonwealth and State governments (Items g + o). Table 4.12 shows, then, the roads expenditure from funds available to the Shire Council for disbursement at its discretion. Table 4.13 compares this roads expenditure with the total income from those sources, and Table

4.14 shows the share borne by locally raised income.

TABLE 4.12—ROADS EXPENDITURE FROM GENERAL FUNDS

($'000)

Year	Main and Trunk roads (Item p)[a]	Shire roads (Item n)[a]	Ancilliaries public roads	Indirect expenses[b]	Total 1980 prices
1972	30.8	59.3	6.7	54.2	424
1973	55.1	42.0	10.8	58.6	437
1974	23.7	77.7	3.8	54.8	370
1975	nil	100.9	23.3	70.6	350
1976	11.0	103.4	11.9	65.6	299
1977	nil	88.7	3.5	55.2	245
1978	nil	178.8	8.1	102.7	362
1979	nil	125.9	4.8	73.1	236
1980	nil	288.6	6.7	79.7	375
Total					3 100

a. Less ancilliaries and indirect expenses.
b. Sum of staff salaries and overheads and unrecouped cost of road plant operation less amounts charged to roadworks at DMR recommended rates.

Source: Gunning Shire Council Statements of Annual Accounts.

TABLE 4.13—SHIRE COUNCIL DISCRETIONARY EXPENDITURE ON ROADS

($'000)

Year	'General' funds income (Items o+g)	'General' funds road expenditure[a] (Items n+p)	Expenditure as proportion of income (per cent)
1972	254.3	151.0	59
1973	252.8	166.5	66
1974	279.1	160.0	57
1975	337.3	194.8	58
1976	372.7	191.9	51
1977	414.0	178.5	43
1978	420.4	289.6	69
1979	442.9	203.8	46
1980	500.7	375.0	75

a. From Table 4.12 total.

SUMMARY

Following rises in 1973-74, the total funds available for roadworks in the Shire remained substantially constant at $2.5 million per year until 1980, in constant price terms. There is some indication that funding authorities were caught unawares by the road price rises in 1980. During the period, slight increases in each of the Commonwealth and State contributions offset a marked decline in locally raised revenue.

The total expenditure on roads in the Shire has followed the same pattern as available funds at an annual value of some $2 million. Expenditure on National Highways rose sharply in 1973-74 and has since remained fairly constant at $1.4 million per year in constant 1980 price terms. For Main and Trunk Roads and for Shire Roads there was an expenditure dip in 1976-77 and a subsequent recovery to 1972-73 rates of expenditure of about $330 000 and $400 000 respectively per year—again in constant 1980 price terms.

TABLE 4.14—LOCALLY RAISED INCOME SPENT ON PUBLIC ROADS

Year	Amount[a] ($'000)	As proportion of total locally raised income (per cent)	As proportion of total expenditure on Shire roads[b] (per cent)
1972	145.0	59	51
1973	159.0	66	72
1974	152.6	57	65
1975	175.3	58	52
1976	166.8	51	60
1977	129.1	43	46
1978	225.9	69	57
1979	155.1	46	35
1980	276.4	75	51

a. Calculated on basis that roads expenditures from locally raised funds, State general purpose grants, and Commonwealth general purpose grants were in proportion to income from those sources each year.
b. Direct plus indirect expenditure.

The majority of expenditure on National Highways since 1974 has been on construction rather than maintenance—reversing an earlier trend. Shire Road expenditure has been biased towards maintenance, while on Main and Trunk Roads there has been a rough balance between maintenance and construction expenditure.

Of the funds available to Gunning Shire Council for disbursement at its discretion from 1972 to 1980, some 58 per cent has been spent on roads annually.

Fifty-eight per cent of the Council's locally raised revenue has annually been spent on roads, and this amount constituted about 55 per cent of the annual expenditure on Shire Roads. An additional amount averaging at least $19000 per year has been spent on private roads.

Locally raised revenue made a decreasing contribution to expenditure on Shire Roads between 1972 and 1980.

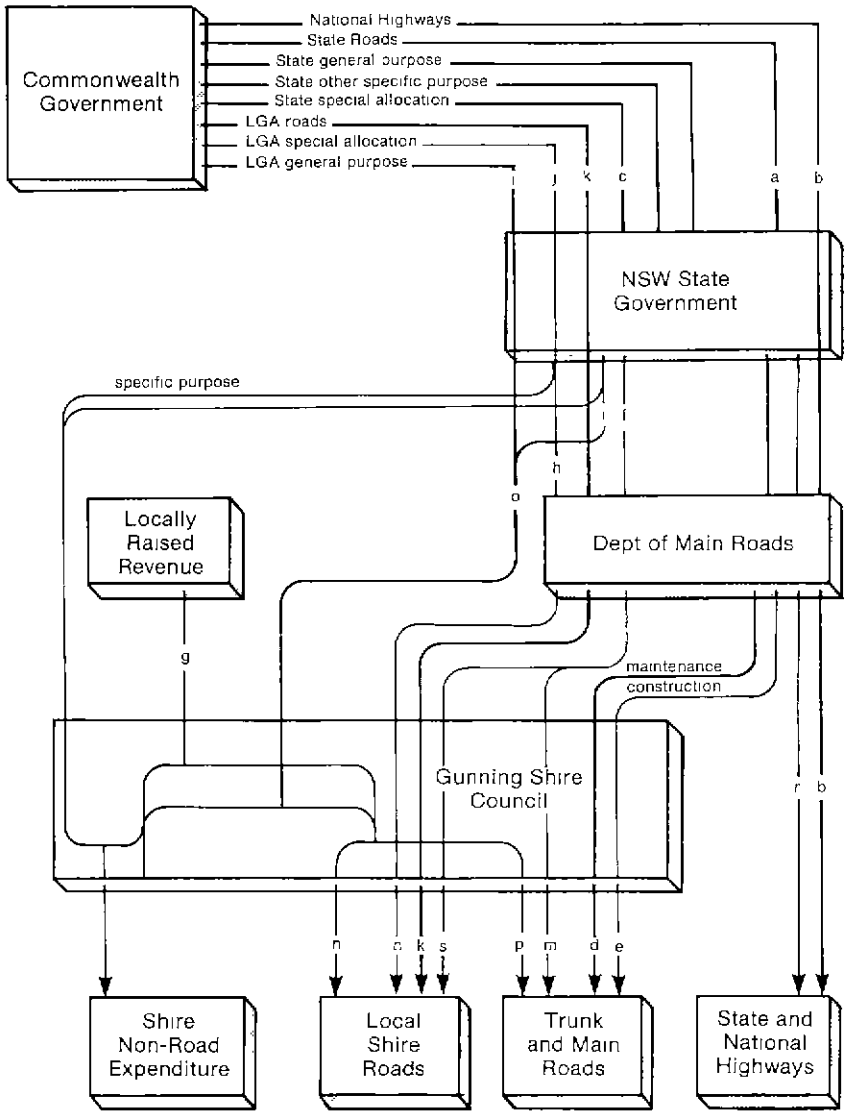
To conclude this chapter, Table 4.15 shows the extent to which each of the funding authorities contributed to the direct costs of each road system.

TABLE 4.15—ROAD SYSTEM DIRECT EXPENDITURE BY SOURCE OF FUNDS, 1972 TO 1980

(1980 prices)

	National Highways[a]	Trunk and Main Roads	Shire Roads
Commonwealth Government	100 per cent (Item b)	[b] 90 per cent	62 per cent (Items h+k+part l)
NSW State Government	nil (Item r)	[b] (Items d+e+m+part i)	2 per cent (part Item i)
Locally raised funds	nil	10 per cent (via Item p)	36 per cent (via Item n)
Total	$9.5m	$2.8m[c]	$3.7m[c]

a. Fiscal year 1972-73 to fiscal year 1979-80.
b. Commonwealth contribution to Trunk and Main Roads is not visible as it is subsumed in NSW State Government contribution. During the period, approximately 40 per cent of total NSW expenditure on Trunk and Main Roads was met by Commonwealth road grants (NAASRA 1973).
c. Excluding ancilliaries.



NOTES:

1 This diagram shows the source and disbursement of funds while distinguishing between funds designated for use in local government areas (items j, k, l) and those not so designated. The diagram applies to NSW only

2 Commonwealth funds designated for use in local government areas are passed to the State Government for distribution. In NSW, about 7.5 per cent of these funds are retained by the State Government for application to

- various bridge works
- the Forestry Commission and Soil Conservation Service
- the National Parks and Wildlife Service
- road works in areas without local governing bodies
- DMR administrative costs
- contingencies

Figure 4.1. Sources and disbursement of roads funds

CHAPTER 5—THE ROADS AND ROAD PLANNING

THE ROAD SYSTEM

Historical development

The present broad shape and size of the Gunning Shire road network reflects the early history of the Shire. At the town of Gunning the principal roads depart from the route pioneered by Hume, to radiate north to the sheep and gold regions of Bathurst and the Lachlan, and south to the Monaro. What is now the Hume Highway traverses the Shire to link the colonial centres of Goulburn and Yass. The lesser roads in the Shire provide access to rural properties or circumferentially join the villages which grew to serve the needs of selectors. The varying density of access roads is consistent with a pattern of land use based on holdings varying historically in size from 250 to 2500 hectares.

The network reflects also the barriers to transport that the Mundoonen and Cullerin ranges presented to transport of the day. Although there were motor cars in this part of Australia in 1909 and motor coaches and trucks in 1911, horse drawn vehicles remained in use for many years. Indeed, when the NSW Main Roads Board was established in 1925 with a charter to improve main roads, much of the road system in rural NSW was suitable only for horse drawn vehicles. The spatial distribution of the road network in Gunning Shire has changed little since that time but has improved in capacity as motor vehicle use increased. Roads survey data is too sparse and its interpretation too unreliable to give useful indications of the rate at which that development took place.

Gunning Shire Council's view of the road system as it existed in 1975, is summarised in Appendix III.

Present extent

Map 5.1 shows the present extent of public roads in Gunning Shire. In addition to the roads shown on that map, there are numerous tracks and roads on private property which are not financed from public funds[1]. These roads are not generally open to the public and examination of their performance has been excluded from this study, though their existence is of some importance.

The Rural Local Government Study (Report by the Secretariat of the Joint Officers' Committee of the Local Government Ministers' Conference 1980) pointed to the existence in some local government areas of road networks more extensive or of higher quality than at present required. In these areas, previous investment decisions tended to dictate the present level and distribution of road work funding. Gunning Shire is not in this position.

The reported total length of public roads in the Shire varies from one source to another by about nine per cent. This variability exemplifies the general uncertainty experienced in interpreting roads inventory data—especially data from inventories in which the definitions forming the bases of tallies have been obscured by time.

For the purpose of this study, the length of public roads in Gunning Shire at December 1979 was taken to be as shown in Table 5.1.

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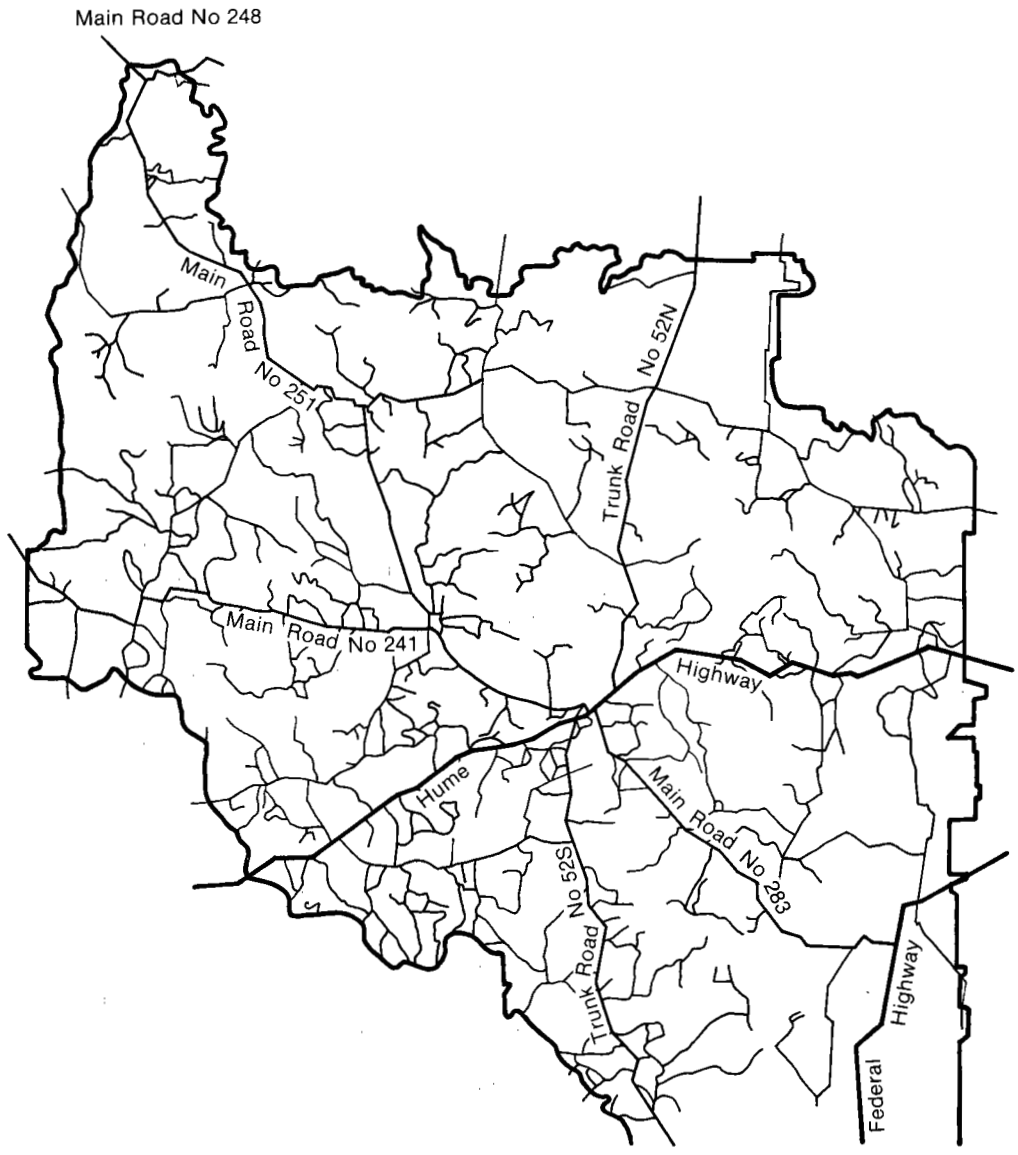
1. Data on the total length of other than public roads is extremely limited. Interpretation of 1:50 000 scale topographic maps based on 1973 aerial photography and 1975 field survey review (NSW Central Mapping Authority 1976) indicates that there is some 860 kilometres of track in the Shire. The reliability of this figure is not known.



Map 5.1. Representative selection of public roads in Shire

Classification system

Table 5.1 uses the term 'road classification' and applies class names that do not result in multiple counting of single road lengths. There is, however, a variety of classification schemes each of which is currently applied to describe rural roads. The principal classification schemes are explained in Appendix IV. They include those used by the Commonwealth Government, by the NSW State Government, by the Gunning Shire Council and by NAASRA. It is significant that neither the Shire residents nor their Council are familiar with the identification of their road system by the Commonwealth classification which is used as a basis for the allocation of Commonwealth funds to local government for roadworks. This classification was illustrated for Gunning Shire in Chapter 4.

Physical condition

The physical condition of the roads throughout Gunning Shire is highly variable. Figures 5.1 to 5.12 depict the variability of both pavement condition and road geometry typifying the system. Driving conditions on much of the major road system are considered to be reasonable for the lighter classes of vehicle in dry weather.

Trunk, Main and Shire Roads

The Shire Council is concerned over the proportion of gravel surfaced roads and their rate of deterioration. Traffic volumes are not high, but the proportion of heavy vehicles now using the road system has increased. The Council believes that routine maintenance work is retaining the condition of bitumen sealed roads. However, it considers that the condition of the gravelled part of the system is deteriorating faster than it is being rejuvenated. Such is the Council's concern, that in the absence of additional funding, it proposed that 40 per cent of the funds allocated in 1980-81 for reconstruction of road in the Shire to bitumen standard be diverted to gravel resheeting of Main Roads. In the ten years to June 80, 135 kilometres of gravel resheeting was carried out on the 124 kilometres of gravel Main and Trunk Road. A Council description of the condition of the Main and Trunk Roads in the Shire is given in Appendix V and should be read in conjunction with the Shire's 1975 submission to the Commonwealth Bureau of roads, and the current work program, given in Appendix VI.

Hume Highway

The Hume Highway is a divided highway having 7.4m carriageways for 12 kilometres from Goulburn to the grade-separated junction between the Federal and Hume Highways at Yarra. From there until Yass the Hume has single carriageway, mainly between 6.7m and 7.4m wide although there are short sections 11m wide. The highway constitutes the main street of Gunning. The condition of the road and road surface on older sections of the Hume Highway is generally poor (BTE 1979). Despite this, vehicles are generally able to maintain speeds close to the 100 kilometres per hour limit; although there are slow sections, particularly in the Cullerin Ranges.

Federal Highway

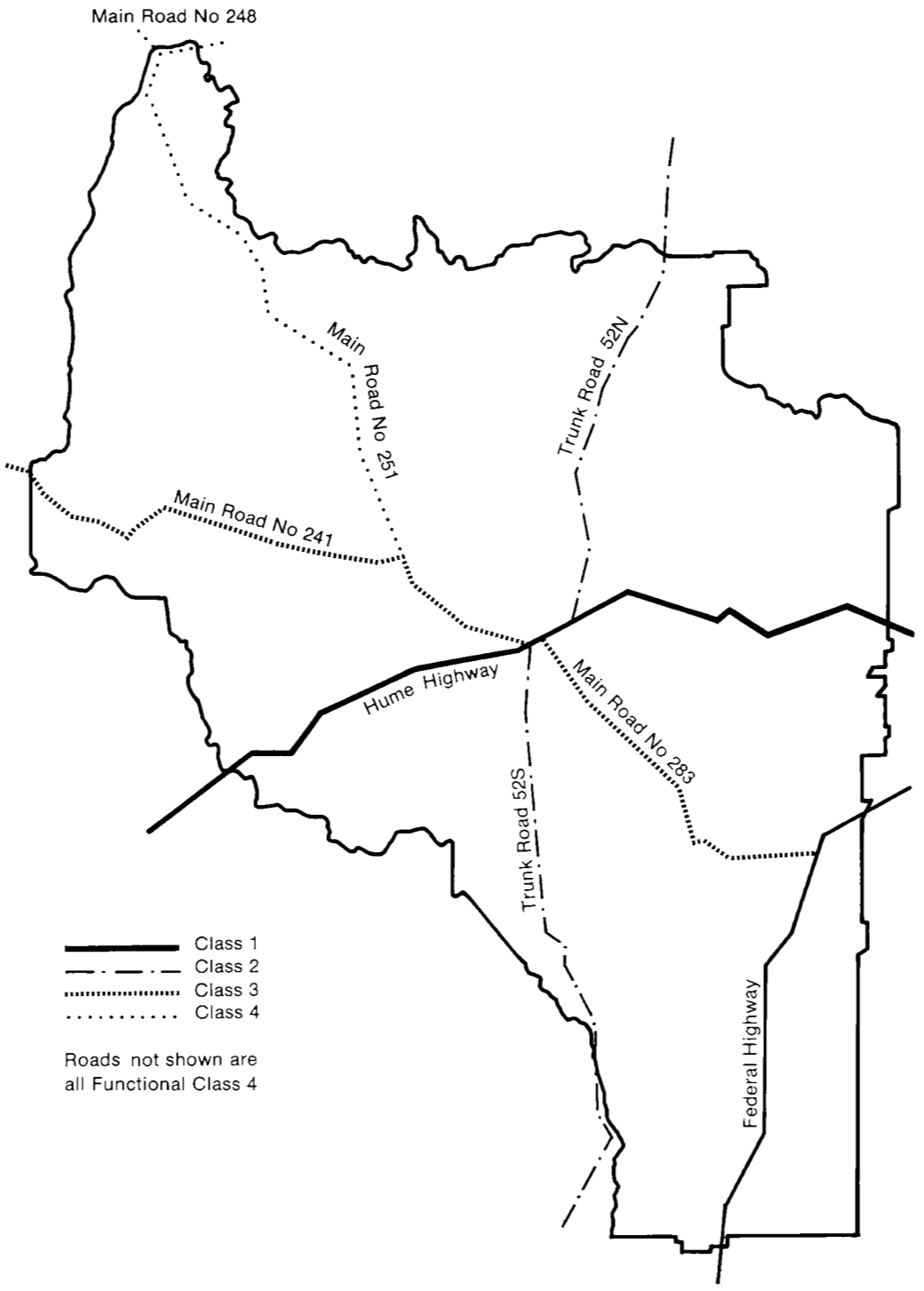
The Federal Highway is divided for about 20 kilometres from its intersection with the Hume Highway at Yarra, with a further divided section under construction. In general the remainder of the existing road is somewhat narrow (6.0 to 6.6m) considering the traffic volume and with poor alignment. South of Collector the highway follows the western shore of Lake George, at the base of a 150m scarp, and is subject to flooding by streams which enter the lake at its northern end. The highway climbs the scarp at Geary's Gap and from there it traverses rolling country, entering the ACT at Ginn's Gap. The structural and surface condition of the road for most of its length was regarded as poor (BTE 1979) but is being improved.

TABLE 5.1—LENGTH OF PUBLIC ROADS IN GUNNING SHIRE

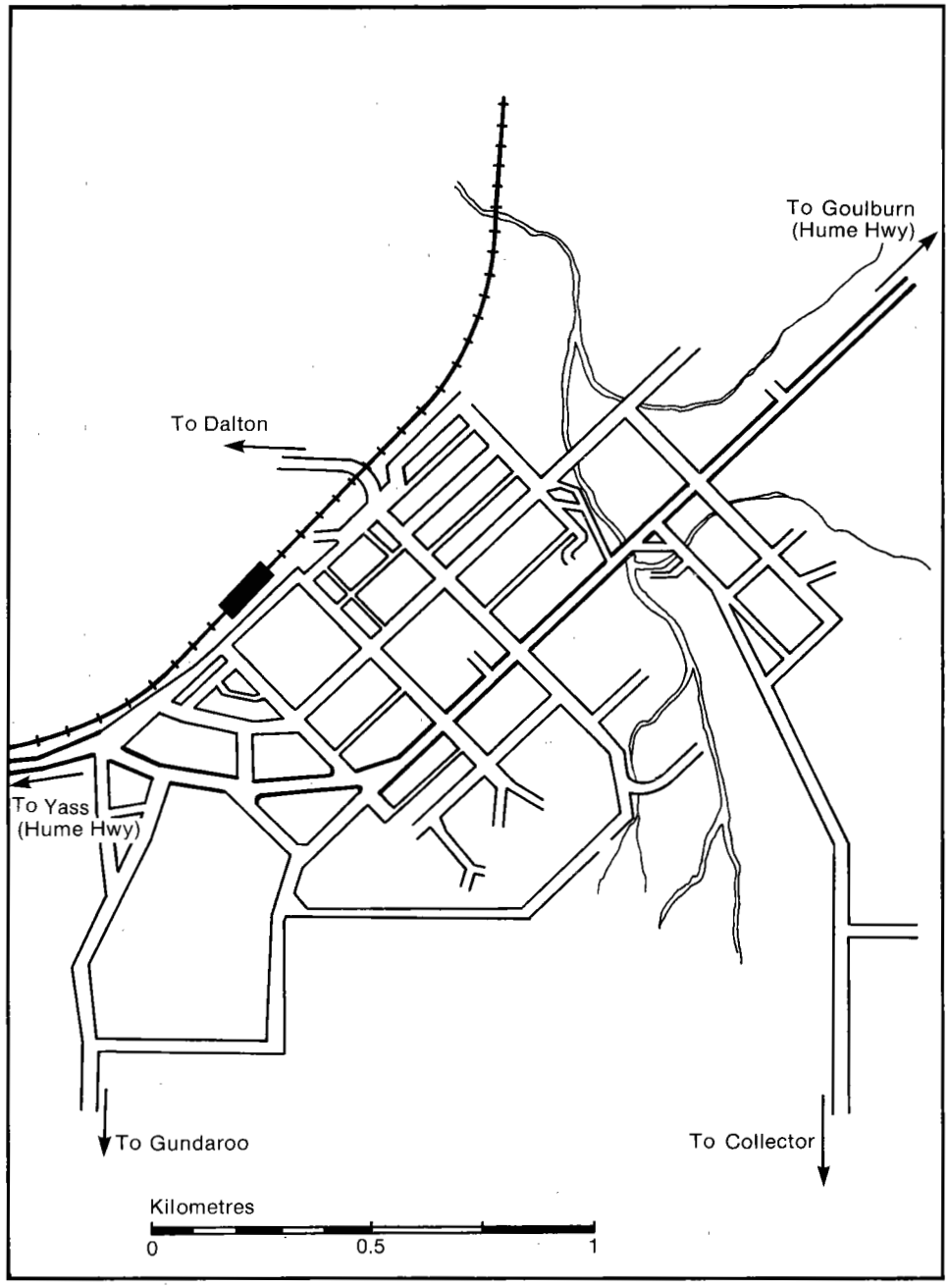
(km)

Road classification	Bituminous seal				Gravel surface	Natural surface	Total
	Pavement width						
	7.4m or more	6.7m	5.6m	3.6m			
National highways	37	40	5.5	—	—	—	82
Main and trunk roads	—	—	45	—	124	—	169
Major Shire & special roads	—	—	34	79	94	10	218
Minor Shire roads	—	—	—	4.5	76	17	98
Access roads	—	—	—	.5	55	35	91
Town streets	—	—	—	9	5	12	26

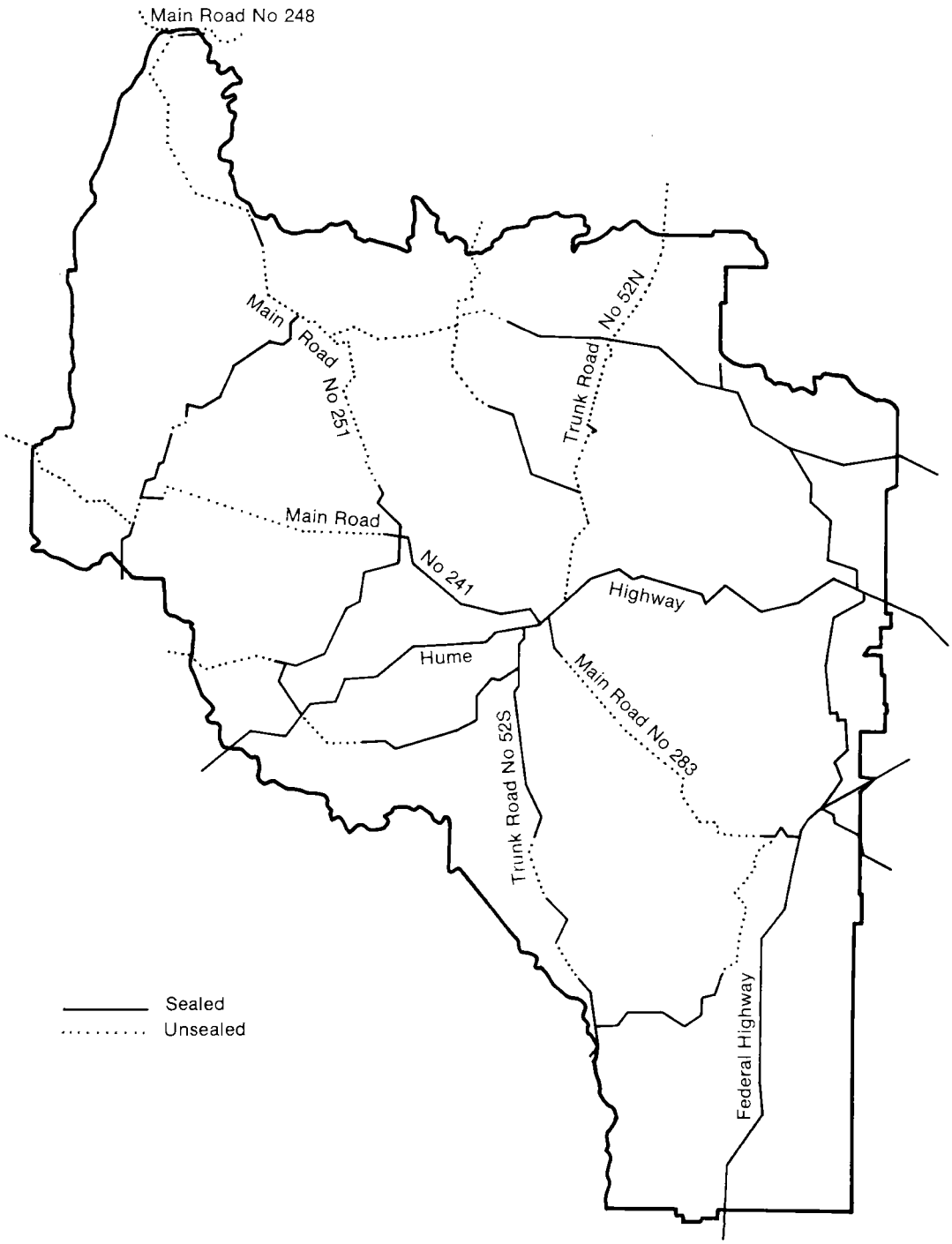
Sources: Australian Bureau of Statistics—Australian Municipal Information System, Australian Roads Survey 1969-74, Australian Council of Local Government Associations, Gunning Shire Council Road Needs Survey 1979, Australian Bureau of Statistics (1980c).



Map 5.2. NAASRA Functional classification of roads



Map 5.3. Roads and streets in Gunning township



Map 5.4. Extent of sealed road in Shire.

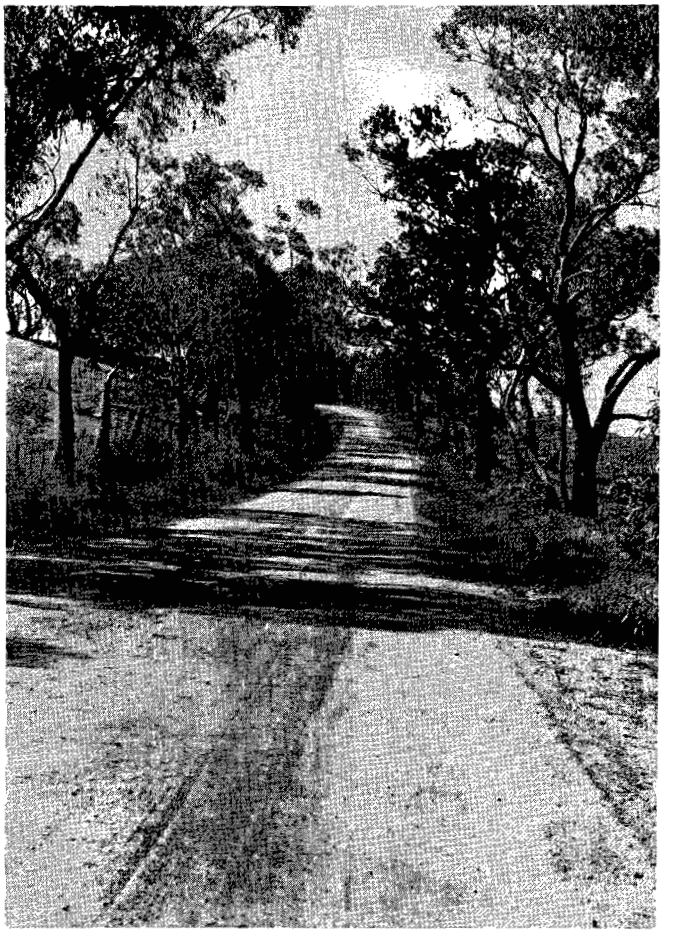


Figure 5.1. Trunk Road 52N, approaching Devil's Elbow

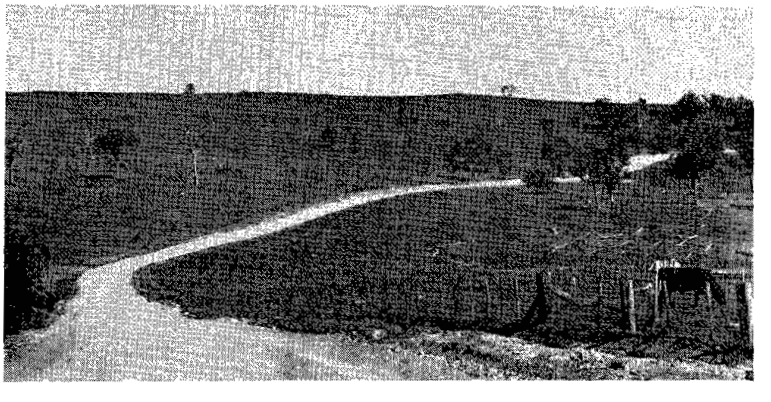


Figure 5.2. Trunk Road, 52N, 30 km from Gunning township. AADT = 150

Figure 5.3. Bulley's Crossing Road, approaching Harts Creek. AADT = 20

Figure 5.4. Bulley's Crossing Road, a Shire Major Road 20 km from Gunning township. AADT = 20

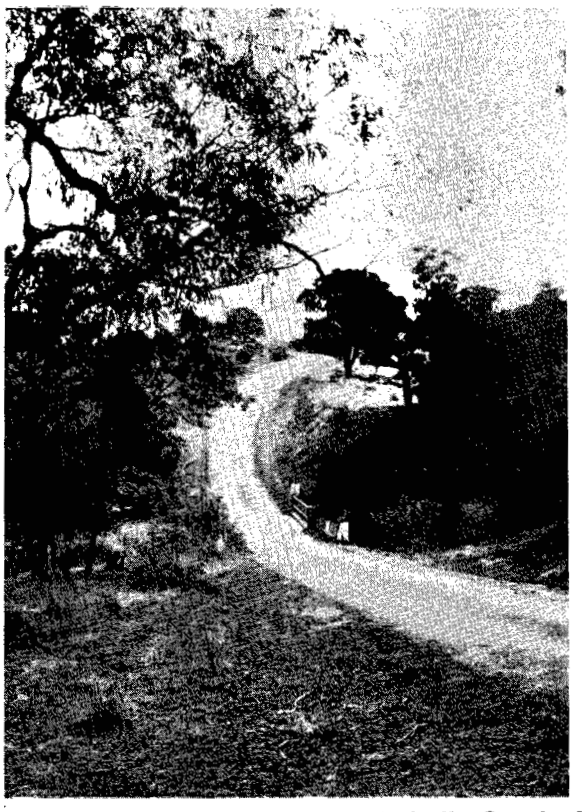


Figure 5.5. The Wheeo Road at Gunningdelballa Creek. AADT ≏ 20

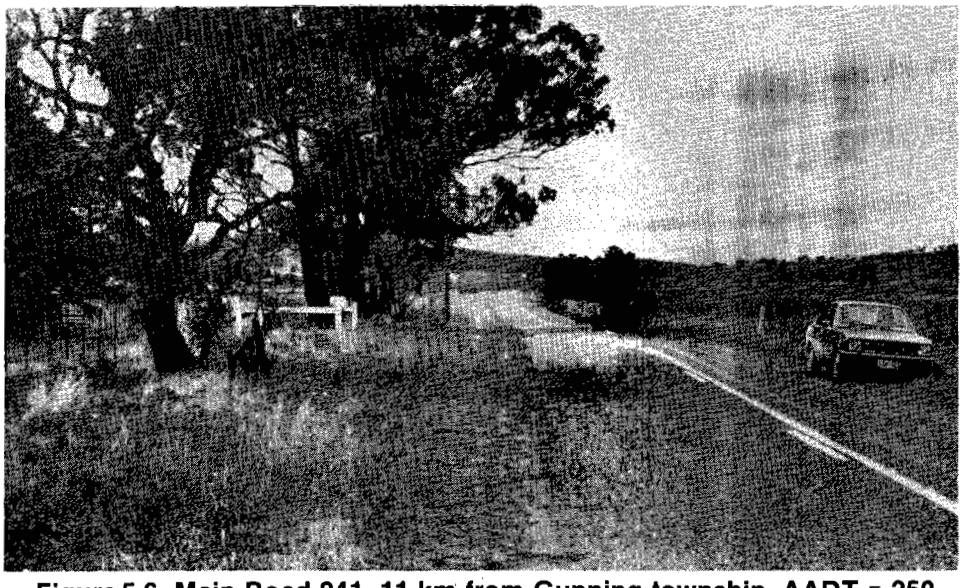


Figure 5.6. Main Road 241, 11 km from Gunning township. AADT = 250

Figure 5.7. The Wheeo Road, 10 km from Gunning township. A Shire Major Road 2 years after resurfacing

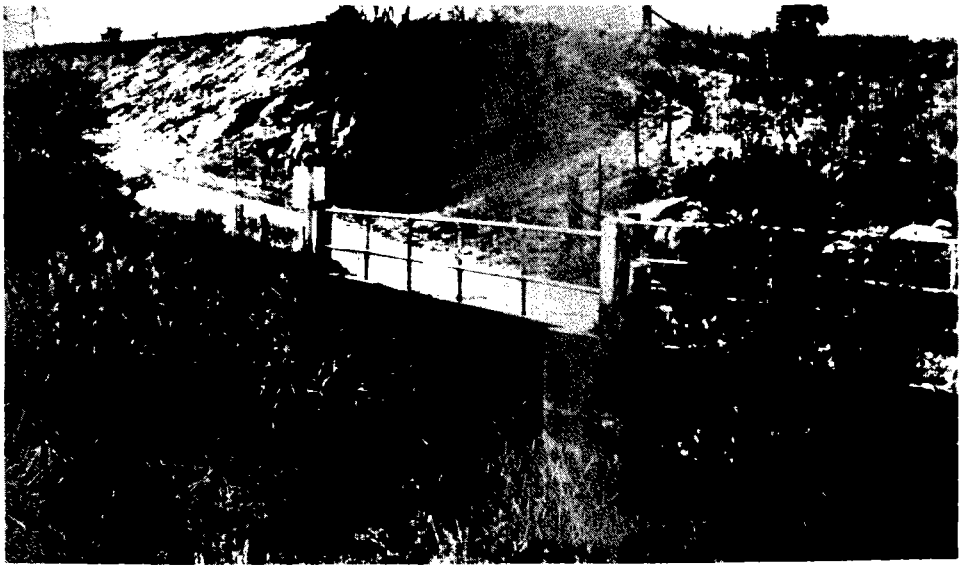


Figure 5.8. Bridge carrying the Wheeo Road across Gunningdelballa Creek.

Figure 5.9. Two views of Trunk Road 52N, 2 km from Gunning township. AADT = 160

Figure 5.10. Biala Street, Gunning

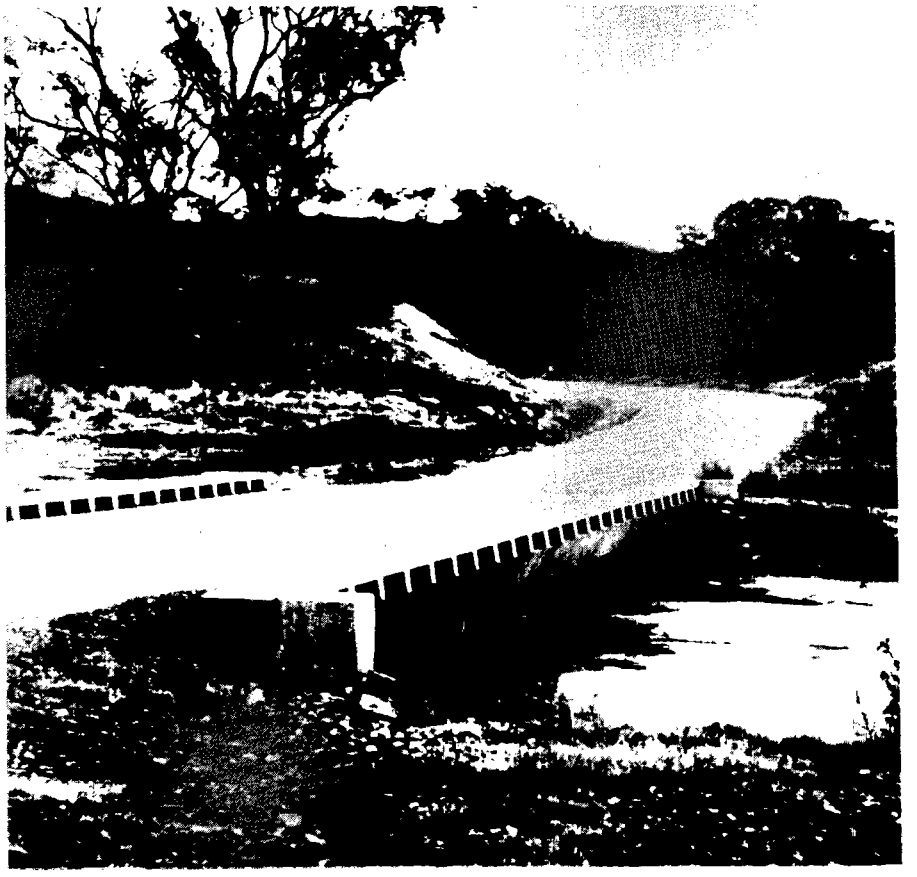


Figure 5.11. Bridge across the Lachlan River, Bulley's Crossing

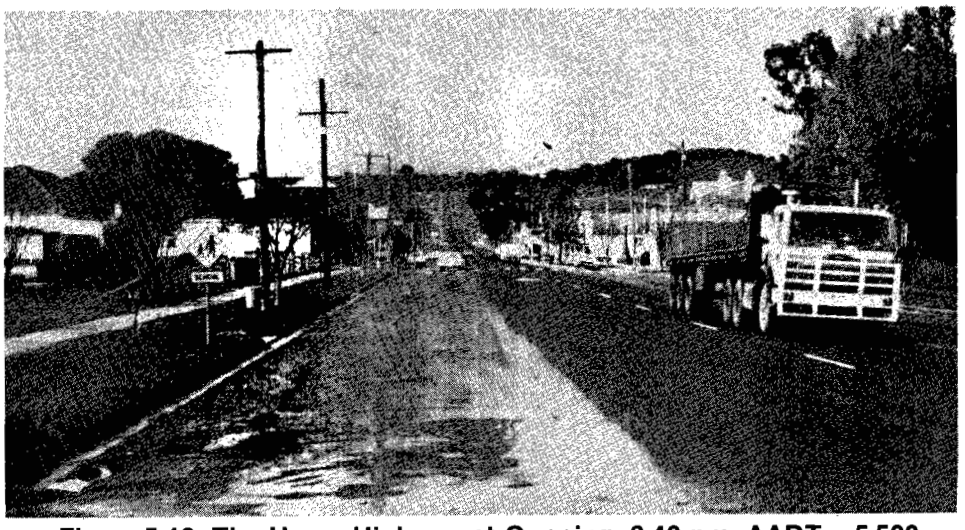


Figure 5.12. The Hume Highway at Gunning, 3.40 pm. AADT = 5 500

Directness and connectivity

From a network efficiency point of view the Gunning Shire road system can be said to serve a large proportion of the origins and destinations observable in the Shire. Because of its chiefly radial nature the network lacks directness, but there is no obvious lack of internal connectivity in the system which would isolate one portion from another—given that the roads remain open.

Terrain

As illustrated in Table 5.2, the terrain through which Gunning roads pass is relatively rougher than the NSW average. This difficulty is most evident in the Functional Class 4 Shire roads.

TABLE 5.2—GUNNING SHIRE ROAD TERRAIN

Road functional class	*Length*									
	Flat		*Undulating*		*Hilly*		*Mountainous*		*Total*	
	(km)	*(per cent)*	*(km)*	*(per cent)*	*(km)*	*(per cent)*	*(km)*	*(per cent)*	*(km)*	*(per cent)*
1	0	0	58	72	23	28	0	0	81	100
2 and 3	0	0	121	97	3	2	1	1	125	100
4	17	3	366	68	152	28	0	0	536	100
Total—all classes	17	2	545	74	178	24	1	0.1	742	100
NSW average	—	47	—	36	—	15	—	2	. .	. .

Source: Commonwealth Bureau of Roads and National Association of Australian State Road Authorities (1972).

Closure

The susceptibility of roads to closure is an important aspect of rural road networks.

The main causes of road closure in Gunning Shire are flooding and pavement disruption due to wet weather traffic. The Shire has an extensive inventory of minor bridges, culverts, and the like which contribute to keeping the roads open. The data of Table 5.3 are taken from the 1969-74 Australian Road Survey (Commonwealth Bureau of Roads and National Association of Australian State Road Authorities 1972).

TABLE 5.3—BRIDGING STRUCTURES ON PUBLIC ROADS; GUNNING SHIRE

	Fords	*Flood-ways*	*Cause-ways*	*Major culverts*	*Bridges*	
					Concrete and steel	*Timber*
Highways	—	1	—	12	11	2
Main and Trunk Roads	1	—	11	26	16	4
Shire Roads	15	—	83	23	29	1
Total	16	1	94	61	56	7

Source: 1969-74 Australian Road Survey.

Of the bridges proper, seven cross railways and the remainder are over water. The bridges on Shire major roads are up to five spans long and typically carry about 40 vehicles per day.

There is some uncertainty about the structural condition of timber bridges in the Shire. Two timber bridges in the Shire have posted eight tonne load limits. The Council is uncertain of its liability if a bridge fails under a lower than posted load, does not have officers to enforce load restrictions, and hesitates to post load limit signs under these circumstances. The bridges at present limited are little used, except as a diversion in the event of Hume Highway closure.

The Australian Roads Survey data on closure are reported in Chapter 8. Those data refer to roads closed to motor cars. Heavier vehicles experience difficulty more frequently and the increasing use of these vehicles is causing concern in Gunning Shire.

Suitability for large vehicles

The pavement of much of the Shire road system is of the less durable type, and throughout the Shire road geometry is less than generous. Consequently the road system's performance has a marked susceptibility to increases in vehicle size. The Shire Council is concerned over higher road wear rates apparently occasioned by an increasing use of the roads by larger vehicles; and those engaged in freight transport spoke of the physical constraints the roads impose on large vehicles.

Two processes seem to be involved—firstly, an increase in total freight movement, and secondly, a trend towards higher proportions of large vehicles in the transport fleet.

While no data are available specifically for Gunning Shire, estimates of freight travelling to and from Sydney along the Hume and Pacific Highways (BTE 1982b) indicates that there was a 50 per cent increase in total annual freight tonnage moved to and from the south eastern region of NSW via the Hume Highway between 1972 and 1978. Some 85 per cent of that freight travels in vehicles of over four tonnes carrying capacity. This increased activity could be expected to be replicated, to some extent, on Gunning Shire roads.

The trend towards the use of proportionally more larger vehicles is fostered by the economics of vehicle scale, and by freedom to choose vehicles optimised for higher quality roads. The transport operators following such a trend are likely to be those with greater working capital, and those whose profitability is relatively insensitive to revenue from regions with low quality roads. The predominance of such operators in Gunning road freight was mentioned in Chapter 2 and one could expect, then, a trend towards reduced levels of service in consequence of the incompatibility of their vehicles with the Shire roads.

According to the residents of Gunning Shire and their Council, the results of these processes have been:

- more heavy vehicles and resultant wear of light pavements on through routes traversing less difficult terrain; and
- some reduction in service frequency or increase in unit costs on the more difficult local and through routes.

One general conclusion that might be drawn is that changes to highways and transport cost structures, and expansion of the national economy, which favoured the development of large centralised road freight operations, also reduced the utility of the rural local roads system by producing a transport industry for which those roads are to some extent unsuited.

Barriers

When the limitation on funds is considered, the Lachlan River forms an effective barrier to east-west road construction in Gunning Shire. One of the photographs (Figure 5.11) shows one major crossing of this river at present available. A second, but less reliable crossing important to Shire residents is located at Bevendale just inside the boundary of Gunning Shire.

An important feature of the Gunning road network is the barrier to movement and impediment to road construction formed by the Hume Highway and the Sydney-Melbourne railway, which together bisect the Shire physically and socially.

Trouble spots

To amplify the description of the roads in the Shire and to provide examples of the type of difficulties being faced, the Shire Engineer was asked by the study team to nominate some points in the network which persistently cause traffic or maintenance problems. This information is given in Appendix V and shows a consistent pattern of poor vertical and horizontal alignment, inadequate waterway structures and weak pavement.

Highway bypasses

Various bypass proposals for the Hume and Federal Highways have been under discussion for some years. These include:

- relocation of the Hume Highway, beginning at Breadalbane, to pass about four kilometres south of Gunning township and rejoin the existing highway before crossing the Mundoonen Range; and
- upgrading the Federal Highway following the existing route but with a bypass to the south of Collector.

The bypasses would shorten travel distances and travel times for through traffic and would improve the overall environment of Gunning and Collector townships—particularly the road safety aspects. The Gunning Shire Council accepts the notion of bypasses but seeks direct access to the highways at both ends of each town (BTE 1979b).

ROAD WORKS PLANNING

The actual process of planning roadworks significantly influences the way in which funds allocated for roadworks are applied. In particular, the process modulates the effectiveness of funding provided to rectify performance deficiencies. To provide information on this process, roadwork planning in Gunning Shire was reviewed.

Program development

Annual programs for works on main and trunk roads are initiated by the Shire Council in the form of a draft works requirement and cost estimate submission to the NSW Department of Main Roads. The Department reviews this submission and returns a proposed works list to the Council for comment. When agreement on the program has been reached, usually within a funding limitation specified by the Department, the Council performs the work to specifications prepared by the Department in consultation with the Shire Engineer. Council's costs are reimbursed through the Department of Main Roads.

A resume of the proposed 1980-81 program for main and trunk road works in the Shire is given in Appendix VI.

Programming, design and execution of works on local Shire roads is the responsibility of the Shire Council alone. The Department of Main Roads distributes to the Shire a proportion of the funds necessary, according to the Department's assessment of Shire needs, and provides engineering design guidelines. The design standards for roads in Gunning Shire are summarised in Appendix VII.

In drawing up its works programs, the Council is guided principally by the Shire Engineer's knowledge of existing performance deficiencies (in particular pavement condition *vis a vis* traffic type and volume) and by the Shire Clerk's projections of funding limitations. Individual Councillors are aware of road performance deficiencies in their own Ridings and, additionally, ensure that the requirements of special interest groups are considered. In Gunning these groups include:

- children travelling to school;
- bulk carriers moving goods within the Shire: and
- residents travelling to work or to obtain goods and services in centres outside the Shire.

Preferential treatment of special interest groups appears to be openly and democratically agreed upon. Through traffic originating and terminating outside the Shire presents conceptual difficulties in Council decision making, as does the determination of policy toward non-resident landowners and non-pastoral holdings.

Other factors which influence the Council's decisions include:

- arresting the rate of pavement deterioration to avoid heavy future expenditure on maintenance;
- undertaking improvements on sections of road long enough to permit efficient use of resources:
  the availability of materials, and the management of plant and men:
- seasonal and weather influence: and
- the influence of road improvements on the volume of traffic and type of vehicle using a road.

No formal numerical decision analysis methods are employed by the Council. Nor does it seem that the use of such methods would alter the decisions being made. The Council is aware of the costs of roadworks and intuitively comprehends their benefits when weighted according to current local priorities. This comprehension is more thorough than can be expressed in most formal analyses. However, some abbreviated type of

formal analyses would assist markedly in recording the decision basis, thereby promoting planning consistency and continuity, and in conveying the decision basis to agencies external to the Shire—such as those providing funds.

Planning difficulties

During discussion with Council officers it became evident that there are several important difficulties in the way of effective road planning by local government authorities like Gunning Shire Council.

There is no written or even agreed master plan spanning several years to provide continuity between successive annual programs. The relative importance of maintenance compared with reconstruction in the present state of the network, and the unpredictability of maintenance requirements, could combine with funding variability and costs uncertainty to reduce the effectiveness of long term plans, but the present one year planning horizon might be expanded to advantage if a three year rolling program were in force.

In the absence of a rolling program, road works strategy must be determined during the preparation of each annual program but the techniques at present used for program preparation are not conducive to the discussion of strategy. The significance of these drawbacks in this Case Study is that the rational application of funds for enhancement of the road user perceived values seems to demand a strategic rather than an *ad hoc* approach.

While the division of responsibility for road works is clear, the differences between the aims of the participating authorities are not resolved by the present planning process. Consider, for example, a road joining a rural area in one Shire with a municipality in an adjacent Shire; the priorities accorded to this road by the two Shires might be quite different. Such a situation has resulted in restricted access to an important retail and service centre for a proportion of Gunning's population.

The program description and the financial transactions that result from the programming process obscure the source of funds and their disbursement.

Inertia is another important factor in road planning. The overall state of road networks change slowly unless there are very large changes in the funds allocated annually. On the other hand, changes that place demands on a road network can take place nearly instantaneously. The cessation of rail services, a curtailment of road freight operations, or the closure of a school are examples. The prediction and regulation both of change and of mismatched rates of change is an important function of local government. Observations in Gunning indicate that local government does not have the information necessary to predict changes impinging on road requirements and has neither the financial power nor the statutory authority to regulate such change. If it is to compensate for these deficiencies, the planning process should flexibly apply funds and should be sensitive to long term needs, attributes not now exhibited.

One example of this lack of flexibility is a prohibition[1] on the use of Commonwealth rural local road grant funds for reconstruction works with individual project cost less than 20 per cent of the total grant (NSW DMR 1979). As these funds constitute about half of the annual expenditure on Gunning Shire Roads, this ruling is a significant restraint on the number of lighter reconstruction projects around 10 kilometres long that can be undertaken in the Shire each year. The problems experienced are aggravated by difficulty in forecasting the availability of funds and by differences in the accounting periods of the various funding agencies.

A failure of government arrangements to keep pace with an increasing interaction between local affairs and those of the wider community may be a root cause of these planning difficulties which can reduce the effectiveness of funding intended to improve road performance.

1. The origin of this prohibition is not known. It is not imposed by the Commonwealth and is thought to be a residual from NSW Public Works Department administration of roads. Discussions between NSW DMR and the Commonwealth Department of Transport and Construction on this issue will be held shortly.

CHAPTER 6—METHOD OF PERFORMANCE ASSESSMENT

BACKGROUND

Fundamentally the community requires that roads should provide, at acceptable cost, a means of travelling between specified locations more quickly, more reliably and less hazardously than by pre-existing means. This means of travel should be provided without imposing unacceptable penalties. The performance of roads should be gauged then, by the extent to which they satisfy that requirement.

Pragmatically, the principle justification for reviewing road performance is the need to determine what, if anything, should be done *next* in the development of the road system. A useful performance assessment should supply, at the least, an answer to that question.

The Gunning Case Study was begun with an awareness of the inadequacies of roads-engineering parameters as the principal basis of performance assessment, and with the view that performance should also be assessed by directly gauging how well the roads serve the purposes of users.

To do this, two things were necessary: an amplified description of the users' objectives; and a statement from the users as to whether those objectives were satisfied.

A description of user objectives was required which would:

- treat users and objectives sufficiently generally to be practical;
- be sufficiently specific to permit individuality in dealing with particular users' views on performance;
- sort and encapsulate those notions and issues of road performance which are now in a confused and fragmented form;
- be a systematic arrangement in terms that did not overlap, so as to facilitate the use of single road or traffic characteristics, standing alone, to represent each facet of performance; and
- show unambiguously the relative importance of the various objectives.

Following extensive discussion about roads, road performance, community requirements, and individual requirements with the users of the Gunning Shire road system, it became clear that such a description of objectives could be assembled. The most appropriate form seemed to be a description of the general objectives applicable to all users which was suitable for expansion in dealing with individual users.

BASIC OBJECTIVES

From discussions with users and a review of the first principles of road performance, generalised user objectives were synthesised. They are presented below, but not in any particular order of importance.

Road cost and equity

The community expects that its road system will be affordable and that it will exhibit funding efficiency, with expenditure apportioned according to community priorities. The requirement applies both to initial cost and to subsequent road maintenance expense. This is now the domain of the road making authorities, who attempt to

express this community objective in their requirements for road durability and maintainability, and in their roadworks planning processes.

Though none of the objectives were enunciated in the terms used in this paper, this first objective was the one least clearly expressed by users and the one most often referred to by the Shire Council.

The community also requires that its notions of equity in the provision of roads be satisfied. Equity in this arena is difficult to define. It involves a comparison between the community's view of the road system it has, the road systems of other regions, and the road system to which it believes it is entitled. It encompasses the concept of wanting something, not because it is needed, but because someone else already has it.

Part of the significance of this objective is that there will be pressure from a community to improve its roads until the perceived limit of entitlement is reached. That perceived limit is likely to be set by notions of equity.

From discussions with users, it seems that these cost and equity objectives are pervasive, and that they do not form part of any system of priorities. That is, the level of user satisfaction is at all times conditioned by considerations of cost and equity.

Availability of routes

The community requires that practical routes are available between the origins and destinations of intended journeys. They require then that roads exist between these places, and that these roads are open to traffic.

In this description, the availability of routes objective is regarded as separate from consideration of route directness. In practice the users will state whether they believe a route is available, and in making this statement they may be influenced by extremes of indirectness. The implicit gradation of availability according to detour length is thoroughly consistent with correct assessment of performance on the basis of user views.

This objective may be used to illustrate a principle applied in specifying general objectives during the study. The availability of routes clearly depends upon the frequency of road closure and minimising closure could have been taken as a general objective. However, the frequency of road closure also influences the attainment of other objectives for which different priorities apply. Setting minimum road closure frequency as an objective would have resulted in an objective with multiple priorities. To avoid that difficulty, the principle adopted was one of identifying as objectives only the fundamental requirements and not derivatives thereof.

This principle was important in preparing a statement of the next objective.

Driver stress

During the course of the study many users expressed opinions to the effect that certain roads were 'too rough', 'too winding', 'too slippery', 'too narrow', 'too dangerous' or carried 'too much traffic'.

Significantly, when voicing opinions about these roads, no user spoke initially in terms directly denoting lack of comfort (only two spoke of vehicle or cargo deterioration.) When questioned as to what was wrong with, for example, a road being 'rough', users almost invariably responded with an oblique reference to safety and to one of the other faults of the road. When these matters were pursued, it was apparent that the topics were inseparable. In particular it was not possible to separate concepts of difficult driving from those of safety. If these two concepts had been separated into two objectives each to be treated specifically, the priorities accorded to those objectives would most probably have been different from each other and at variance with the priority applicable to the subject these users were really addressing.

Further, the opinions expressed had to be reconciled with the knowledge that:

- users throughout Australia do not appear to be influenced by the risk of accidents, as expressed by accident statistics, in that they continue to drive knowing that the risk is higher than they would accept in most other activities;
- on most of the local roads in Gunning, the reported number of accidents is small, yet it is local roads that cause comment; and with
- the conclusion that there is a difference between the published accident rate, or risk, and the road users' perceptions of the likelihood of *their* having an accident.

Accordingly, adopting the view that it was not reduction of the accident rate, nor reduction of surface roughness that was the fundamental requirement being expressed, but a need for reduction in the *combined effects* of those faults on road users, the study team coined the term 'driver stress' to describe this user objective.

By 'reduction in driver stress' this paper means reduction in the standard of care, alertness, skill and attentiveness that users perceive is necessary in traversing a route with an acceptable risk of damage to the vehicle or its contents. In other regions, this objective might encompass the desire to minimise frustration arising from traffic density, detours, poor traffic control measures, and the like.

None of this is to say that separate objectives of reducing vehicle operating costs or accident costs do not exist. Reduction of driver stress is a different objective—one that was strongly expressed by users in Gunning Shire. It could be expected that the reduction of the road-induced component of vehicle operating costs, and reduction of the cost of accidents, would be the objectives more particularly of those who are concerned more with national economics than these road users are.

Other objectives

From first principles, additional objectives can be suggested. These include:

- minimising travel time;
- minimising vehicle operating costs;
- minimising atmospheric pollution;
- minimising total cost of accidents; and
- maximising environmental aesthetics.

There are also the objectives of the 'indirect' users of roads to be considered—the objectives of those who rely on road use but who do not themselves travel. These objectives include, for example, the reliable transport of bulk supplies, the maintenance of essential facilities, and the convenient movement of customers and clients. This paper adopts the view that, when translated into fundamental road requirements, their basic objectives are identical with the objectives of users directly involved with travel.

PRIORITY OF OBJECTIVES

In any multi-attribute decision analysis it is most useful if certain attributes are dominant. That is, one attribute has absolute priority and always takes precedence over the others. Discussion in Gunning indicated that the basic objectives of road users exhibited this trait.

The nature of the dominance was such that a hierarchy of objectives could be established, in which users would first seek satisfaction with the highest priority objective and not until they achieved that satisfaction would they seek satisfaction of the objective with the next priority.

Hierarchy of objectives are common to many fields of study. Those to whom the hierarchy applies seek to satisfy the highest priority objective which is at the present

time unsatisfied. If for any reason a previously satisfied objective reverts to being unsatisfied, then effort will be redirected to that objective. Fresh dissatisfaction with an objective previously satisfied may arise through changes in aspirations, through failures of previous efforts, or through changes in external conditions.

A difficulty is encountered when treating those objectives which seem to be as yet unsatisfied because their priority has not so far demanded attention. These objectives tend to be ill-defined and to have indefinite priority. To regard unsatisfactory conditions in these areas as being something that 'can be tolerated for the time being' is misleading, as persons with these vague objectives are usually unaware of the prevailing conditions and certainly have not quantified them. It is better to regard these lesser objectives as requirements that have not yet been thought about.

The hierarchy of objectives derived from observations in Gunning Shire is not as straight forward as the simple list of basic objectives might indicate. Added complexity was necessary to describe the prevailing priorities accurately. The hierarchy is as follows:

(a) Availability of routes to places of primary importance.

(b) Availability of routes to places of secondary importance.

(c) Reduction of driver stress on routes to places of primary importance, and availability of routes to places of tertiary importance.

(d) Reduction of driver stress on routes to places of secondary importance.

(e) Reduction of travel time on routes to places of primary importance.

(f) Reduction of driver stress on routes to places of tertiary importance.

(g) Reduction of travel time on routes to places of secondary importance.

The road cost and equity objectives do not appear in this hierarchy because they are considered pervasive and not part of any system of priorities. That is to say, questions of cost minimisation and equity arise during any consideration of the desirability, and means, of satisfying each of the other objectives for each group of road users.

Most of the requirements listed earlier as 'other objectives' have also been omitted. There are two reasons for this omission. First, these objectives lie, for Gunning Shire, in the realm of 'those things which have not been thought about yet'. Accordingly the potential requirements are ill-defined and no precedence for the objectives can be established. Secondly, preparation of the performance assessment, as proposed at the start of this chapter, necessitates identification of only the next objective that demands satisfaction. Observation in Gunning Shire indicated that the seven objectives listed above would cover that requirement for all road users. Local road users in Gunning demonstrated a notable indifference to questions of travel time, and the related objectives seem to represent the limit of their present perspective.

The hierarchy presented here is intended to be used as a short form description of a complex situation and as an aid to discussion and analysis. Its effect on performance assessment is to remove one degree of freedom by ordering the basic objectives. In short, it answers the question 'what is the next road improvement task'?

DIFFERENTIATION BETWEEN USERS

In the matter of performance assessment, first principles seem to indicate that the significant differences between users relate to the routes they regard as important and the quality of road they require on those routes. The Gunning study confirmed that expectation, and it is particularly convenient that the slightly more complex form of the basic objectives, as used in the hierarchy listed above, entrains the notion of route importance. The hierarchy thus provides the framework of sufficient detail needed to examine performance from the viewpoint of individual users.

In employing this statement of objectives as a basis for the assessment of performance

from the user viewpoint, differentiation between users is based on the differences in their choice of routes which are of primary, secondary and tertiary importance, and the differences between additional road quality needed before users are prepared to pursue the next objective in the hierarchy.

Each user is characterised by an immediate objective: the next objective in the hierarchy for the route selected by the user concerned.

PERFORMANCE INFERENCE

The presentation of user objectives developed in this chapter permits selection of indicators which are directly relevant to road performance. There is the possibility then of selecting and measuring performance indicators for each objective so as to infer user satisfaction and hence road performance. Such inference is valid only if the overall road use context remains fixed during the process.

Two purposes for attempting such inference are to review the performance effects of road works by measuring relevant indicators before and after the work, and to estimate road performance in one region from measurement of indicators and satisfaction in another substantially identical region.

An important constraint arises from the fact that in any single performance assessment an objective will be found to be either satisfied or not satisfied. For example, if an objective is found to be not satisfied it will be possible to say what value of the indicator corresponds with a lack of satisfaction but not to say that that value corresponds with satisfaction. To define the boundary between dissatisfaction and satisfaction requires more than one performance assessment and indicator measurement. For this reason the performance review of the roads in Gunning Shire that follows presents data both on higher priority unsatisfied objectives and on objectives that have been satisfied.

CHAPTER 7—ROAD USERS AND ROUTES IN GUNNING SHIRE

USER GROUPS

The range of all possible users of the Gunning Shire road system was too large for individual treatment. Accordingly some form of user grouping was required. If users are to be grouped without unduly suppressing individual user views on road performance, the only sound basis for the grouping is commonality of immediate objectives, but immediate objectives cannot be used for this purpose at the beginning of an assessment as they are not then known. For the purpose of the study users were initially grouped on the basis of the economic function of their travel in the belief that this would be likely to coincide with their immediate objectives.

Selection of the most appropriate group size and therefore of the number of groups is largely a matter of judgment. The user grouping used in the study is shown in Table 7.1 and it proved in practice to be a comprehensive and manageable selection of adequate specificity.

Note that each trip function is performed by two user groups: 'through' travellers whose journeys originate and terminate outside the Shire, and 'local' travellers whose journeys originate or terminate inside the Shire. Note also that any single person may be a member of several user groups as the function of his trips changes.

To help reduce the number of user groups, indirect users of the road system were excluded in the hope that their views would be reasonably well represented by those of the associated direct users. Beyond a certain level of detail that practice cannot be relied upon to give accurate performance assessments from the viewpoint of the indirect user. For example, is an indirect user, such as a retail outlet or a school, as concerned over the frequency of road closure as the travelling customers or students themselves? The study was unable to treat users in sufficient detail to resolve this matter.

Past roads needs surveys have been criticised in some circles for their omission of the defence applications of roads, and it will be seen that Table 7.1 does not specifically mention defence users. To comment on the defence value of a rural road network is to be highly speculative and at the level of detail possible in a paper such as this, defence use of the roads may be considered congruent with that of all the users listed in Table 7.1. Defence is given no further separate treatment in this paper.

ROUTE IMPORTANCE

In establishing which routes are of what importance to each user group, this paper will deal with each group as though it were an entity. However, it must be recognised that individual users or sub-groups of users may have requirements different from those of the group as a whole. In particular, some of the routes regarded as important to the whole group may not be used by individual members of the group.

Discussion with users indicated that their concept of the importance of various places is characterised by three factors relating to the trips they wish to make to those places. These are:

- *frequency*—the number of times the trip is or would be made;
- *immediacy*—reflecting the consequences of trip postponement, including the economical scheduling of vehicles and the existence of designated arrival times; and

TABLE 7.1—INITIAL USER GROUPING

User group	*Examples*
Suppliers of goods or services	
Produce carriers	Stock carriers
	Grain carriers
	Wool carriers
Bulk suppliers	Perishable foodstuffs supplier
	Non-perishable foodstuffs supplier
	Petroleum products supplier
	Seed, fertiliser, stockfeed suppliers
	Road construction materials supplier
Retail distributors	Bakers
	Milkmen
	Petroleum products retailers
Servicers	Fire brigade
	Police
	Road makers
	Noxious weed inspectors
	Postmen
	Line maintenance crews
Purchasers of goods and services	
Bulk goods purchasers	Agricultural chemicals purchaser
Non-bulk goods purchasers	Household consumables purchaser
	Household durables purchaser
	Primary producer purchaser
Service purchasers	Medical patients
	Clients of other professionals
Travellers to workplace	Employees
	School children
	Business liaison
Travellers to social and recreational activity	Tourists
	Churchgoers
	Sportsmen

- *value*—of the cargo, passengers or service being transported, and of the vehicle, covering also the degree of dependence upon the result of the trip.

The assessments of route importance which follow are based either directly upon the definite statements of users or upon a combination of some user views and estimates of the three parameters—frequency, immediacy and value.

Through users

Early in the course of the study it became clear that there was significant commonality of route importance between the through user groups. Though each group travelled with differing frequency, immediacy and value, the group view of the relative importance of various places did not change from group to group. To avoid repetition in this part of the paper those users will be taken together.

Their activities include:

- interstate freight transport;
- intrastate freight transport such as
  movement of livestock and produce from Crookwell Shire to Yass and Goulburn,
  carriage of roadmaking materials from Canberra to Crookwell;

- tourism;
- business management and government administration; and
- the purchase of goods and services in the larger towns and in Canberra or Sydney.

The general pattern of through traffic is shown on Map 7.1.

Little aggregated data on through user trip frequency or traffic volume is available. The following information has been derived from traffic data in Appendix VIII to indicate the scale of through user activity.

- Federal Highway
  about 2900 through vehicles per day
  representing 74 per cent of total traffic
  some 25 per cent of through vehicles are trucks of six tyres or heavier
- Hume Highway
  through traffic less than 3800 vehicles per day
  about 950 through commercial vehicles per day
  representing 25 per cent of through traffic
  including 830 interstate commercial vehicle trips.

Results of the study suggest that the route importance for through user groups is as shown in Table 7.2. The table includes only those parts of the through users' total route which lie in Gunning Shire. The significance of the remainder of the route should not be overlooked in assessing road performance solely from a through user viewpoint. For example, the route from Seymour to Melbourne may be of more importance to the through user than the Goulburn to Yass route. That significance was set aside during this study which was predicated on current practice in which road resources are allocated first on the basis of regional requirements rather than user group requirements.

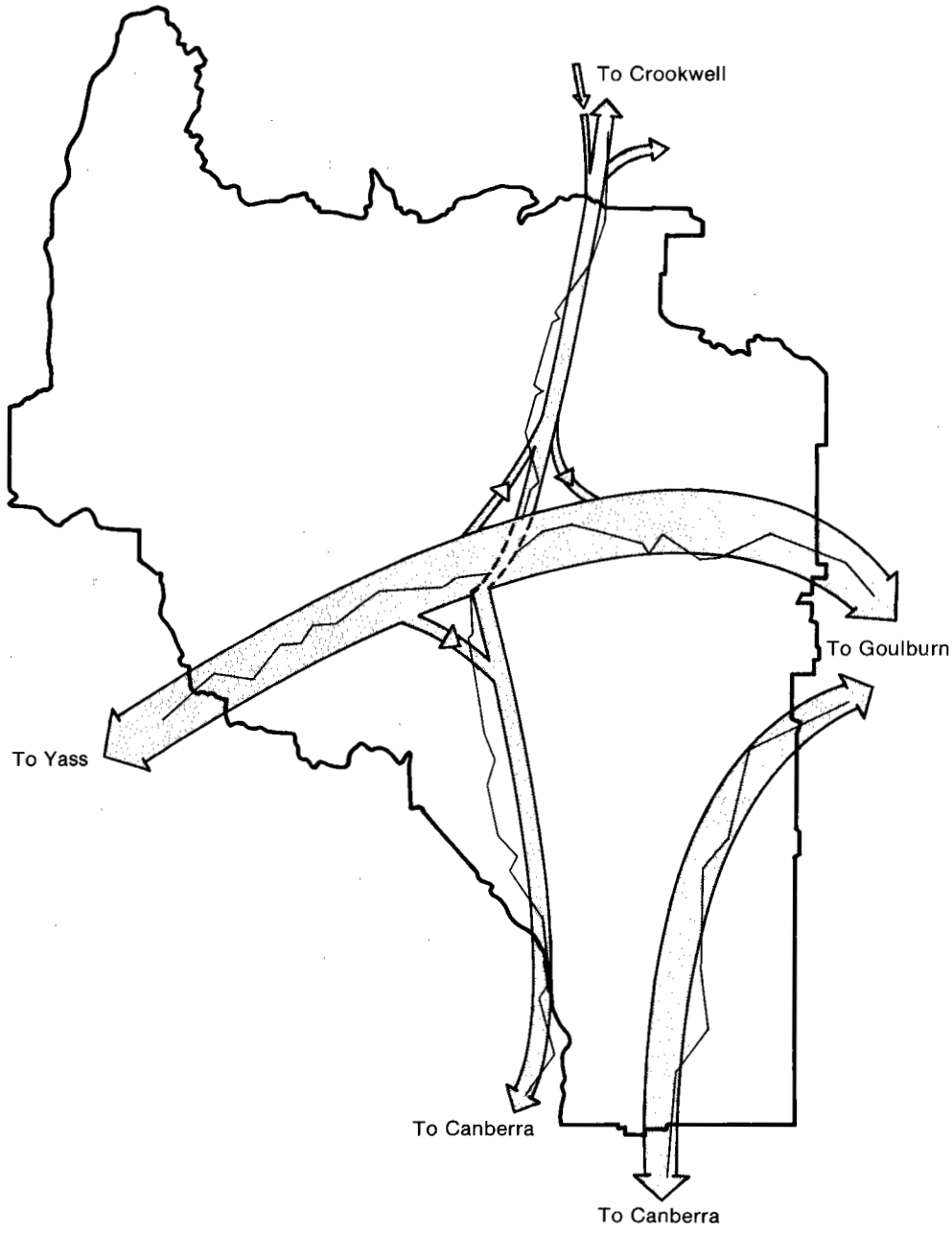
TABLE 7.2—GUNNING SHIRE ROUTES OF IMPORTANCE TO THROUGH USER GROUPS

Routes to places of primary importance	Goulburn and beyond to Yass and beyond Canberra, Queanbeyan and beyond to Goulburn and beyond
Routes to places of secondary importance	Yass and beyond to Crookwell region Canberra, Queanbeyan to Crookwell region Goulburn to Crookwell region
Routes to places of tertiary importance	Goulburn to Boorowa region Yass and beyond to Canberra, Queanbeyan and beyond

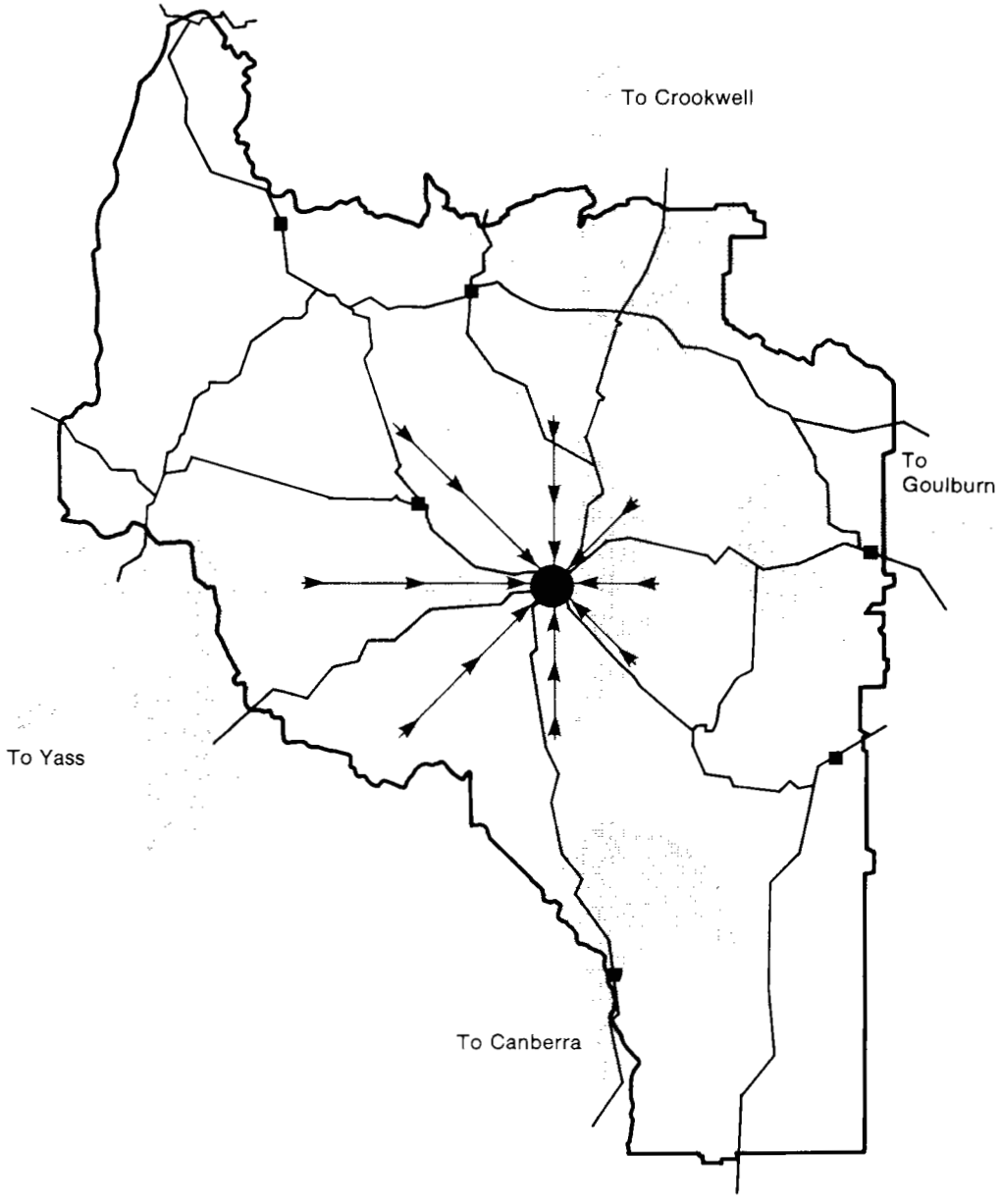
Local users

Users whose trips originate or terminate within the Shire did not demonstrate the commonality of route importance that through users did. There is however a distinctive pattern behind the local users routes, with users from the differing districts generally favouring different regional centres.

Goulburn, Yass and Canberra, and to a lesser extent Crookwell, are the destinations for most major shopping trips and trips to medical or other professional services. Residents living near the Shire borders tend also to use these centres for their pre-schools, post offices, banks and recreational facilities. However, Gunning township is an important centre for these activities for most other Shire residents. A similar pattern applies for travel to school. Most travel to work is confined to the residents' local districts but Canberra and Goulburn draw some travel for this purpose. The overall pattern of this local travel is illustrated in Map 7.2.



Map 7.1. Through user groups, traffic pattern



Map 7.2. Local user groups, traffic pattern

Produce carriers

The frequency of the trips made by produce carriers is not high and is seasonal. Large vehicles are employed and the value of vehicle and cargo is high. The consequences of trip postponement relate to the vulnerability of loaded produce, especially stock, to the timing of sales and price fluctuations, and to the scheduling of vehicles. The parameters do not vary substantially between routes.

The value of produce sold during 1979 corresponds with a minimum of some 800 semi-trailer trips by produce carriers in that year. The trips originate or terminate at a grower's property. Because these properties are uniformly distributed throughout the Shire, there is no obvious priority of routes. The scope of the study did not permit a more detailed review of routes than is shown in Table 7.3.

TABLE 7.3—ROUTES OF IMPORTANCE TO LOCAL PRODUCE CARRIERS

Routes to places of primary importance	All properties to Goulburn All properties to Yass
Routes to places of secondary importance	Northern properties to Crookwell
Routes to places of tertiary importance	Property to property

Bulk suppliers

The principal sources of supply for Gunning Shire and the distribution frequencies are set out in Appendix XI. These commodities are, in the main, delivered to Gunning township and to the various villages in the Shire. Seed, stockfeed, fertiliser and road making materials are usually delivered direct to the point of use. Seed is the only commodity in this class transported out of the Shire. The resultant route importance is shown in Table 7.4.

TABLE 7.4—ROUTES OF IMPORTANCE TO LOCAL BULK SUPPLIERS

Routes to places of primary importance	Goulburn to Gunning Canberra, Queanbeyan to Gunning Yass to Gunning
Routes to places of secondary importance	Gunning to Dalton, Biala, Bevendale Canberra, Queanbeyan to Collector, Gundaroo
Routes to places of tertiary importance	Gurrundah to Goulburn, Yass, Boorowa, Crookwell districts

Retail distributors

The volume of goods distributed to consumers in Gunning Shire is small. The distribution takes place along defined routes, none of which can be considered more important than the others. Those routes are shown in Table 7.5.

Servicers

Of the trips to supply services in the Shire, those of the postal service have the most firmly defined routes. These are shown on Map 7.3.

Reasonably well defined routes are followed by the crews maintaining State and national facilities in the Shire. The locations of these facilities are illustrated in Map 7.4.

Maintenance of the Sydney-Melbourne rail link involves travel over the Gunning road system. The 860mm natural gas pipeline from Moomba, South Australia to Sydney traverses the Shire, as does the supply for Canberra. Some 17 per cent of NSW electric power is carried by lines crossing the Shire on the way to Sydney. These lines are inspected frequently and repaired as required using the local road system and dedicated easements.

Goulburn-based linesmen maintain the Sydney, Canberra, Melbourne telecommunication links that parallel the Hume and Federal Highways and the air navigation beacons in, or adjacent to, the Shire.

The maintenance of local electricity and telephone lines involves the use of much less well defined routes. These trips and those of the police, fire brigades and Council's inspectors require access to individual properties.

The route importance for these service groups is shown in Table 7.5 together with that of the retail distribution.

TABLE 7.5—ROUTES OF IMPORTANCE TO LOCAL RETAIL DISTRIBUTORS AND SERVICERS

Routes to places of primary importance	Gunning to Dalton Dalton to Jerrawa, Blakney Ck, Bevendale, Narrawa Gunning to Lerida, Breadalbane, Collector Gunning to Biala Gunning to Gundaroo
Routes to places of secondary importance	Gunning to Yass Gunning to Goulburn Gunning to all properties
Routes to places of tertiary importance	Goulburn to Collector Goulburn to Rugby

Purchasers of goods and services

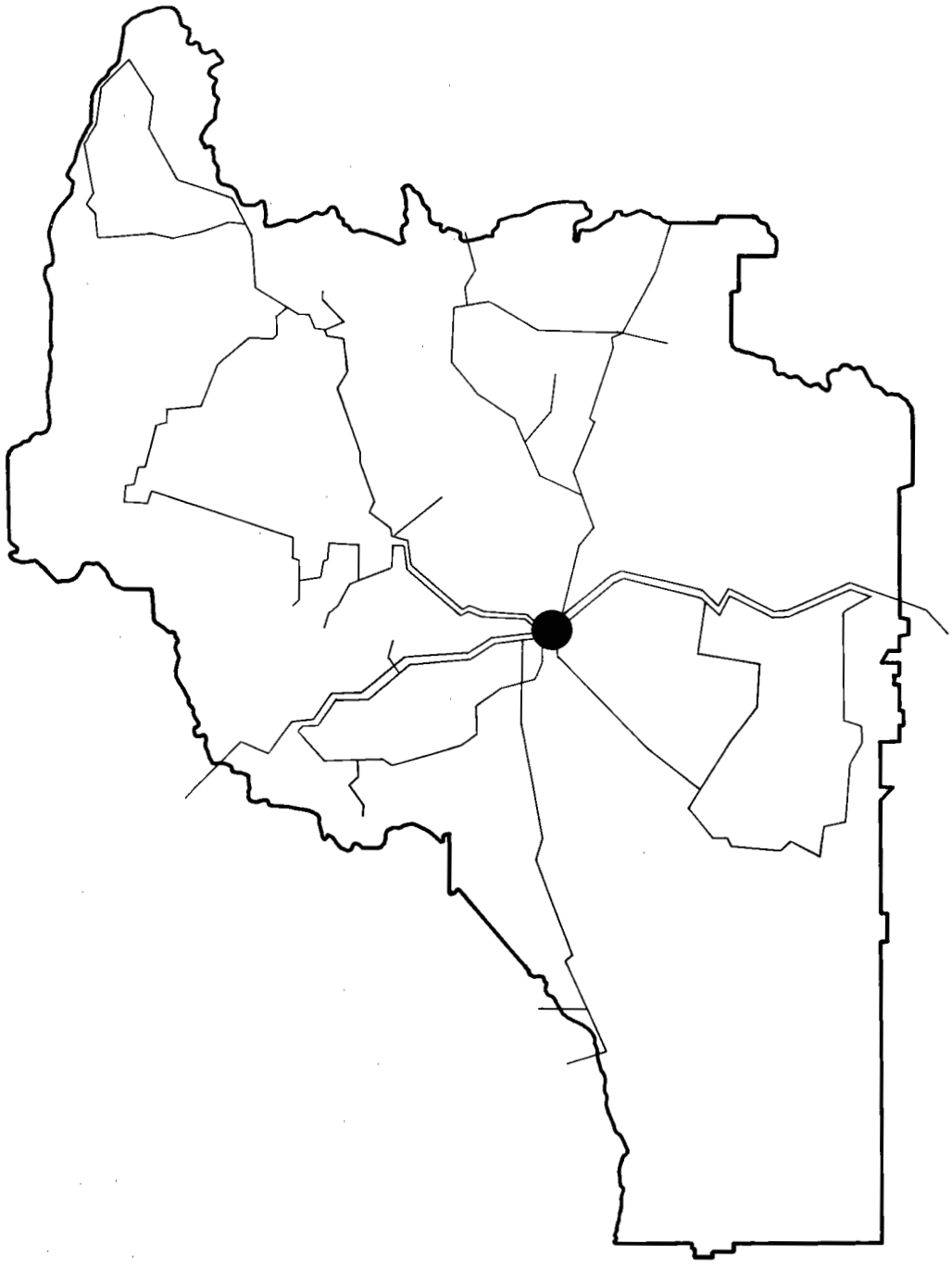
A large proportion of all local trips is made by residents acting more or less in a private, as distinct from commercial, capacity. The volume and importance of these trips justified detailed examination and a special survey was carried out. The results of that survey, which are given in Appendix X, show that the Shire residents use the same centre for obtaining services as they use for purchasing goods. For that reason, users travelling to obtain goods and those travelling to obtain services are taken together in this paper.

The pattern of this travel is illustrated in Figure 7.1, and is summarised in the route importance of Table 7.6. Note that these journeys originate at the user's residence.

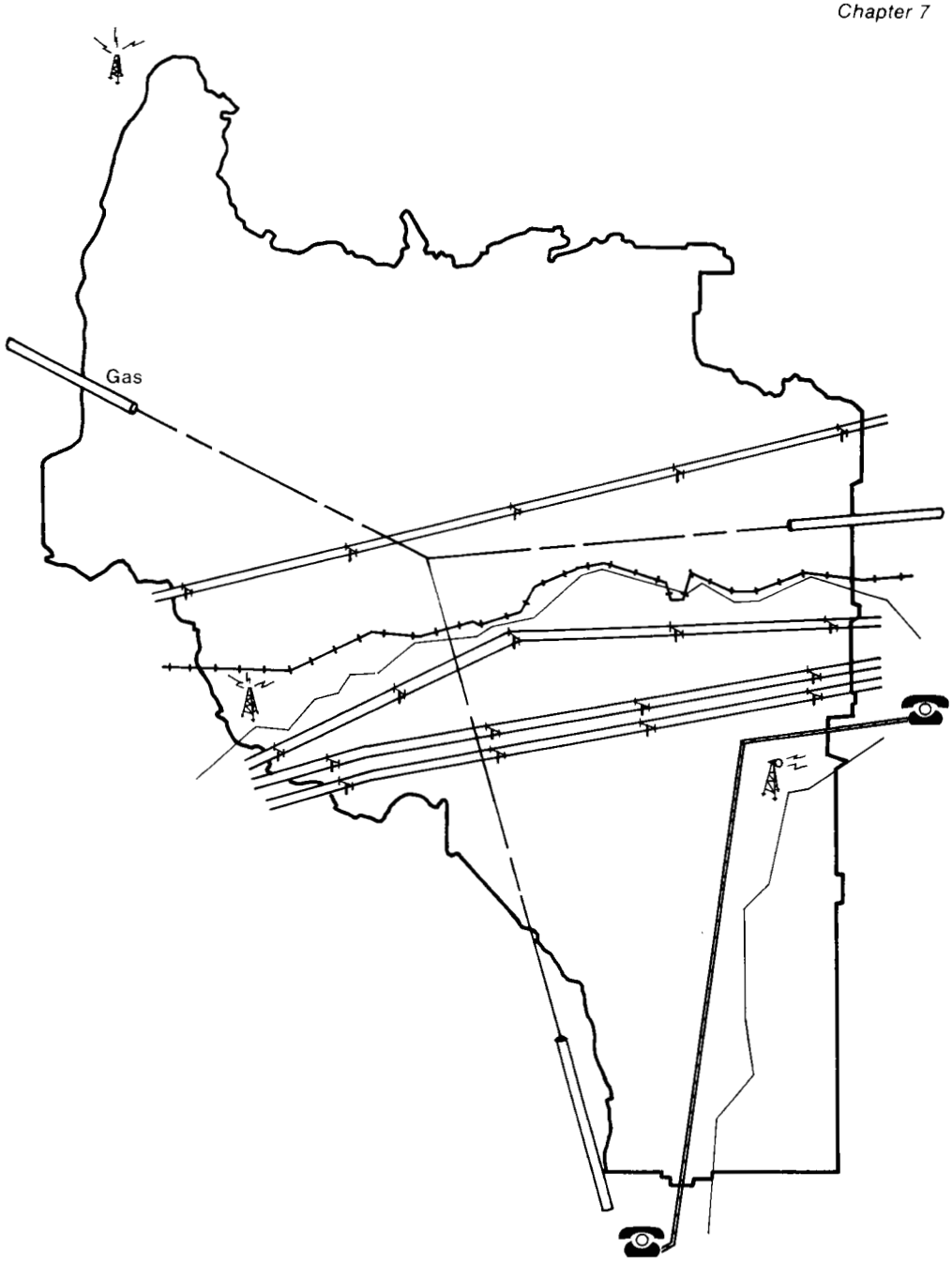
Travellers to workplace

The trips of school children were regarded by residents as the most important travel activity of the households surveyed. This reflects the frequency, value and immediacy (or designated arrival time) factors used to describe trip importance. The routes taken by school buses which transport some 65 per cent of the school children are shown on Map 7.5. Most of the remaining school children attend schools in the districts in which they live; of them, half do not use motor transport.

Some 75 per cent of employed persons in the Shire travel to work in the district in which they reside. Of them, about half use motor transport. The pattern of travel for those working outside their local district is shown in Figure 7.2.



Map 7.3. Mail distribution routes



Map 7.4. State and national facilities in Shire

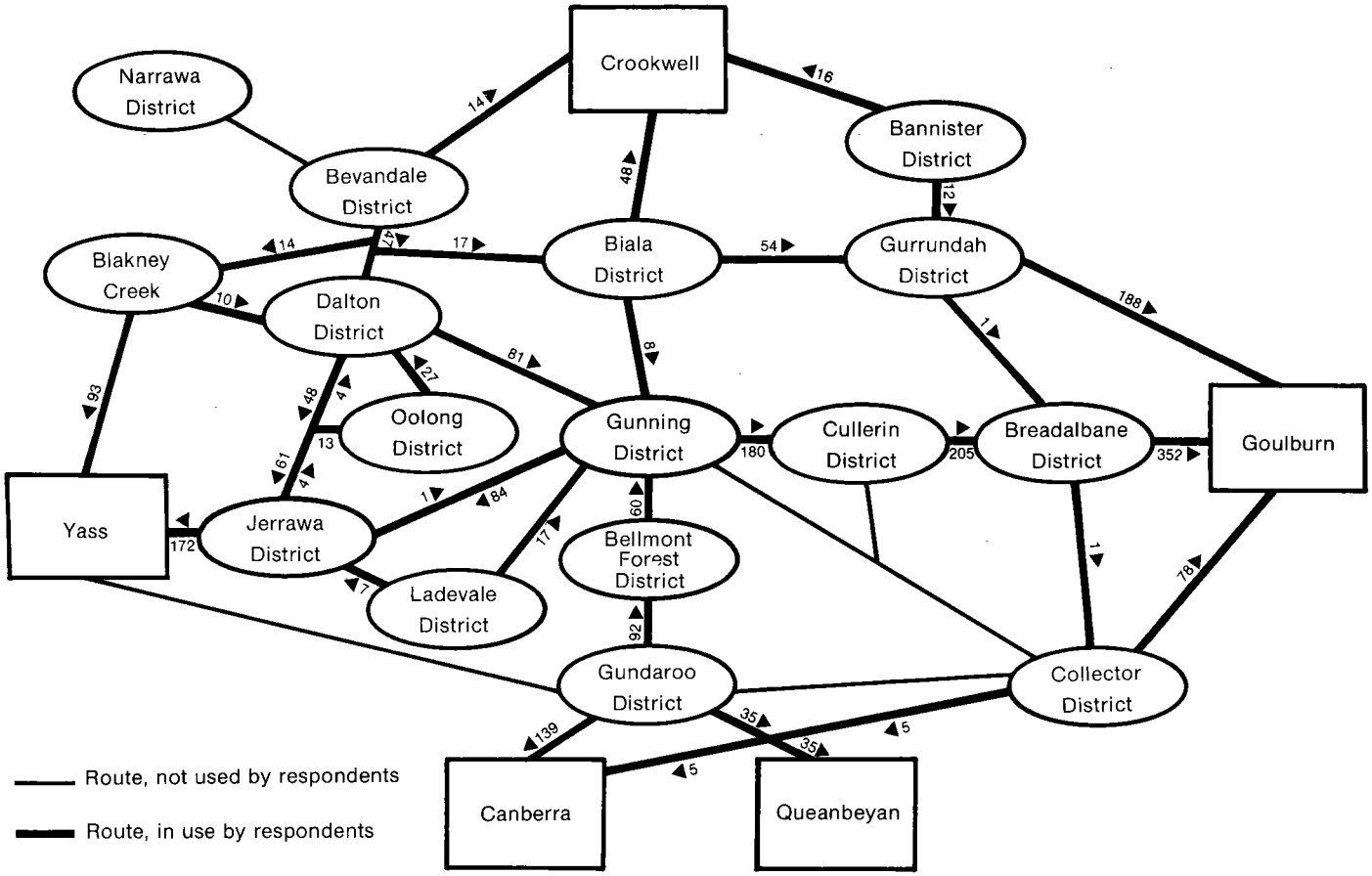


Figure 7.1. Travel by residents to shopping and medical services; trips per month in sample of 192 households

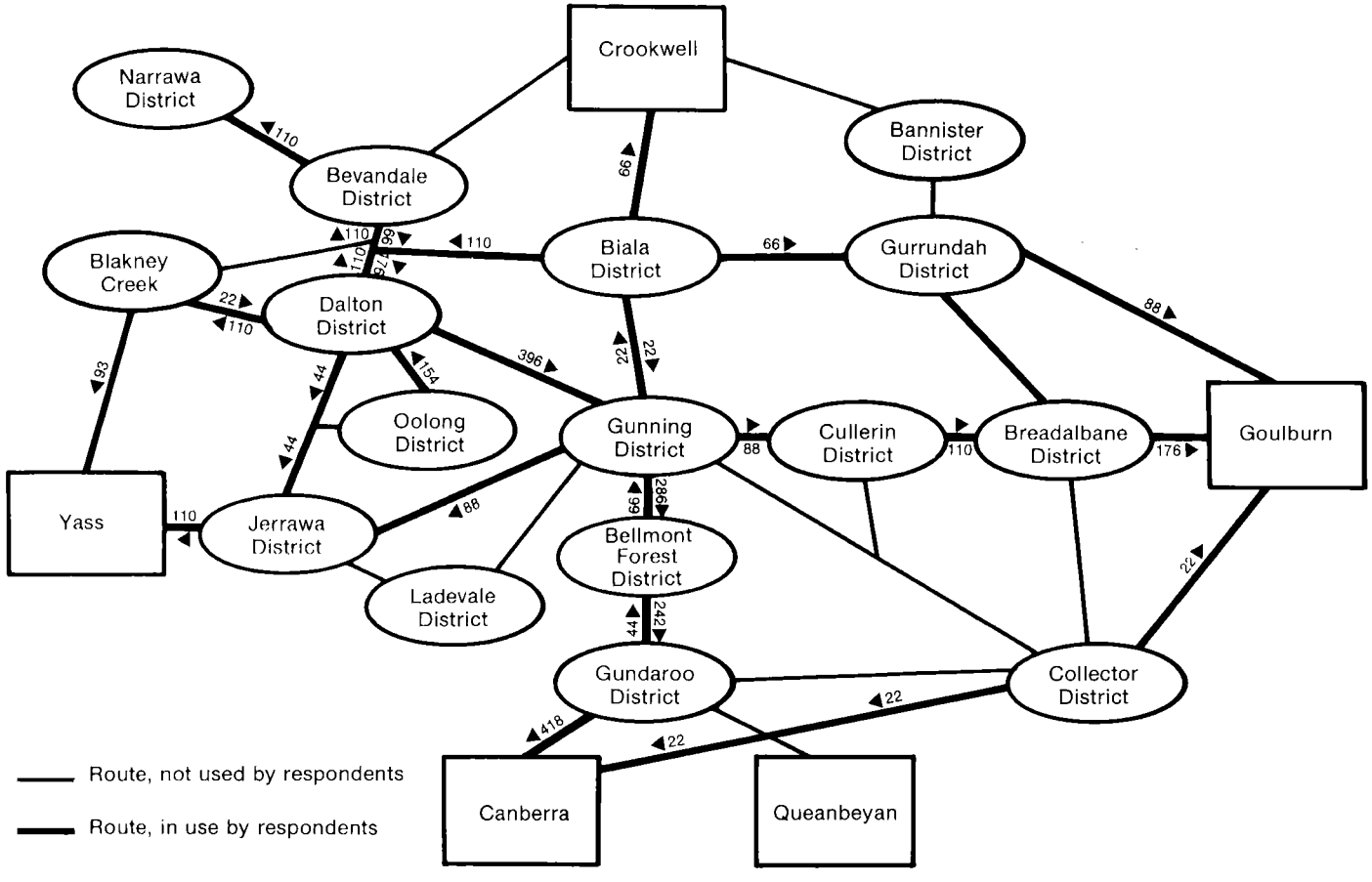
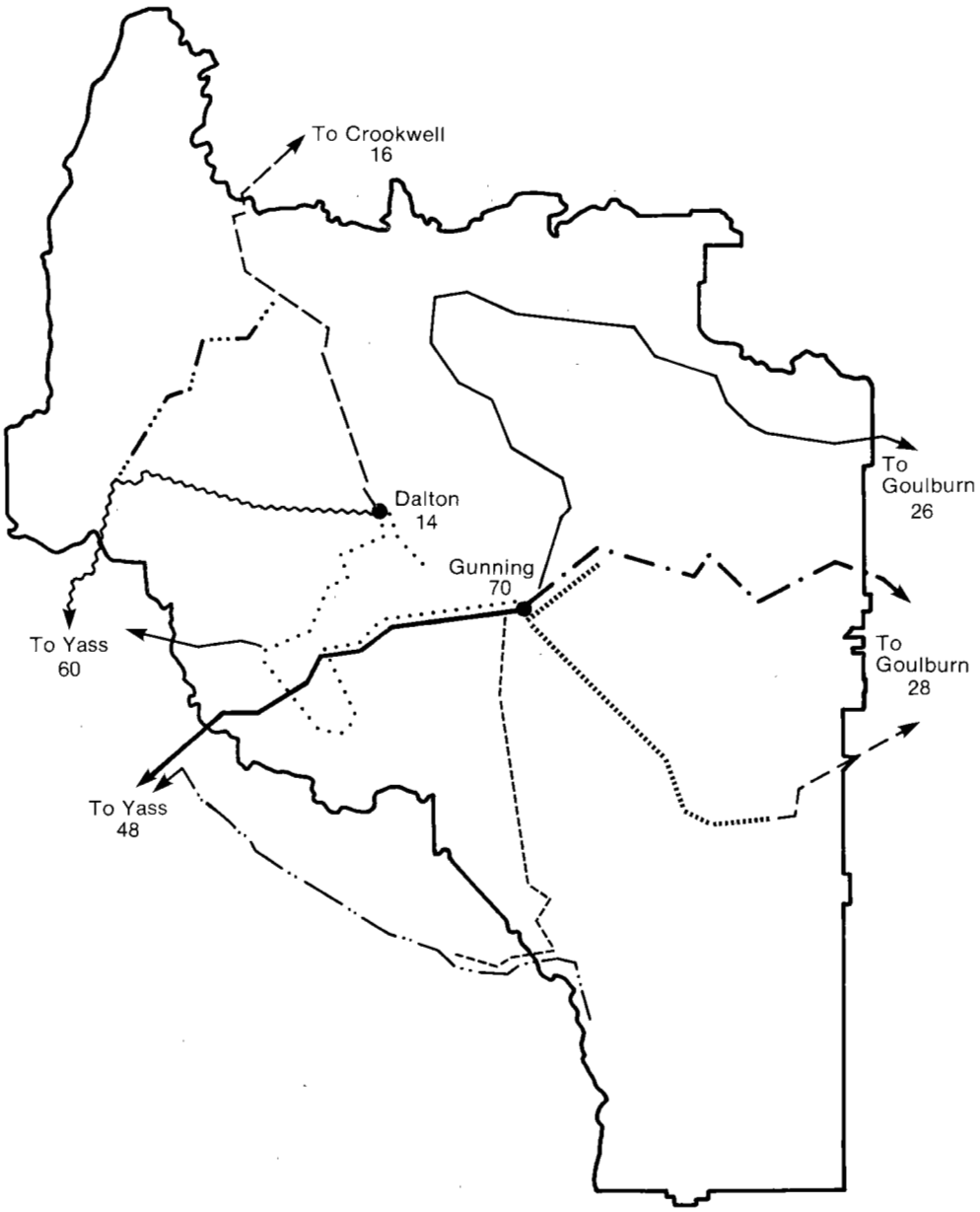


Figure 7.2. Travel by residents to work; trips per month in sample of 192 households



Figures represent number of pupils alighting at destination

Line styles differentiate between operators

Map 7.5. School bus routes.

TABLE 7.6—ROUTES OF IMPORTANCE TO LOCAL PURCHASERS OF GOODS AND SERVICES

Routes to places of primary importance	Gunning to Goulburn Gunning to Canberra, Queanbeyan Gurrundah to Goulburn Blakney Creek to Yass Gunning to Yass Dalton to Yass Collector to Goulburn Local residences to Gunning, Blakney Ck, Dalton, Collector
Routes to places of secondary importance	Biala to Gurrundah Biala to Crookwell Bevendale to Blakney Ck, Dalton, Biala Local residences to Bevendale, Biala
Routes to places of tertiary importance	Oolong to Dalton Bevendale to Crookwell Ladevale to Gunning

In addition to those travellers to the workplace, there is a significant but unmeasured amount of travel for the purpose of what might be termed business liaison—business management activities not falling into one of the other categories. The majority of this travel is between properties or holdings.
Table 7.7 sets out the route importance for travellers to the workplace.

TABLE 7.7—ROUTES OF IMPORTANCE TO LOCAL TRAVELLERS TO WORKPLACE

Routes to places of primary importance	Gunning to Canberra Dalton to Gunning Gunning to Goulburn Dalton to Bevendale Jerrawa to Yass Oolong to Dalton Local residences to Gunning, Dalton, Oolong
Routes to places of secondary importance	Bevendale to Crookwell Biala to Bevendale Dalton to Blakney Ck Bevendale to Narrawa Blakney Ck to Yass Gunning to Jerrawa Gurrundah to Goulburn Gunning to Collector Local residences to Biala, Bevendale, Gurrundah, Blakney Ck
Routes to places of tertiary importance	Biala to Gurrundah Biala to Crookwell Dalton to Jerrawa Breadalbane to Gurrundah Gunning to Gurrundah

Travellers to social and recreational activity

Appendix X details the travel of residents to social and recreational activity. Table 7.8 summarises the importance of routes to this user group.

TABLE 7.8—ROUTES OF IMPORTANCE TO SOCIAL AND RECREATIONAL TRAVELLERS

Routes to places of primary importance	Biala to Gunning Bevendale to Gunning Dalton to Gunning Oolong to Gunning Local residences to Biala, Bevendale, Dalton
Routes to places of secondary importance	Blakney Ck to Yass Gurrundah to Goulburn Local residences to Blakney Ck, Gurrundah
Routes to places of tertiary importance	Residence to residence

The full tabulation of route importance to users is too voluminous for thorough consideration in this paper. Some compression of this volume can be effected by replacing each route by the principal road available for that route providing it is recognised that only part of an existing road may be necessary to provide the route required. The information is restructured in that way in Table 7.9.

TABLE 7.9—SUMMARY OF ROAD IMPORTANCE TO USERS

User group	*Primary routes*	*Secondary routes*	*Tertiary routes*
Through users	Hume Highway Federal Highway	TR 52 Goulburn-Gurrundah Road	MR 241
Local users			
Produce carriers	Hume Highway most Local Access Roads all Shire roads	TR 52N northern Local Access Roads Bulley's Crossing Road Biala-Gurrundah Road	all other Shire roads
Bulk suppliers	Hume Highway TR 52S	MR 241 MR 251 Bulley's Crossing Road Biala-Gurrundah Road Federal Highway	Gurrundah-Goulburn Road Breadalbane-Gurrundah Road TR 52N
Retail distributors	Hume Highway TR 52, MR 283 MR 241, MR 251 Jerrawa Road Biala-Gurrundah Road	most Local Access Roads all Shire roads	Federal Highway
Purchasers of goods and services	Hume Highway TR 52 Federal Highway Jerrawa Road Blakney Ck Road Cooks Hill Road Wheo Road Gurrundah-Goulburn Road Local Access Roads and Minor Shire roads near Gunning, Dalton, Collector, Blakney Ck	Biala-Gurrundah Road Wheo Road Bulley's Crossing Road MR 241, MR 251 Blakney Ck Road Kiowarrah Road MR 283 northern end north western area Local Access Roads and Minor Shire Roads	Jerrawa Road Berrebanglo Road

TABLE 7.9—SUMMARY OF ROAD IMPORTANCE TO USERS (Cont)

User group	*Primary routes*	*Secondary routes*	*Tertiary routes*
Travellers to workplace	Hume Highway MR 241, MR 21 Jerrawa Road TR 25S Local Access Roads Minor Shire Roads Gunning, Dalton, Oolong Bellmount Forest, Gundaroo	Bulley's Crossing Road Blakney Ck Road MR 283 Gurrundah-Goulburn Road all northern Local Access Roads and Minor Shire Roads	Biala-Gurrundah Road Wheo Road TR 52N
Social and recreational travellers	TR 52N MR 251, MR 241 Jerrawa Road Biala-Gurrundah Road Local Access Roads and Minor Shire Roads Biala, Bevendale, Dalton	Blakney Ck Road Gurrundah-Goulburn Road Local Access Roads Blakney Ck Gurrundah	remaining Local Access Roads and Shire Roads

NOTE: TR = Trunk Road
MR = Main Road

CHAPTER 8—USER ASSESSMENT

The intention of this chapter is to set down the views of road users on the performance of Gunning Shire's road system and, thereby, to determine the immediate objectives of those users.

During the study, users demonstrated substantial commonality of opinion on the quality of the roads in the Shire. To avoid repetition their views will be reported not route by route and user by user, but under the heading of each of the basic general objectives established in Chapter 6—namely: cost and equity, route availability, driver stress, and travel time.

To illustrate user opinions and in an attempt to provide a basis for future inference, some numerical indicators are presented. The indicators have been chosen on their illustrative value, or on their suitability as a figure of merit for the Shire's road performance. They are not presented for the purpose of substantiating or justifying user views, nor as a basis for drawing conclusions on road performance adequacy.

COST AND EQUITY

Absolute level of expenditure

None of the users interviewed during the study said that money should be significantly diverted from roads to other community needs.

Users acknowledged that the satisfaction of their wishes for road works would require more expenditure. They were aware that government funds are not limitless, and were reluctant to make increased contributions to those funds. (In this connection, it is of interest that very few users were conscious of the Commonwealth Government's contribution to road funding.)

Appropriateness of expenditure

There was some disquiet, not so much about the cost efficiency of road work itself, but about the appropriateness of the work being done. Users were concerned, for example, about the balance of expenditure between bitumen and gravel pavements, between arterial and access roads, and between various arterial roads. However, there was no consistent view of what would be more appropriate, with one exception. This was the view of residents that locally raised revenue ought not to be spent on work which favoured, in the main, through users.

Equity

No user complained of inequitable treatment of Gunning vis a vis other shires, nor of one area in Gunning Shire compared with another. However, a number of users believed the road deficiencies they experienced were an inevitable consequence of living in a more remote part of the Shire. In particular, users depending on travel to Crookwell via Bevendale and from Narrawa believed they suffered from such a problem and from a division of responsibility for road works between two shires.

Indicators

The absolute level of expenditure on roads in Gunning Shire has been discussed in detail in Chapters 3 and 4. Tables 8.1 and 8.2 present the data that is thought most

relevant to the local user's concern. In Table 8.1 the estimator E for the appropriate apportionment of expenditure is a simple measure of road length and usage.

TABLE 8.1—COMPARISON OF ROAD SYSTEM USE AND FUNDING; GUNNING SHIRE, 1980 PRICES

Road system	*Proportion of total length*	*Proportion of vehicle kilometres travelled 1972*	*Proportion of vehicle hours 1972*	*Proportion of total expenditure*		
				actual		*estimator*
				1972-1979	*1979*	
	(L)	*(vkt)*	*(vht)*			*(E)*
National and State highways	0.12	0.85	0.81	0.59	0.67	0.59
Trunk and main roads	0.25	0.10	0.11	0.18	0.13	0.15
Local Shire roads	0.63	0.05	0.07	0.23	0.20	0.25

NOTE: E has been calculated by the expression:

$$E = \frac{L + vkt + vht}{3}$$

Source: Commonwealth Bureau of Roads and NAASRA (1972), Gunning Shire Accounts, Department of Main Roads NSW (1977, 1980).

The opinions of local road users about the appropriateness of expenditure accords more closely with the longer term expenditure balance shown in Table 8.1 than with the recent balance. That is local users thought that a little more money should be spent on local roads at the expense of national roads. It is interesting that a simple, estimator such as E should so closely correspond to traditional decisions by road funding authorities, and even more closely to the opinions of local users.

TABLE 8.2—DISTRIBUTION OF EXPENDITURE ON TRUNK; MAIN AND SHIRE ROADS, 1980 PRICES

(per cent)

Type of work[a]	*Approximate proportion of total expenditure 1972 to 1979*[b]
New construction	3
Reconstruction to bitumen pavement	20
Heavy gravel resheet or reseal	18
Light gravel resheet or reseal and routine maintenance	59

a. To NSW DMR definitions (see Chapter 4).
b. Direct expenditure, excluding bridges and ancilliaries.

Source: Gunning Shire Council Statements of Annual Accounts.

The distribution of expenditure on various types of roadwork is shown in Table 8.2. A pronounced bias towards maintaining, rather than improving, existing quality can be seen. Although this imbalance engenders discussion in the Shire, there is no consensus as to whether it is appropriate or not.

However, it is clear that the Shire Council considers that, within the limits of available funds, more cost effective enhancement of pavement can be achieved by gravel resheeting rather than sealing.

AVAILABILITY OF ROUTES

Roads exist to meet all the route requirements identified for local and through users. However, owing to closure, those roads are not always available to meet travel requirements.

Road closure

The principal cause of closure is wet weather which causes flooding and accentuates pavement damage by heavy vehicles. Roads that are particularly vulnerable are those with small amounts of gravel pavement material, those with clay sub-grade and those with multiple crests. These include the northern portions of MR 251 and TR 52N, many Shire Roads and more Local Access Roads. Appendix V provides amplifying detail. The sealed roads in the Shire are generally free from closure.

The Shire of Gunning is located in the Lachlan and Yass rivers catchment area, and the terrain is such that road flooding is generally of relatively short duration. For the same reason, however, flooding can occur quickly, cutting off return journeys.

School buses become bogged each winter in Gunning Shire resulting in lengthy service delays. Because of the considerable reliance placed on interconnecting services, and because of travel times of up to two hours and the absence of bus stop shelters, residents find such delays particularly inconvenient.

Stock carriers and carriers of bulk supplies such as seed and road making gravel are particularly troubled by road closure. Their vehicles are generally more suited to higher quality roads. Users spoke of sheep being off-loaded, being covered in mud or lost, and being too late for sales. One person described the irony of a large truck being forced to dump a complete load of road gravel to obtain traction. With this type of consequence, even the *threat* of closure is sufficient to deter some carriers from undertaking a trip.

Indicators

Table 8.3 summarises the rate of road closure in Gunning Shire determined by the 1969-74 Australian Road Survey. Note that the tabulated data relate to motor cars and that the closure rate is higher for trucks.

TABLE 8.3—PUBLIC ROADS SUBJECT TO CLOSURE TO MOTOR CARS

	Number of roads closed for:				
	1 or 2 days per year	*3 to 5 days per year*	*6 to 10 days per year*	*11 to 20 days per year*	*20 to 50 days per year*
Main Roads					
No detour available	—	1	—	—	—
Detour available	—	—	—	—	—
Shire Major or Special Roads					
No detour available	6	5	2	—	—
Detour available (av detour = 41km)	—	1	1	—	—
Shire Minor Roads					
No detour available	2	2	—	—	—
Detour available (av detour = 17km)	3	—	—	—	1
Shire Access Roads					
No detour available	5	4	5	—	5
Detour available (av detour = 11km)	1	2	—	—	1

Five of the roads tabulated are subject to closure at more than one location. Discussion with the Shire Engineer indicates that while work has been done to effect improvements in particular areas, the overall situation in 1980 is largely unchanged from that reported in 1972.

DRIVER STRESS

The most significant driver stress issue in the Shire's road system relates to the Hume Highway. Firstly, where this road passes over the Cullerin Range the general alignment, vertical and horizontal, is poor and the pavement is narrow, and there are narrow bridges with sharply curved approaches[1]. Overtaking is not possible through most of the section and this is important because of the steep grades encountered. Drivers experience difficulty passing oncoming trucks in several places. The drivers of heavy vehicles in particular experience difficulty on this section, and the accident rate is high. Through users rate this section as one of the two most difficult parts of the entire Hume Highway.

Secondly, the Hume Highway carries a large volume of traffic, much of it heavy vehicles, directly across the centre of the Shire at highway speeds. The highway constitutes the main street of Gunning. Local users must cross this traffic stream or join it for short distances. The resultant traffic mix is stressful for local users, especially where the highway is narrow and sight distances short. In particular, residents are concerned about school buses crossing or using the highway. Although many local users avoid the highway by travelling on the less direct local roads, *local* traffic on the highway between Jerrawa and Breadalbane is not less than 870 vehicles per day, rising to 2200 per day in Gunning township.

Many other roads in the Shire engender sufficient stress for users to comment. Much of MR 251 and TR 52N is regarded as difficult to drive on. This is because of a combination of bad alignment, poor surface condition and narrow formation width. Wet weather accentuates the difficulties. Some of the Major Shire Roads, many of the Minor Shire Roads and most of the Local Access Roads present similar difficulties. These difficulties are felt most by drivers of the heavier less manoeuvreable vehicles. School buses have been known to slide badly on their regular routes and stock carriers prefer to use vehicles at one half or two thirds of their maximum load carrying capability.

Indicators

The following data are presented as indicators of the road and traffic conditions that give rise to the reported level of driver stress.

Hume Highway traffic conflict

- AADT = 5100 (average of counting stations)
- proportion of heavy trucks = 30 per cent
- ratio of through to local traffic = 4:1
- proportion of local-user-designated routes crossing or using highway (from Chapter 7) = 38 per cent

Pavement condition

- A simple and available indicator for pavement condition on the gravel roads is the past rate of gravel resheet per unit of traffic volume. For the ten years to 1980, on Main and Trunk Roads in Gunning Shire, the value of this indicator was 1.25km of resheet per million vehicle kilometres of travel—a rate which has not provided pavements which satisfy user requirements.
- Another simple indicator is the percentage of sealed road in the Shire. Table 8.4 compares Gunning with other areas in Australia.

1. A better aligned replacement for one of those bridges will be completed early in 1981.

TABLE 8.4—PROPORTION OF LENGTH OF SEALED ROAD IN AUSTRALIA

(per cent)

	Rural Roads		All roads	
	Gunning Shire	NSW	Aust	Aust
Unsealed	63	73	79	75
Sealed	37	27	21	25
Total (km)	683	167 800	785 600	821 600

Source: Commonwealth Bureau of Roads and NAASRA (1972).

Gunning Shire's relatively high proportion of sealed road has not been sufficient to satisfy user requirements for the minimisation of driver stress. The study suggested that three factors contribute to this situation:

- a local terrain and climate which makes greater than average demands on pavements;
- some routes of primary importance to local users remain unsealed; and
- sealing is unable to offset the stressful influence of poor road geometry.

Because it is not pavement condition alone that creates the difficulties users described, but a combination of road geometry and pavement condition, more involved analysis seems justified. Appendix XI describes the results of two studies in which the Gunning road system was compared with two different nominal quality standards. Those results are summarised in Tables 8.5 and 8.6, and may be regarded as rough numerical proxies for the road quality which has led to the views expressed by road users in the Shire.

TABLE 8.5—WORK REQUIRED TO BRING SHIRE ROADS TO GUNNING COUNCIL ASSESSMENT STANDARD, 1979

Shire road-class	Reconstruction		Gravel resheeting	
	(km)	(per cent)	(km)	(per cent)
Shire Major and Special Roads	26	12	28	13
Shire Minor Roads	32	33	31	32
Shire Access Roads	26	29	27	30
Total	84		86	

TABLE 8.6—EXTENT OF ROAD NOT MEETING 1969-74 AUSTRALIAN ROAD SURVEY ASSESSMENT STANDARD.

Road	'Deficient length'	
	(km)	(per cent)
Hume Highway	47	97
Federal Highway	31	95
MR 241	29	73
MR 248	3	95
TR 52	44	76
MR 251	25	60
MR 283	21	85
Shire Roads	232	47

Table 8.6 does not address the nature of the deficiencies alleged to exist.

To give a better estimate of their significance Table 8.7 is presented.

TABLE 8.7—COST OF BRINGING NOMINALLY DEFICIENT SECTIONS OF GUNNING ROAD SYSTEM TO 1969-74 ARS DESIGN STANDARD, 1972 PRICES

	($ million)
State and National Highways	18.4
Main and Trunk Roads	4.4
Shire Roads	1.5

Because the road quality standards used in deriving Tables 8.5 to 8.7 were not based on agreed fundamental performance requirements, these results cannot be used legitimately as an absolute statement of needs. Indeed, one of the reasons for including here the results of two surveys is to illustrate the variability of this type of indicator with differences in assessment standards. The accuracy of the standards as expressions of real performance requirements might in fact be reasonably judged by comparing user views with the results in Tables 8.5 and 8.6.

Nevertheless, as with the other indicators presented in this chapter, this data remains useful as a basis for comparing Gunning with other shires; or for inferring, in part, from road survey data, the likely level of satisfaction of road users in other areas.

Accident rates

As a final indicator of driver stress in the Shire, the data from Appendix XII has been used to provide a digest of road accident experience. The general relevance of accident rates in this context was discussed in Chapter 6, and the indicators presented here are those thought most likely to represent the road users' perception of threat.

TABLE 8.8—ACCIDENT RATES IN GUNNING SHIRE, 1976-1979[a]

	Fatal accidents		*Non-fatal accidents*	
	per million VKT	*per million VHT*	*per million VKT*	*per million VHT*
National and State Highways	0.09	7.4	1.7	140
Main, Trunk and Shire Roads	0.00	0.0	1.6	101

a. Based on 1972 traffic volumes.

In the four years 1976-1979 there was one reportable accident in Gunning Shire every 2.4 days.

In the same period, casualty accidents in the Shire involving drivers resident in the Shire occurred at an annual rate of 0.007 per head of Shire population. The national casualty accident rate in that period was 0.019 per head of population per annum.

TRAVEL TIME

Users of the Gunning Shire road system demonstrated a marked indifference to travel time as an objective for roads. Very few through or local users objected to the duration of their trips. Those who did were concerned more that the particular goods or service they sought were long distances away. The contribution to the associated travel time made by road conditions seemed to be much less of a concern.

The travel of children to school by bus is an example of a similar nature. The duration of the trip is a consequence of the circuitous route rather than of the point to point times. Bus routing, and therefore travel time, is a matter of transport economics generally, rather than of road conditions particularly.

Travel times for residents were evaluated during the survey of households, and the ambivalence evident in the results presented in Appendix X corroborates the observations made here.

Users of the Gunning Shire road system are satisfied, for the time being, with the contribution now made by their roads to the reduction of travel times to places of primary importance, and not yet concerned over travel times to places of secondary importance.

Indicators

Travel times for specific activities of local users are shown in Appendix X. To provide a more broadly useful set of indicators, travel time contour maps were produced from 1972 ARS data spot-checked during the study. These are presented as Maps 8.1 and 8.2.

Internal travel

Map 8.1 shows the travel time from various points in the Shire to Gunning township via the quickest route. It has been used to derive the indicators in Table 8.9.

TABLE 8.9—GEOGRAPHIC DISTRIBUTION OF TRAVEL TIMES

Travel time to Gunning township	*Area of Shire with that travel time*[a]		*Approximate proportion of population with that travel time*
	(sq km)	*(per cent)*	*(per cent)*
Less than 10 min	213	10	36
10 min to 22 min	556	25	26
22 min to 30 min	697	28	20
greater than 30 min	823	37	19

a. 'Area of the Shire' excludes areas within a contour which fall outside the Shire boundary.

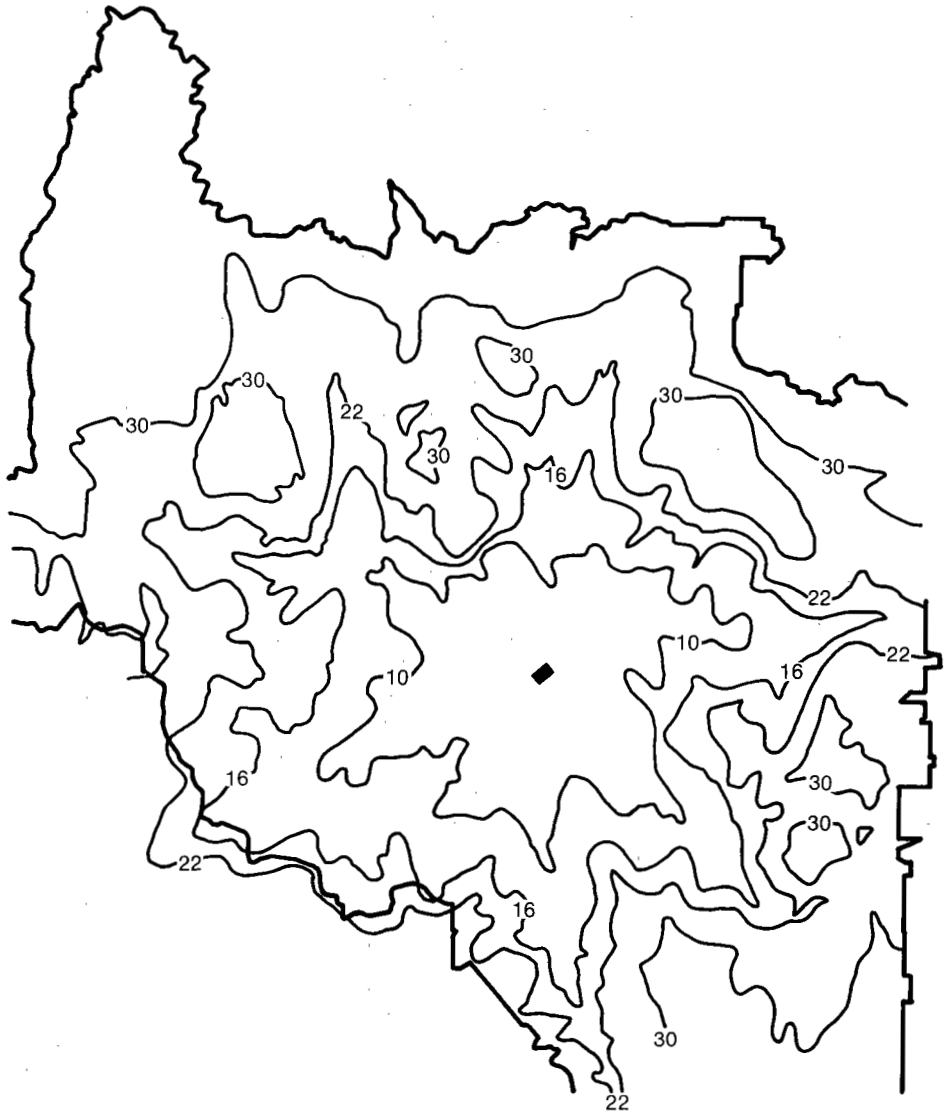
Map 8.2 shows the variation in travel time directness throughout the Shire. The contours join points for which the road travelling time is a particular fraction of the time to reach the point if travel radially from Gunning at 60km/h was possible. Drawing an analogy between route length and line of sight distance, this could be called travel time directness. Thus, for example, the time taken to reach any point on the 0.5 contour is twice the time taken if the journey had been made in a straight line at 60km/h. The higher the coefficient, the better the travel time directness.

The directness coefficient may also be regarded as denoting the average speed made good in the direction of the intended destination. For example, from a point on the 1.2 contour, the average speed made good toward Gunning is 1.2 x 60km/h, ie 72km/h.

This map was prepared by overlaying circles centered on Gunning Township on Map 8.1. The data in Table 8.10 has been derived from the map.

External travel

As a final indicator of travel time, as Appendix IX shows, the mean time taken for trips from residences to the nearest town large enough to provide medical and other professional services is 25 minutes for Gunning Shire.



Map 8.1. Travel time to Gunning township

Map 8.2. Travel time to Gunning township; directness coefficient

TABLE 8.10—GEOGRAPHIC DISTRIBUTION OF TRAVEL TIME DIRECTNESS

Travel time directness coefficient	*Proportion of Shire area with that coefficient (per cent)*	*Average speed equivalent of coefficient (km per hour)*
Better than 1.2	3	better than 72
1.0 to 1.2	10	60 to 72
0.8 to 1.0	32	48 to 60
0.6 to 0.8	42	36 to 60
Worse than 0.6	13	worse than 36

USERS' IMMEDIATE OBJECTIVES

If these views of users are now set against the hierarchy of objectives and the tabulation of route importance, the immediate objective of each user group may be estimated. In the presentation of immediate objectives in Table 8.11, two objectives are listed for most user groups. The second objective is presented either as an alternative if attainment of the first objective is impracticable, or because the relevance of the condition of all roads could not be completely defined in a study of this scope.

TABLE 8.11—USERS' IMMEDIATE OBJECTIVES

Through users	
produce carriers	reduction in closure rate: TR 52N
and bulk suppliers	reduction in driver stress: Hume, Cullerin Range
other through users	reduction in driver stress: Hume, Cullerin Range
	reduction in driver stress: TR 52N
Local users	
produce carriers	reduction in closure rate: TR 52N, MR 251 and all Shire Roads
	reduction driver stress: Hume, Cullerin Range
bulk suppliers	reduction in driver stress: Hume, Cullerin Range
	reduction closure rate: TR 52N and Bulley's Crossing Road
retail distributors and servicers	reduction closure rate: northern MR 251, Wheo Road, Bulley's Crossing Road
purchasers of goods and services	reduction of closure rate: Shire access and minor Roads, Jerrawa/Dalton, Bevandale/Biala areas, Biala to Crookwell route
	reduction of driver stress: Hume Highway, Cullerin Range, TR 52, MR 251, Shire minor Roads to Dalton, Bevandale, Biala
travellers to workplace	reduction in closure rate: Shire access and minor Roads, Jerrawa/Dalton/Oolong area
	reduction closure rate: all roads in Biala/Bevandale area
	reduction of driver stress: MR 251
social and recreational travellers	reduction in closure rate: Shire access and minor Roads, Biala/Bevandale area
	reduction of driver stress: MR 251, TR 52N

Having presented the results in Table 8.11, it is worth reiterating that they represent the immediate objectives of each user group as a whole and not necessarily those of all users in each group.

The substantial degree of commonality among the immediate objectives of all user groups is noteworthy and should facilitate the planning of future roadworks. Note especially that measures required to satisfy through users are likely also to serve important interests of local users—but not their highest priorities.

In particular, the user groups comprising perhaps the larger number of residents have first priority requirements substantially different from those of other users. The fact that funds to meet these two different sets of requirements appear to be drawn from different sources may subdue any resultant conflict in roadwork planning.

Determinants of performance

From a list of users' immediate objectives such as Table 8.11, it would be possible in a study concentrating on selected user groups to nominate all the physical characteristics of individual roads which are at present limiting performance. In the Gunning study this detailed degree of analysis was not possible owing to the large range of users being considered, nor was it justified considering the purpose of the study.

Table 8.11 illustrates the class of results that are available from a method of road performance analysis in which a systematic set of fundamental performance requirements are taken as a start point.

As a statement on the performance of roads in Gunning Shire, it indicates that either the most important or the second most important objective of the majority of road user groups in the Shire is not yet satisfied by the present road system.

Finally, while the chapter has presented a list of the highest priority requirements of road users in Gunning Shire, it does not suggest that the satisfaction of those requirements is necessarily justified. There are other users to be considered.

CHAPTER 9—CONCLUSIONS

The study reported in this paper was undertaken as part of a broader program of studies of the performance of the Australian road system. The main purpose of such a study of a relatively small area was to obtain insights as to how the road system is seen by users at the local community level and, at the same time, explore the extent to which such views may be regarded as having more general currency.

Physically and demographically the Shire of Gunning appears to be not atypical of rural local government areas in New South Wales. In 1978 some 54 per cent of its total expenditure was on roads which is in-line with other similar local government areas. Expenditure patterns have been relatively stable over the last 40 years, though a small drift is apparent from public works towards public services.

The basic methods for funding roads in the Shire from Commonwealth, State and local sources are complex. Further complexity arises from the inconsistency of Commonwealth and State classifications for a number of roads, the number of inter-government transfers involved and the accounting procedures used.

Over the period 1972 to 1980 Commonwealth funds disbursed to the Shire in the form of general purpose grants, annual road grants and special road allocations remained approximately constant in real terms, although there were distinct peaks in 1972, 1977 and 1979 and troughs in 1974 and 1976.

Commonwealth contributions to work on National Highways in the Shire rose rapidly in real terms from 1972 to 1975 and has remained roughly constant since that time.

Over the same period NSW funding by way of general purpose grants and reimbursement for work on Main and Trunk Roads within the Shire has remained roughly constant in real terms, with peaks in 1974 and 1978 and a trough in 1977.

Funds raised locally by the Shire (mainly by way of general purpose funds, but with some contribution from roadwork charges) has declined in real terms over the period from 1972 to 1980.

Actual expenditure on National Highways in the Shire over the period from 1972 to 1980 matched exactly the Commonwealth funds provided, but with a steadily increasing proportion going to construction (including reconstruction) as against maintenance.

Actual expenditure over the same period on Main and Trunk Roads has remained relatively constant in real terms. The split between maintenance and construction has also remained relatively constant at about 50 per cent to each.

Expenditures on Shire Roads fell in real terms from 1972 to 1977, but recovered to the original levels by 1980. In the first part of the decade expenditure was biased in the direction of maintenance, but, in the last two years, the pendulum has swung in favour of reconstruction.

Overall total expenditure on roads in Gunning Shire has remained relatively constant in real terms over the period 1972 to 1980.

In the course of the study it became clear that local residents are unfamiliar with the road classification system used as a basis for allocation of Commonwealth funding for roads. Nor were they aware of which constraints on use of funds were imposed by the Commonwealth and which by others. It is clear that the role of the Commonwealth in funding roads is not well understood at the local government area level.

With regard to the road system itself, it is clear that connectivity between centres is generally satisfactory, but that connections often lack directness as a result of the development history of the road system. The system predates general use of the motor car and it is clear that the present network of roads is not well matched to some present use patterns.

The major problems as perceived by the Shire Council are the maintenance of the many gravel roads and the closure of roads due to flooding or softening of the surface during rainy periods. Both of these problems are exacerbated by the growth in size of commercial vehicles.

Council planning for roadworks depends heavily on the Shire Engineer's assessment of existing deficiencies and the Shire Clerk's projections of funding limitations. No formal numerical analysis is undertaken, nor does it seem necessary given the degree of local knowledge and involvement—although some such analysis would be of assistance in conveying the basis of decision making to outside authorities—notably those providing funds. It does seem that the intended beneficiaries of roadworks should be more formally identified, and that the road characteristics required by those users should be more formally incorporated into the decision process.

Several planning difficulties were identified which parallel closely those encountered in other transport areas and in other levels of government. Single year budgeting (with associated uncertainties about funding) inhibit strategic planning, and differing aims of participating authorities complicate the process further. Constraints placed on the use of funds reduce flexibility or response to changes in the condition and use of the road system. Taken together these factors mean that the planning process is deficient both in terms of strategic aims and flexibility—a state of affairs which appears to arise directly from the current institutional arrangements.

From discussions with Council members and officers, local residents, and road users generally it is clear that all comment on condition, needs, priorities, etc is to be viewed within a broad framework of cost and equity considerations. All expressed needs are to be seen in the context of the ability of the community (both local and general) to pay for improvements, and in the context of what may be seen as 'fair treatment' for groups within the local community and between Gunning and other areas.

For the purposes of this study several distinct types of user objectives were identified. They were:

- availability of routes (which subsumes the more extreme cases of indirectness);
- driver stress (which incorporates road roughness, winding roads, surface condition, traffic and safety);
- travel time;
- vehicle costs; and
- environmental aspects.

Starting from these general objectives a hierarchy of objectives was established for road users in Gunning Shire. The hierarchy found was:

- availability of routes to places of primary importance;
- availability of routes to places of secondary importance;
- reduction of driver stress on routes to places of primary importance and availability of routes to places of tertiary importance;
- reduction of driver stress on routes to places of secondary importance;
- reduction of travel time on routes to places of primary importance;
- reduction of driver stress on routes to places of tertiary importance; and
- reduction of travel time on routes to places of secondary importance.

These objectives formed the basis for priorities in road improvements as perceived by road users in Gunning Shire. It was clear that until these objectives are satisfied any other developments are of minor importance.

Although the seven items listed above covered the immediate priorities of all road user groups in Gunning it was clear that different groups regarded different routes as being important and held different views on the quality of roads required on those routes. Thus the detailed assessment of road performance was undertaken on the basis of four main user groups:

- suppliers of goods and services (stock, grain, wool, petroleum, materials, food, fire, police, etc);
- purchasers of goods and services (householders, retailers, etc);
- travellers to workplace (employees, school children);
- travellers to social and recreational activities (tourists, sportsmen, churchgoers, etc).

In each case these groups were divided between local users (ie those with trips within Gunning Shire or which started or ended there) and through users (ie those who passed through Gunning Shire in the course of their trip).

As would be expected the routes found to be of primary importance to through users are those to Goulburn, Yass, Canberra, Queanbeyan and beyond. The routes of primary interest to local users are those from properties in the Shire to Goulburn or Yass. More specifically, through users were mainly concerned about the Hume and Federal Highways while all major links in the Shire proved to be of importance to some local user group.

It became clear during the course of the study that road users were particularly concerned about the number of road closures brought about by flooding or by the condition of road surfaces after rain. This problem loomed large in the minds of school bus operators, stock carriers and carriers of bulk supplies. A lack of hard data concerning road closure makes it difficult to place these concerns in a proper perspective, but the 1972 Australian Roads Survey indicated that some six major, five minor and six access roads were closed to motor cars for one or two days per year and three major roads were closed for six to ten days per year. Clearly such roads would be impassable to heavy vehicles for considerably more days per year. This rate of closure is regarded as unsatisfactory by road users to the extent that it is given top priority for rectification.

The Hume Highway is regarded as a major source of driver stress by users, but other roads in the Shire were not free from comment in this regard. Main Road 251 and Trunk Road 52N are both regarded as difficult to drive on, especially in wet weather, and rate high in any priority list for improvement.

By and large, residents were of the view that travel times on the Shire's roads were not a major concern so that improvements in travel time had a lower priority than the items mentioned above.

When considering the apportionment of funds to various parts of the road system, it is traditional practice to divide the system, for example, into Highways, Trunk and Main Roads, and Shire Roads. In discussing the appropriateness of this tradition with road users in Gunning, no clear concensus was expressed but there was a degree of disquiet on the subject, and they expressed a definite consensus about the allocation of funds to particular roads.

The approach taken in this study suggests that the traditional division of the road system for the allocation of funds may be inappropriate. The allocation process would seem to be more representative of user needs if it were to apportion funds among travel functions or routes directly, rather than indirectly to categories of roads as is usually done.

This paper has presented the views of the users of the Gunning Shire road system. It does not suggest which users ought to be favoured, nor does it decide whether the objectives of any users ought to be satisfied—irrespective of whether this were to be achieved by an increase in total road funding or by funding the objectives of one group of users at the expense of other users.

The suitability of current funding and of the resultant roadworks program must ultimately be assessed against stated policy objectives. The nature of those objectives is inevitably such that the adequacy of road performance remains in the end, a value judgment.

APPENDIX I—OVERVIEW AND PERSPECTIVE STATISTICS

SIZE AND SCALE

Area of rural authorities

Rural LGAs generally have large areas. As shown in Table I.1, the average area varies from 19145 square kilometres in Western Australia to 1613 square kilometres in South Australia. The area of individual authorities varies greatly, ranging from 4 square kilometres (Mullumbimby, NSW and Jamestown, SA) to 330000 square kilometres (Wiluna, WA). The area of Gunning Shire is 2199 square kilometres.

In the tables which follow, note that division of LGAs into rural and town categories is subject to definitional difficulties.

TABLE I.1—AVERAGE AREA OF LGAs, 1974-75

(square kilometres)

	NSW	*Vic*	*Qld*	*SA*	*WA*	*Tas*	*All States*
Rural	4 861	1 965	18 224	1 613	19 145	1 752	8 370
Town	2 437	667	6 143	409	31 535	905	5 422
City	159	97	671	72	185	150	145
Average	3 117	1 076	13 178	1 113	18 319	1 395	6 077

Source: Secretariat to the Joint Officers Committee 1980.

Population of rural LGAs

Rural LGAs have small populations. In 1975 the average population of rural LGAs was 2820, compared with 11 853 for town authorities and 56063 for city authorities. There is a wide variation in population from authority to authority. Populations of between 1000 and 2000 occur in 26 per cent of rural LGAs while five per cent of rural LGAs have populations of between one and 500 and five per cent have populations of over 7000. The average population for rural LGAs in each State varies from 3789 in Victoria to 1603 in Western Australia, as shown in Table I.2. The population of Gunning Shire is estimated to be 1950 persons (ABS 1980b).

TABLE I.2—AVERAGE POPULATION OF LGAs, 30 JUNE 1975

	NSW	*Vic*	*Qld*	*SA*	*WA*	*Tas*	*All States*
Rural	3 767	3 789	2 917	1 944	1 603	2 531	2 820
Town	12 768	9 257	17 625	7 550	8 552	12 560	11 853
City	78 909	48 773	159 207	32 678	32 922	46 283	56 063
Average	21 364	17 386	15 240	8 952	8 132	8 280	14 836

Source: Secretariat to the Joint Officers Committee 1980.

Density of population in rural LGAs

Rural LGAs have a low average population density (0.3 persons per square kilometre) compared with town authorities (2.2) and city authorities (386.6). Fifty-one per cent of rural LGAs have a population density of below one person per square kilometre. Between States the population density varies from 0.1 persons per square kilometre in Western Australia to 1.9 in Victoria as shown in Table I.3. The higher population densities in Victoria, South Australia and Tasmania reflect the smaller size of rural LGAs in these States and the closer settlement patterns in Victoria and Tasmania. The population density in Gunning Shire is approximately 0.9 persons per square kilometre.

TABLE I.3—AVERAGE POPULATION DENSITY OF LGAs, AT 30 JUNE 1975

(persons per square kilometre)

	NSW	*Vic*	*Qld*	*SA*	*WA*	*Tas*	*All States*
Rural	0.8	1.9	0.2	1.2	0.1	1.4	0.3
Town	5.2	13.8	2.9	18.5	0.3	13.9	2.2
City	496.3	502.8	237.3	453.9	178.0	308.6	386.6
Average	6.9	16.2	1.2	8.0	0.4	5.9	2.4

Source: Secretariat to the Joint Officers Committee 1980.

Crops and pastures

As a further indicator of size and scale, Table I.4 presents data on crops and pastures in Gunning Shire.

TABLE I.4—STATISTICS OF CROPS AND PASTURES, 1977-78

	Shire of Gunning	*Proportion of NSW total (per cent)*
Number of establishments	314	0.6
Area of establishments	175 239 ha	0.3
Total area of lucerne	454 ha	0.1
Total area of other sown pasture	78 880 ha	1.5
Wheat, area sown for grain	212 ha	—
Wheat, grain production	226 tonnes	—
Oats, area sown for grain	1 173 ha	0.4
Oats, grain production	1 037 tonnes	0.4
Hay production wheaten and oaten	692 tonnes	0.7
Hay production lucerne	659 tonnes	0.3
Hay production grass and pasture	594 tonnes	0.4

Source: Australian Bureau of Statistics 1979a.

CLIMATE

Tables I.5 and I.6 describe the climate in Gunning Shire.

SUMMARY OF POPULATION AND SOCIAL INDICATORS—GUNNING SHIRE 1976

Tables I.7 and I.8 describe the composition of the Shire's population and its dwellings. Tables I.9 and I.10 set out the educational level and occupations of the Shire's population. Population, age and personal income distributions are shown in Figure I.1.

TABLE I.5—AVERAGE MONTHLY RAINFALL

(millimetres)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Gunning	57	45	50	50	51	58	53	59	55	65	55	57	578m AMSL
Hollywood[a]	54	96	53	53	53	60	57	63	54	68	55	61	520m AMSL
Crookwell	57	45	50	50	51	58	53	59	55	65	55	57	888m AMSL

a. Hollywood is located at the foot of Narrawa Mountain — Lat. 34 24' S°
— Long. 109 06' E°
— 610m AMSL

TABLE I.6—TEMPERATURE

(Degrees Centigrade)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CROOKWELL												
Average Daily Max	26	26	23	19	14	11	10	11	14	18	21	24
Average Daily Min	11	12	9	5	2	1	0	1	2	5	7	9
GUNNING[a]												
Average Daily Max	28	28	25	21	16	13	10	13	16	20	23	26
Average Daily Min	13	14	11	7	4	3	2	3	4	7	9	13

a. Temperature records are not maintained by Bureau of Meteorology for stations in Gunning Shire. These statistics derived by application of 0.0065 kelvin/metre to Crookwell data.

Source: Department of Science and the Environment, Bureau of Meteorology.

The data was taken from the Australian Bureau of Statistics 1976 Census of Population and Housing Local Government Area Summary, ABS (1978b).

TABLE I.7—POPULATION COMPOSITION

NUMBER OF PERSONS USUALLY RESIDENT IN GUNNING SHIRE			
Year	1971	1975	1976
Persons	1 222	1 669	1 858[a]
IMMIGRANTS SINCE 1971			
Source	NSW	Other State	Overseas
Persons[b]	277	91	35
RACIAL ORIGIN			
Aboriginal, Torres Strait Islander			11
Australian born European			1 730
Other European			126
Other Asian			1

a. In 1976 there were 54 visitors and 10 persons with unstated usual residence.
b. Excluding 179 persons under 5 years of age.

TABLE I.8—DWELLINGS

Dwelling type	*Number of dwellings*	*Persons occupying*
Private occupied	594	1 889
Private unoccupied	138	0
On rural holding	not assessed	1 098
Non-private	6	33

TABLE 1.9—EDUCATION AND TRAINING

Qualification	*Persons qualified*
Doctorate, Masters Degree	3
Graduate Diploma	3
Bachelor Degree	20
Diploma	56
Technician Certificate	101
Trade Certificate	81

TABLE I.10—EMPLOYMENT/MAJOR USUAL ACTIVITY

Occupation	*Persons*
Professional, technical	61
Administration, executive	27
Clerical	74
Sales	27
Farm workers	457
Miner, quarry men	4
Transport, communications	31
Produce, process workers, labourers	108
Service, sport, recreation	59
Child at school	380
Adult student	68

Employer	*Employees*
Non-government	681
Australian Government	63
State Government	85
Local government	51
Self employed	308

Industry	*Persons engaged in industry*
Agriculture and agricultural services	459
Mining	4
Manufacturing	6
Construction	54
Wholesale and retail trade	72
Transport and storage	28
Communications	12
Finance	20
Public administration	83
Community services	68
Recreation, hotel, restaurant	28

TRANSPORT AND COMMUNICATIONS

Postal and telephone services

The distribution of telephone installations in the Shire is shown in Table I.11. There are post offices in each of the following villages.

Breadalbane	Gunning
Collector	Gundaroo
Cullerin	Dalton

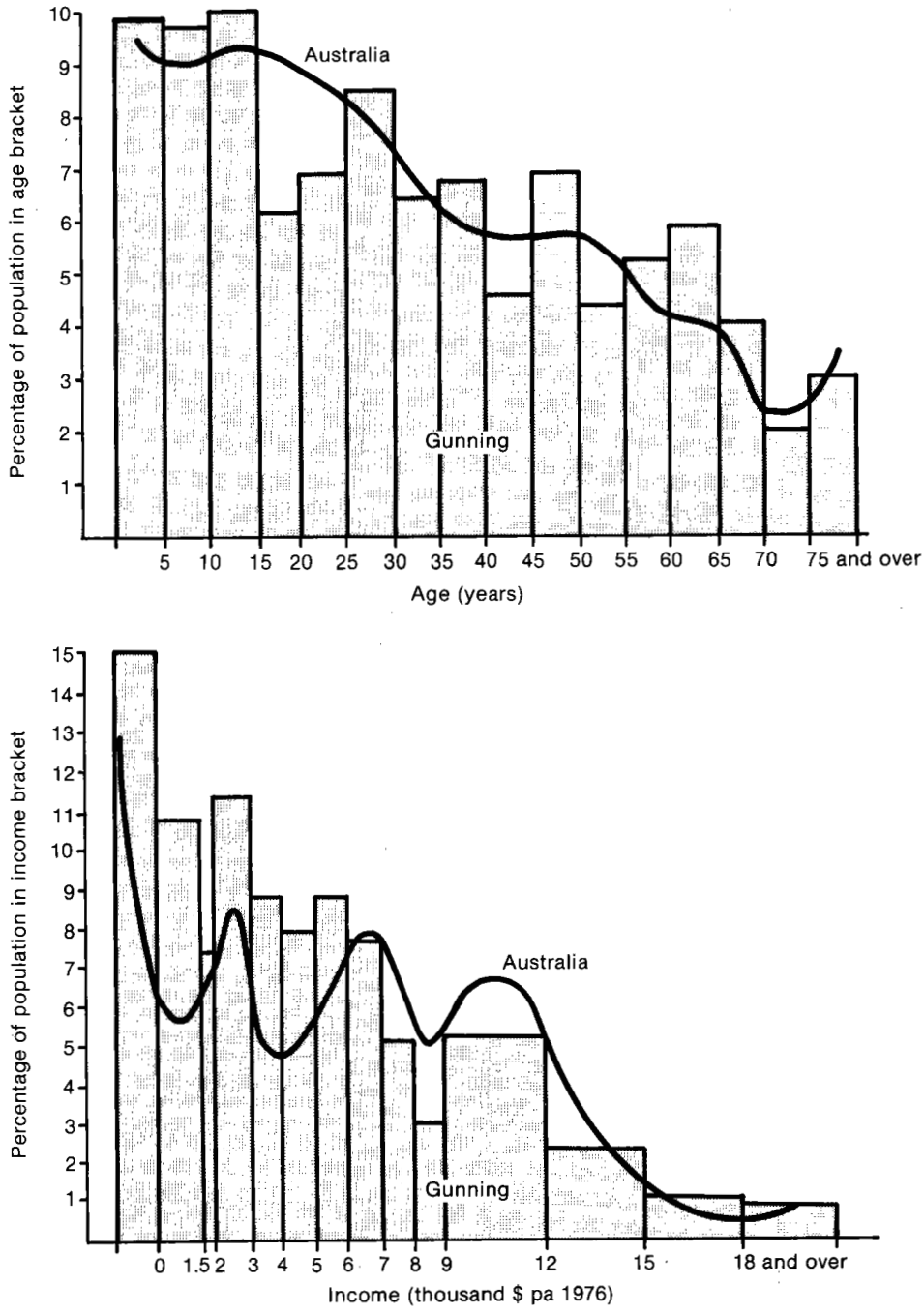


Figure I.1. Age and Income distributions, 1976

TABLE I.11—TELEPHONE SUBSCRIBERS

Exchange	*Subscribers*
Gunning	212
Dalton	68
Collector	55
Breadalbane	48
Biala	30
Bevendale	26
Gundaroo	80
Geary's Gap	78
Blakney Creek	63

NOTE: A few additional subscribers in the Shire are connected to exchanges at Sutton and Bannister beyond the Shire border.

Source: Customer Services Manager, Telecom Business Office, Goulburn.

Motor vehicle ownership

Table I.12 details the motor vehicle ownership in Gunning Shire.

TABLE I.12—GUNNING SHIRE MOTOR VEHICLE NUMBERS

Vehicle type	*Register at[a] 30 June 1980*
Motor cars	649
Motor lorries (excluding station wagons)	551
Motor cycles	94
Station wagons	139
Trailers (prime movers are included in car, lorry etc tally)	251
Tractors	34
Plant type vehicles	20
Omnibuses	8
Total all types	1 746

a. NSW Department of Motor Transport motor vehicle registrations for Postcode 2581 covering exclusively Gunning Shire.

Transport fuel sales in Gunning Shire, 1979-80

From discussions with fuel retailers and depots, the following fuel sales volume within the Shire was identified for 1979-80.

- Motor spirit 2 080 kilo litres
- Auto distillate 764 kilo litres
- Vehicle LPG 280 kilo litres

This volume includes:

- 500 kL of auto distillate supplied direct to Gunning transport contractors from depots outside the Shire;
- 250 kL of auto distillate and 500 kL of motor spirit supplied to primary producers' bulk storage; and
- fuel consumed by bus operators who are also fuel retailers.

It does not include fuel purchased outside Gunning Shire by individual residents.

Sales of motor spirit to Hume Highway traffic amounted to about 430 kilo litres.

Railway services

The timetable for passenger trains from Gunning is shown in Table I.13.

TABLE I.13—RAIL SERVICES; PASSENGER TRAINS STOPPING AT GUNNING

Day of week	*Time*			
	Northbound		*Southbound*	
Mon		1:31 pm	3:34 am	11:51 am
Tues	1:34 am	1:31 pm	3:34 am	11:51 am
Wed	1:34 am	1:31 pm	3:34 am	11:51 am
Thurs	1:34 am	1:31 pm	3:34 am	11:51 am
Fri	1:34 am	1:31 pm	3:34 am	11:51 am
Sat	1:34 am	1:31 pm	3:34 am	11:51 am
Sun	1:34 am			

Other passenger trains will stop at Gunning on request for interstate passengers only. These trains pass through Gunning daily at the following times:

Northbound	*Southbound*
4:37 am	12:18 am
5:55 pm	11:40 am

Note that a useful day trip to Goulburn or Yass by rail is not possible unless the passenger is prepared to leave Gunning before dawn.

APPENDIX II—GUNNING SHIRE FINANCES

Introduction

The Bureau was able to examine a set of the Shire of Gunning's 'statement of accounts' for the forty year period 1939 to 1978. These statements were prepared in a format specified under State Government legislation for the purposes of Shire accounting. Each statement provides for the year in question, in standard accounting style, a record of the Shire's income and its expenditures.

Separate accounts are prepared for the Shire's 'General Fund' and its water and sewerage operations and, in earlier years, its electricity supply operations. This Appendix outlines a number of aspects of Shire finances over the period under review. The accounts have been recast in order to identify each year's financial transactions—being defined as the monetary value of a transaction involving the exchange of services or assets. Total income and expenditure are taken as the totals from the Shire's general and utility accounts.

Format of 'Statement of Accounts'

The accounting return for the Shire consists of a number of Schedules and Statements which form the basis of the summary of the Shire's financial transactions for the year. The major items within each schedule and statement for Gunning Shire are as follows.

Schedule 1—General purpose expenditure
- salaries—clerical (office) staff
- election expenses
- office rent and cleaning
- maintenance and depreciation of office equipment
- printing and stationery
- postage and telephone
- subscription to local government association
- audit fees
- valuation fees

Schedule 2—Public works expenditure
- main roads and bridges (including wages)
- shire roads and bridges (including wages)
- contract work done
- salaries for engineering staff, overseer, storekeeper and other administrative expenses associated with public works expenditure

Schedule 3—Health administration (income and expenditure)
- sanitary (pan)
- garbage
- parks and gardens
- health inspectors salary
- rubbish depot (tip)

Schedule 4—Public service expenditure
- street lighting
- contribution to bush fire fighting fund
- public swimming pool
- library (headquartered at Goulburn)

- noxious weed control (including inspectors salary)
- public cemeteries
- public conveniences (separate from parks)
- registration of dogs
- stray cattle control

Schedule 5—Shire property (income and expenditure)
- town hall and shire offices
- other property—houses (5 houses—1978)
- plant (basically road making plant)

Schedule 6—Miscellaneous income and expenditure
- interest on loans (paid by Shire on loans—from banks and other financial institutions)
- superannuation contributions
- long service leave
- contribution to Southern Tablelands County Council
- donations to local institutions etc
- interest on investments
- profit on sale of assets

Schedule 7—General purpose sundry income
- government subsidy for pensioners rates
- subdivision and licence fees
- building permits
- sundry fees
- grants commissions (NSW and Commonwealth)

Schedule 8—Sundry public works income
- Commonwealth and State Government grants and reimbursements for roads work

Schedule 9—Contributions to works
- Contract work income

Schedule 10—Public services income
- street lighting
- contribution to bush fire fighting fund
- public swimming pool
- library (headquartered at Goulburn)
- noxious weed control (including inspector's salary)
- public cemeteries
- public conveniences (separate from parks)
- registration of dogs
- stray cattle control

Schedule 11—Rates and extra charges
- general rates
- sewerage and water rates

Schedule 12—Statement of outstanding rates and extra charges on overdue rates (general, water and sewerage rates)

Schedule 13—List of sundry debtors and creditors

Schedule 14—Statement of fixed assets
- shows depreciation, sale of assets, new purchase, book values of assets

Schedule 15—Return of expenditure of loan monies
- shows outstanding debt, repayed principal and expenditure from loans

Schedule 15a—Statement of reserves
- monetary reserves (money on fixed deposit)

Schedule 17—Statement of bank balances

Schedule 18—Statistical summary of loans current
- for all four funds
  - General
  - Gunning Water Supply
  - Dalton Water Supply
  - Gunning Sewerage Supply

Statement of trust funds

Statement of reconciliation of Government grants

Dalton water balance sheet

Gunning water balance sheet

Gunning sewerage balance sheet

Methodology

Shire income and expenditure was calculated from the various schedules which make up the complete statement of accounts, using the procedure set out in Table II.1. The various adjustments to the statement income or expenditure shown in Table II.1 were made in calculating both total and specific function income and expenditure.

TABLE II.1—GUNNING SHIRE COUNCIL FINANCIAL TRANSACTIONS; CALCULATION PROCEDURES

Income		*Expenditure*	
Total income equals		Total expenditure equals	
Statement income from:		Statement expenditure for:	
General purposes	(Schedule 7)	General purposes	(Schedule 1)
Rates and charges	(Schedule 11)		
Public works	(Schedule 8 & 9)	Public works	(Schedule 2)
Health services	(Schedule 3)	Health services	(Schedule 3)
Public services	(Schedule 10)	Public services	(Schedule 4)
Shire property	(Schedule 5)	Shire property	(Schedule 5)
Miscellaneous	(Schedule 6)	Miscellaneous	(Schedule 6)
Water	(Balance sheet)	Water	(Balance sheet)
Sewerage	(Balance sheet)	Sewerage	(Balance sheet)
Electricity	(Balance sheet)	Electricity	(Balance sheet)
plus:		plus:	
Income from sale of assets		Value of assets purchased	
Expenditure from loans		Loan repayments	
Repayment of loans made to Shire employees and ratepayers		Advances to Shire employees and ratepayers	
Plant rent		Rent of plant	
less:		less:	
Net income of plant rent[a]		Net expenditure on plant rent[a]	
		Depreciation[b]	

a. The 'Shire property' sub-account includes. as either income or expenditure, the net outcome of the rent of plant. This net result is deducted and the corresponding gross income and expenditure substituted.
b. Included as an expenditure item in the 'above the line' accounts but is not a cash flow.

The raw data was converted to dollars to give a 'current price' table. In order to examine real changes over the period a series of indexes was used to convert the current price values to constant 1978 prices. Unfortunately there is a limited number of indexes

which cover the 1939 to 1978 period. Five indexes have been used. These are:

- Australian Bureau of Statistics (ABS) Retail Price Index (ABS RP);
- road price index (BTE RD)—reported in BTE (1979) pp300-301;
- ABS—Australian National Accounts implicit price deflators,

  Final consumption expenditure—government sector (FCE GV)

  Gross fixed capital expenditure—private sector other than building and construction (GFCE O)

  Gross fixed capital expenditure—public sector (GFCE P).

TABLE II.2—PRICE INDICES USED IN APPENDIX II ANALYSIS

Year	*ABS RP*	*BTE RD*[a]	*FCE GV*	*GFCE O*	*GFCE P*
1978	100.0	100.0	100.0	100.0	100.0
1977	92.7	92.9	92.7	92.2	92.6
1976	82.5	84.4	83.5	81.8	81.7
1975	72.7	75.9	72.6	70.5	71.0
1974	63.2	63.6	58.4	55.7	57.5
1973	54.9	54.9	50.0	48.7	50.6
1972	50.1	51.5	45.1	45.6	47.4
1971	47.3	49.0	40.3	42.4	44.1
1970	44.6	46.6	36.4	39.8	41.8
1969	42.9	44.7	34.5	38.1	39.7
1968	41.7	42.8	32.7	36.3	38.4
1967	40.7	42.6	31.4	35.3	36.7
1966	39.4	41.5	29.8	34.4	35.2
1965	38.2	42.5	28.9	33.6	34.3
1964	36.8	42.7	27.5	32.7	33.0
1963	36.0	41.5	26.3	32.4	32.2
1962	35.8	41.3	25.9	32.2	31.9
1961	35.9	40.3	25.2	32.0	31.0
1960	35.0	37.5	24.2	31.6	30.2
1959	33.7	36.2	22.1	31.0	29.4
1958	33.1	35.5	22.1	30.6	29.0
1957	32.7	34.9	21.4	29.8	28.8
1956	31.9	33.0	20.6	28.3	27.9
1955	30.0	32.3	19.0	26.9	26.6
1954	29.4	31.3	18.0	26.6	25.7
1953	29.1	30.9	18.0	26.3	24.6
1952	26.5	27.4	15.8	24.1	22.2
1951	23.8	22.9	13.2	20.1	19.0
1950	20.0	20.3	10.9	17.0	16.6
1949	18.3	18.6	9.9	15.5	15.3
1948	16.6	17.0	8.9	14.1	13.8
1947	15.1	14.8	7.8	12.3	12.1
1946	14.5	14.2	7.5	11.8	11.6
1945	14.2	13.4	7.2	11.3	11.1
1944	14.2	14.2	7.5	11.8	11.6
1943	14.3	13.5	7.3	11.5	11.4
1942	13.8	12.4	6.8	10.8	10.7
1941	12.7	11.5	6.3	9.9	9.8
1940	12.1	11.1	6.0	9.5	9.4
1939	11.6	10.9	5.8	9.2	9.1

a. There are minor differences between the values of the BTE RD index used in this analysis and those subsequently published as BTE (1982a).

The national account deflators were available on a financial year basis from 1948-49. The roads index was also based on financial years. As the Shire's accounts are on a calendar year basis the financial year indexes were applied to calendar years as follows: 1977-78 applies to 1978, 1976-77 to 1977 etc. The retail price index used a calendar year scale. Finally, the 1939 to 1948 component of the national account series of indexes was approximated by applying the simple average of the annual changes exhibited by the roads and retail price indexes back from the 1948-49 national account values. The final results are set out in Table II.2.

Aggregate financial trends

Current price income and expenditure was examined and it was seen that between 1964 and 1978 only one 'deficit' was recorded (in 1974). It must be remembered that this refers to financial flows, and as such is not necessarily representative of the 'true' income and expenditure position of the Shire in economic resource terms. For instance it takes no account of the changes in value of assets over the year, non-monetary benefits from expenditure, etc.

Table II.3 provides average annual growth rates for the full period and for each decade commencing 1939. On this 'point to point' estimate of growth rates, both expenditure and income exhibited negative average annual growth rates for the 1939-48 and 1969-78 decades and positive rates for the two intervening decades. Between 1939 and 1978 the average annual growth rates for both income and expenditure showed positive growth in real terms. In real terms, both income and expenditure peaked during the early 1970s and has declined markedly since. The 1978 income total was some 34 per cent less, in real terms than the peak 1970 expenditure while the 1978 expenditure total was some 32 per cent less than the peak income year which was also 1970. However, care must be exercised in drawing too strong a conclusion from such figures, especially those of average annual growth rates which can be markedly influenced in magnitude by the start and finish years selected.

There is not a great deal of yearly variation in absolute terms between annual income and expenditure. However there is a marked fluctuation in both those aggregates over the period with two notable periods of rapid and sustained increases, the first from 1947 to 1955 and the second from 1964 to 1970. There were four notable isolated peaks in both aggregates 1940, 1955, 1962 and 1970. The first peak was related to the supply of electricity, the 1955 peak also related to electricity and to a lesser extent purchase of road plant, the 1962 peak was due to water supply expenditure and the 1970 peak

TABLE II.3—AVERAGE ANNUAL GROWTH RATES

(per cent)

Adjustment method	*Income 1939-78*	*Expenditure 1939-78*
Nil (current price)	8.74	8.66
Retail Price Index	3.04	2.97
Road Index	2.88	2.81
Current Expenditure Index	1.27	1.20
GFCE Other Index	2.45	2.37
GFCE Public Index	2.42	2.34
GFCE public adjusted growth rate by decade	*Income*	*Expenditure*
1939-48	-4.62	-4.86
1949-58	5.94	6.19
1959-68	4.96	4.48
1969-78	-2.83	-2.24
1939-78	2.42	2.34

related in the main to roads expenditure, although 1970 represented a general boom year for Shire finances.

Table II.4 sets out average annual growth rates from 1947 to 1955, 1964 to 1970, and 1970 to 1977. These periods encompass times of most rapid sustained increase and decrease in the financial aggregates.

Table II.4 shows that in real terms, both expenditure and income increased rapidly over the eight year period from 1947 to 1955 and both almost achieved rates of 30 per cent per annum in money terms. The second 'boom', the six year period from 1964 to 1970 exhibited real rates of increase only slightly less than those of the earlier boom. In money terms, the rates were much more modest, reflecting the economic stability which characterised the 1960s. Over the seven year period 1970 to 1977 real average annual growth rates for both income and expenditure were negative, in fact markedly negative with real expenditure in 1977 being roughly equivalent to that recorded in 1965. A similar result can be observed on the income side, with income in real terms in 1977 being equivalent to that of 1966. Both aggregates showed some recovery in 1978.

TABLE II.4—AVERAGE ANNUAL GROWTH RATES
(per cent)

Years	*Income growth*	*Expenditure growth*
Unadjusted (current prices)		
1948-1955	29.97	28.66
1964-1970	17.45	20.13
1970-1977	4.26	2.53
Adjusted by GFCE		
1947-1955	13.4	16.60
1964-1970	12.9	15.48
1970-1977	-6.94	-8.49

Functional financial trends

Whereas aggregate expenditure and income for the Shire exhibited a marked degree of instability the major component shares remained relatively constant.

On the income side, there appears to have been little overall change in the proportion from each broad category. On the expenditure side, the works share has declined while the share to public services has increased. These results are easier to discern in Table II.5 which provides 10 year aggregates.

As would be expected, there is greater variability at the disaggregated level, especially for the individual works items of roads, water sewerage and electricity. For the items which have existed in one form or another for the total period, only noxious weed expenditure exhibited a steady growth. On the income side there is too much between-year variability to identify sharp trends. However over the last decade the general rate's share of total income remained below that achieved in much of the earlier period. Road grants peaked around the late 1950s to early 1960s. The effect of the Commonwealth's personal income tax sharing arrangements for local government is reflected in the recently increased share of general purpose grants.

Sources of income

The Shire's income may be recast into a different form from that used in the functional analysis so as to identify both general and specific purpose grants, revenues, sales of assets and expenditure from loans. Tables II.6 and II.7 represent this data in two alternative forms for each of the four 10 year periods commencing 1939.

TABLE II.5—TEN YEAR AGGREGATES OF MAJOR INCOME AND EXPENDITURE ITEMS

Years	Works		Health		Public Service		Other		Total	
	($'000)	(per cent)	($'000)	(per cent)	($'000)	(per cent)	($'000)	(per cent)	($'000)	(per cent)
					INCOME					
1939-1948	1 383.2	43.2	117.4	3.7	3.1	0.1	1 701.9	53.1	3 205.6	100.0
1949-1958	3 117.9	48.1	178.3	2.8	67.0	1.0	3 113.8	48.1	6 477.0	100.0
1959-1968	3 860.0	40.2	271.5	2.8	291.2	3.0	5 175.2	53.9	9 597.9	100.0
1969-1978	5 867.6	42.1	284.0	2.0	695.2	5.0	7 097.9	50.9	13 944.6	100.0
					EXPENDITURE					
1939-1948	2 311.5	72.1	152.6	4.8	105.6	3.3	634.7	19.8	3 204.4	100.0
1949-1958	4 382.2	68.7	280.2	4.4	211.3	3.3	1 510.0	23.7	6 383.7	100.0
1959-1968	5 862.8	63.3	439.4	4.7	466.0	5.0	2 500.8	27.0	9 269.0	100.0
1969-1978	8 389.2	62.3	513.5	3.8	1 029.3	7.7	3 522.1	26.2	13 454.3	100.0

Table II.6 indicates that the grants share of total income has increased markedly in the last 20 years while that of revenue from goods and services provided, and from contributions towards goods and services provided has decreased. It should be noted that the charges and contributions total for some years will include a number of small grants; such as library services.

Table II.7 shows that there has been a general down trend in the share of income for general or untied purposes (including both untied grants and general rates) and that there has been a general increase in the share of specific revenue from charges, contributions and tied grants. The proportion of expenditure financed by loan has decreased notably from that of the 1940s and 1950s.

TABLE II.6—SOURCES OF INCOME, 1978 PRICES[a]

Years	Grants		Charges and contributions		Other		Total	
	($'000)	(per cent)	($'000)	(per cent)	($'000)	(per cent)	($'000)	(per cent)
1939 to 1948	843.4	26.3	1 992.2	62.2	370.0	11.5	3 205.7	100.0
1949 to 1958	1 827.2	28.2	3 402.4	52.5	1 247.6	19.3	6 477.5	100.0
1959 to 1968	3 747.4	39.0	5 228.2	54.5	622.2	6.5	9 598.2	100.0
1969 to 1978	5 756.1	41.3	7 207.1	51.7	981.1	7.0	13 944.6	100.0

a. Adjusted by GFCE Public.

TABLE II.7—CLASSIFICATION OF INCOME, 1978 PRICES[a]

Years	General revenue		Specific revenue		Loans		Other		Total	
	('000)	(per cent)	($'000)	(per cent)	($'000)	(per cent)	($'000)	(per cent)	($'000)	(per cent)
1939 to 1948	1 472.9	45.9	1 362.7	42.5	299.9	9.4	70.1	2.2	3 205.7	100.0
1949 to 1958	2 336.5	36.1	2 893.1	44.7	1 099.3	17.0	148.3	2.3	6 477.5	100.0
1959 to 1968	3 872.2	40.3	5 103.4	53.2	594.2	6.2	28.0	0.3	9 598.2	100.0
1969 to 1978	4 242.3	37.6	7 720.9	55.4	662.7	4.8	318.4	2.3	13 944.6	100.0

a. Adjusted by GFCE Public.

APPENDIX III—COUNCIL SUBMISSION TO THE COMMONWEALTH BUREAU OF ROADS, 1975

The following is a summary of the main issues raised by representatives of the Gunning Shire Council during oral hearings before the Bureau of Roads in Sydney on 30 April 1975.

The Gunning Shire Council stressed the combined effects of reduction in rural road grants and inflation on its road improvement and maintenance program. It takes pride in the road system it was building for the community under previous assistance conditions, it is concerned that progress will be seriously retarded and also that the current road assets are in serious danger of being lost through forced reduction in maintenance or the lowering of construction standards.

Council is also concerned that current conditions have led to losses in a first class road construction team and may lead to unemployment in the Shire with obvious consequences to its economy. Council stresses that while it accepts the need to upgrade the National Roads system this should not be achieved at the expense of the supporting road systems. It argues that the belief that rural roads serve only country people is fallacious as the urban population is largely dependent on the rural road systems. The Council added that inadequate rural road systems add to the cost of primry produce to the community at large.

Council also stressed problems in providing and maintaining roads which form school bus routes. The rationalisation of the schooling system has necessitated more routes and larger vehicles, thus making travel more hazardous and loss of school time greater. It pleaded, therefore, for some special consideration to be given to the matter of finance for these roads.

Commenting on a submission from the Bevandale Progress Association for financial assistance to the Gunning Shire to construct a bridge over the Lachlan River connecting with the Crookwell Shire, Council explained that the road is a local rural road; is a school bus route; and is closed for up to three months every year because of flooding. Accordingly, there is a strong case for a new bridge but Council is unable to finance construction without special assistance from the State and/or Australian Government.

Council added that when this road is closed the local community and school buses are forced to take a 28 mile detour over treacherous and dangerous roads.

Finally, Council referred to the effects of their proximity to Canberra. Because of this proximity it was forced to provide connecting roads which served not only the tourist industry but also residents of Gunning who commute daily to work places in Canberra. (Twenty-five per cent of the ratepayers in Gunning work in the ACT.) This placed a burden on the Gunning Shire which most other Shires did not have to bear, but the somewhat unique position of Gunning was not recognised in the distribution of grants.

APPENDIX IV—CLASSIFICATION OF RURAL ROADS

COMMONWEALTH CLASSIFICATION

A National Highway is the principal road linking two or more capital cities.

Arterial Roads are those declared as such by the Minister for Transport.

Local Roads are those roads that are classified neither as Arterial Roads or as National Roads.

STATE CLASSIFICATION

State Highways are the principal means of road communication throughout the State, in many cases connecting with similar roads in other States. The State Commissioner of Main Roads is directly responsible for State Highways and meets the full cost of road and bridge works on them.

Trunk Roads are the secondary avenues of road communication which connect with the State Highways to link the main regions of the State. Trunk Roads are the responsibility of the councils through whose areas they pass and grants are made by the State Commissioner of Main Roads to the councils to meet the full cost of approved works on these roads.

Main Roads mainly join towns and important centres of population with each other, and, in conjunction with State Highways and Trunk Roads, effectively link all districts in the State to the overall road network. In the country areas, Main Roads maintenance is undertaken by the councils through whose areas they pass and grants are made by the State Commissioner of Main Roads to the councils to meet the full cost of approved works on these roads.

SHIRE CLASSIFICATION

Shire Classification applies to roads not declared under a State Classification.

Major Shire Roads—those that form the nucleus of the Shire Road network—are through roads and serve the largest number of ratepayers as well as the general public.

Special Roads—these are roads that would normally be of a lower category but because of a special use eg school bus route, bushfire link, garbage depot, gravel pit access, cemetery etc become more important.

Minor Shire Roads—these serve a more limited number of persons and provide links to major roads and main roads systems.

Local Access Roads—these are the spur roads which provide access to only one or two houses, property access only etc.

NATIONAL ASSOCIATION OF AUSTRALIAN STATE ROAD AUTHORITIES FUNCTIONAL CLASSIFICATION

Functional Class 1—those roads which form the principal avenue for communications between major regions of Australia including direct connection between capital cities.

Functional Class 2—those roads, not being Class 1, whose main function is to form the principal avenue of communications for movements:

- between a capital city and adjoining States and their capital cities

- between a capital city and key towns; and
- between key towns.

Functional Class 3—those roads, not being Class 1, or 2, whose main function is to form an avenue of communication for movements:

- between important centres and the Class 1 and Class 2 roads and key towns;
- between important centres; and
- of an arterial nature within a town in a rural area.

Functional Class 4—those roads, not being Class 1, 2 or 3 whose main function is to provide access to abutting property (including property within a town in a rural area).

In Gunning Shire all of the Major Shire Roads, Special Shire Roads, and Shire Access Roads fall within NAASRA Functional Class 4. Of the Main and Trunk Roads, 127 kilometres are Functional Class 2 or 3, and 42 kilometres Functional Class 4. Most of the Functional Class 3 and Class 4 road is gravel surfaced.

APPENDIX V—ROAD PHYSICAL CONDITION

MAIN AND TRUNK ROAD CONDITION AND TRENDS

Data for the following description of the condition of Main and Trunk Roads in Gunning Shire at 28 August 1980 was provided by the Shire Council. Road locations are shown on Figure V.1 together with approximate AADT.

Trunk Road 52 South

Gunning to Gundaroo 28 km bitumen, 8 km gravel. The gravelled length of this road is in reasonable condition. It becomes very raw and rough but is generally an all weather pavement. The road is the subject of a reconstruction programme converting the gravel pavement to bitumen at about 1 km per year. Gravel patching will suffice to hold the unsealed pavement for the next five to seven years.

Trunk Road 52 North

Gunning to Crookwell Shire 28 km gravel. The gravel pavement on this road is generally very poor owing to a lack of good natural gravel within reasonable distance of the road, the soft red clay of the road foundation, and the inadequate drainage. The road is important to the Shire and carried more traffic than any gravel Main Road in the Shire.

About 5 km of Trunk Road 52 North has been gravel resheeted in each of the past five years. Heavy vehicles, especially those associated with this resheeting, contribute significantly to the deterioration of this road. The resulting considerable expense on gravel patching could be markedly reduced by quickly resheeting this road entirely before resuming a routine 5 km/year resheet programme.

Trunk Road 52 North is not planned for reconstruction in bitumen before 1990.

Main Road 241

Gunning to Boorowa Shire 13 km bitumen, 28 km gravel.

This road is the best gravel pavement Main Road in the Shire and is generally in good condition. Gravel resheeting at 5 km/year is necessary to maintain this condition.

Main Road 248

Main Road 248 links the north of Gunning Shire with Boorowa and Goulburn. Only 3 km of the road lies within Gunning Shire. 2 km of which is gravel. The gravel length is in steep country and becomes raw but is generally an all-weather pavement.

Main Road 251

Dalton to Bevandale and Crookwell Shire 3 km bitumen, 40 km gravel. Between Dalton and Bevandale the length of gravel road has short sections that are narrow, lengths that fail especially in wet weather, and lengths of solid but very rough road over ridges. North of Bevandale, Main Road 251 is very narrow with a poor pavement. The route followed by MR 251 is important to the Shire but funds have permitted only 5 km of the road to be resheeted since 1974. This road is rated as Functional Class 4 in contrast to the other Main Roads in the Shire which are rated Functional Class 3.

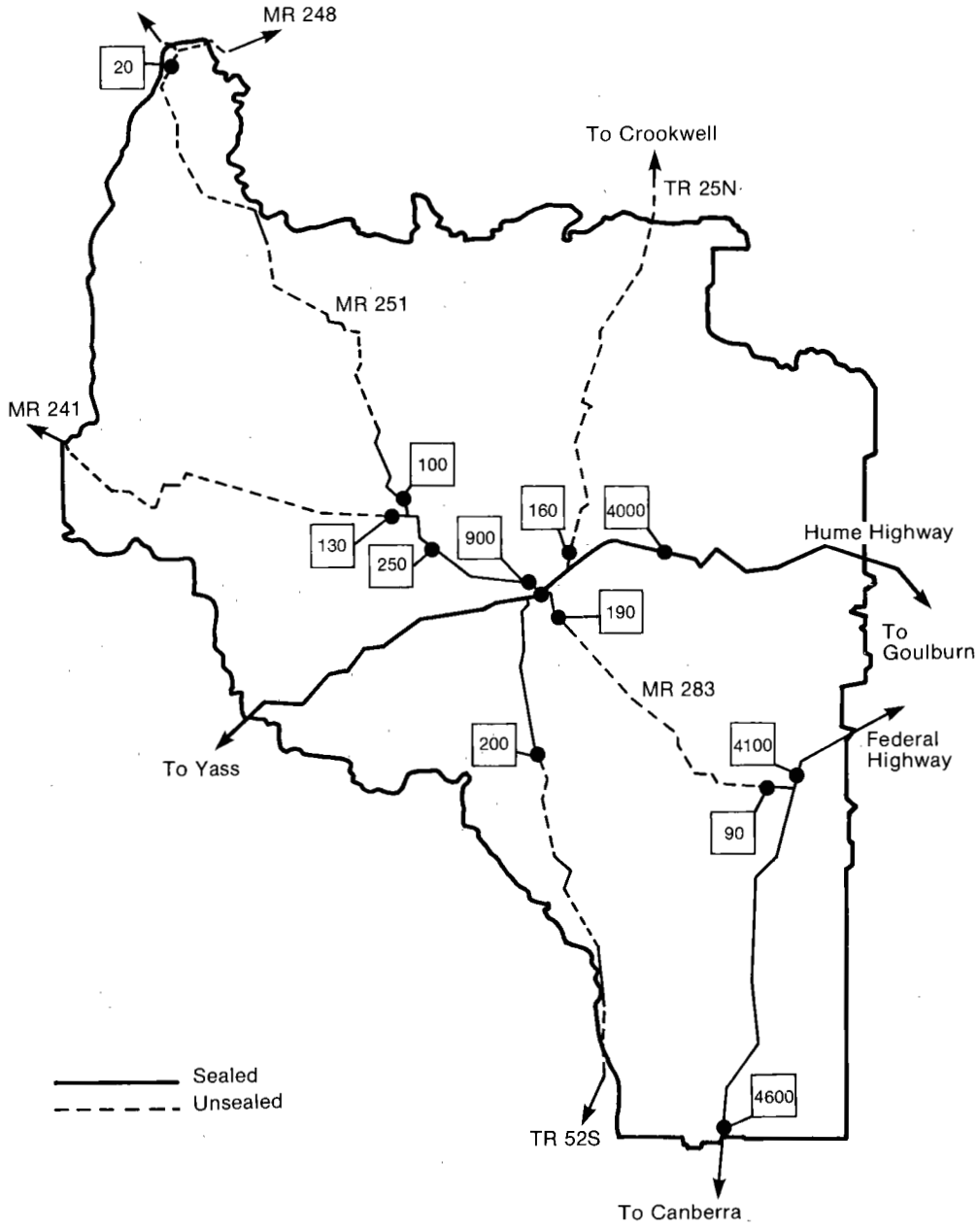


Figure V.1. Highways, Main and Trunk Roads, location and approximate AADT

Main Road 283

The pavement of this road is generally in reasonable condition but some sections are poor, particularly in wet weather. Less than 4 km of the road has been resheeted since 1973.

TYPICAL TROUBLE SPOTS IN GUNNING SHIRE ROAD SYSTEM

The following sections of road persistently create traffic and maintenance problems. Their locations are shown on Map V.2

1. *Trunk Road 52 N*
   28 km of gravel pavement with very weak road base and bad vertical and horizontal alignment.
2. *Felled Timber Road*
   flooding in most years, road relocation and two major waterway structures required.
3. *Bulleys Crossing Road*
   1.5 km very narrow and winding, reconstruction required.
4. *Broadway—Jerrawa Road*
   7.5 km very narrow with poor vertical and horizontal alignment and no effective road base, four concrete causeways and reconstruction required.
5. *Sheldrick's Lane*
   3.7 km of narrow road over swampy ground, reconstruction required.
6. *Marked Tree Rd*
   16.6 km with extremely tight corners and sharp crests, reconstruction required.
7. *Dalton—Jerrawa Rd*
   3.6 km of sharp corners and crests, widening required.
8. *McLean's Lane*
   2.8 km along floodplain requires building up and major waterway structures.
9. *Leary's Lane*
   Dangerous bend to be rectified.
10. *Main Road 251*
    Very poor pavement in many sections, with bad vertical and horizontal alignment.

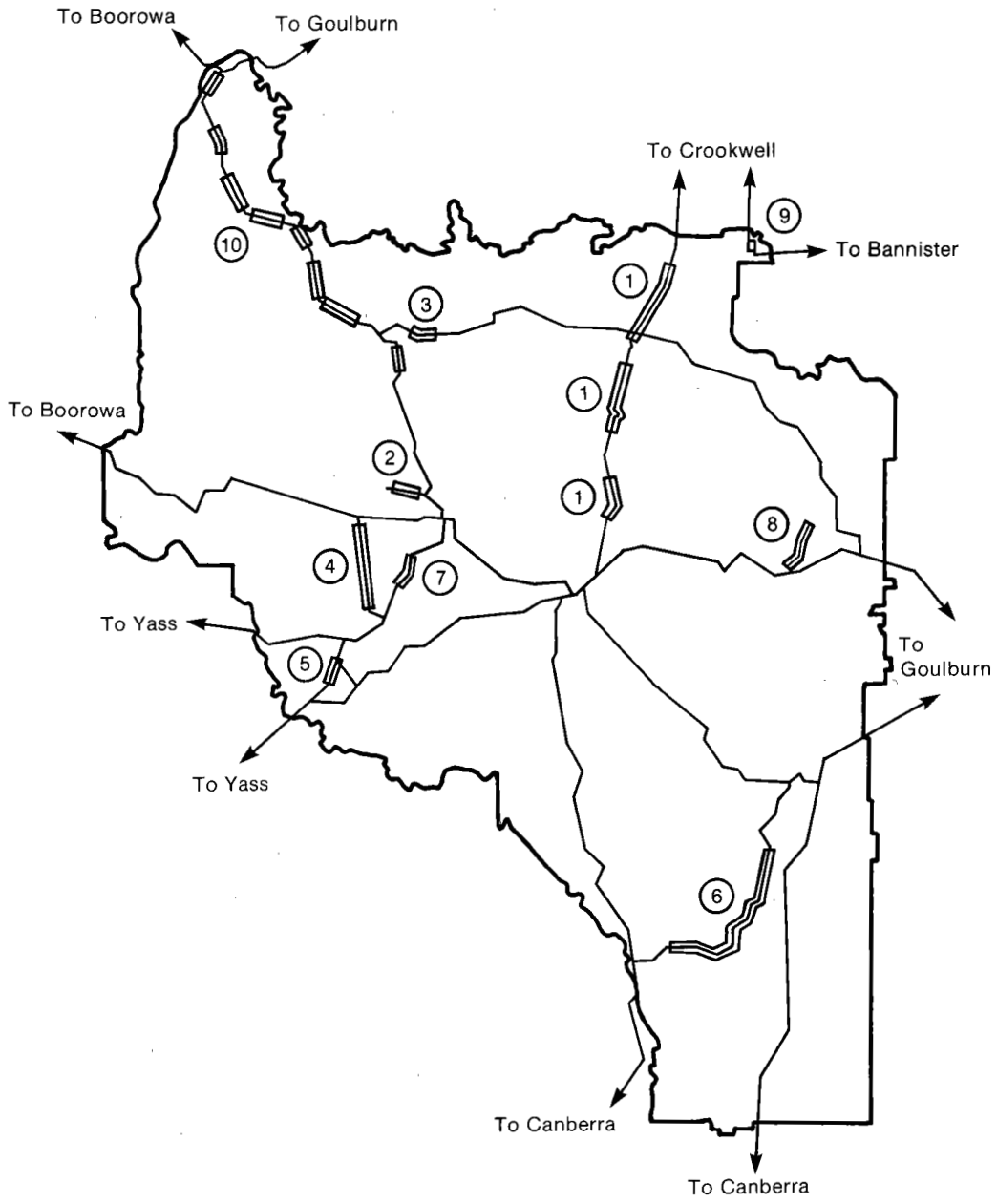
Projects addressing these trouble spots are included in each of the Shire's annual roadwork programs where considered practical in the light of available funds and the cost of an effective project.

ROAD CLOSURE DIARY

The following are verbatim extracts from the journal of a farmer residing in the Biala district. They detail vehicles bogged and pulled out by that resident on Trunk Road 52 North, previously known as Main Road 249N, which in this area, 10 to 30 km from Gunning, carries some 240 vehicles per day. This road has a gravel surface. The cross roads mentioned are at the intersection of TR52 with the principal circumferential road in the Gunning network the Bulleys Crossing-Biala-Gurrundah road.

1961

4 May	Towed semi-trailer with Caterpillar north of cross roads Rain 15mm on 5 May
20 June	Towing B. Logan semi-trailer at Policemens Hill—unable to proceed and had to be turned back via Goulburn Rain 9mm on 17 June 6.2mm on 18 June 14.5mm on 19 June



Map V.2. Trouble spots in Shire's road system

1962

25 May — Pulling semi-trailer Medway Bros
Rain 19mm 23 May
8mm 24 May
4.8mm 25 May

5 June — Pulling School Bus Policemens Hill South of cross roads
Rain 6.5mm 4 June
5mm 5 June

6 December — Pulling semi-trailer

1963

30 January — Pulling School Bus south of X roads
Rain 8.2mm 29 January
10.2mm 30 January

31 January — School Bus—had to be left at Rockview

30 April — Pulling cars and School Bus south of X roads
Rain 18mm 29 April
1.5mm 30 April

23 May — Unloaded and salvaged—bogged truck north of Xroads following weeks of light rain

3 June — Car bogged and School Bus bogged trying to pass around site
Rain 5.5mm 2 June
3mm 3 June

1965

Drought Year

7 August — Pulling car back onto road north of X roads
Rain 17.2mm 8 June—Snow

17 October — Semi-trailer of stock—Beattie Bros
Pulling with Medway Dozer
Rain 5.8mm 16 October
38mm 17 October

1966

21 March — On deputation to Gunning Shire Council re Gunning-Crookwell Road

2 July — Pulling furniture van—south of X road
Rain 7.5mm 2 July

18 August — Tyre chains to semi-trailer south of X road
Rain .5mm 18 August

1968

7 November — Readymix trucks bogged—north X road
Rain 39.2mm 7 November

1969

22 May — Pulling car back onto road—south X road
Station wagon away from tree and onto road—south X road
Rain 4.5mm 20 May
3.2mm 21 May
5.5mm 22 May

3 June — Called up Assistant Engineer Mr Daley—after 5th vehicle through my road boundary fence—north of X roads

1970

5 June — Pulled car—skidded off road—north X roads
Rain 3.2mm 4 June

1974

10 April — Road closed from Biala turnoff app 10 km to X roads, for fortnight after two semi-trailers were in trouble. Period of heavy rain

11 July — An employee—Gordon Clancy—towed a car through slipping section—north of X road. Period of light rain

1976

1 February — Used Caterpillar D4 to pull two semi-trailer loads of sheep—Ron McKay's at Policemens Hill app 20 km north from Gunning. Shire grader pulled Semi-trailer load of sheep—Harold Thorn at Devils Elbow, then graded material off road patches to enable these loads to proceed towards Crookwell
Rain 25.5mm 2 February

1977

4 March — Semi-load of cars stuck on Reserve Hill app 18 km from Gunning
Rain 12.8mm 4 March

28 May — Stock truck—Stafford Rodgers bogged at Reserve Hill and had to turn at 'Hilltop' and detour

29 May — Tourist bus held up at same area
Rain 42.5mm 28 May

20 July — During week ending 20 July my employee Gordon Clancy towed car back onto road. Another car out of control on slippery surface and overturned—south of X roads
Rain 2.2mm 14 July
3.5mm 15 July
2.2mm 16 July

29 July — I was held up on way to Gunning and Goulburn on business, while a Dozer was offloaded from bogged low loader on section south of X road
Rain 4.5mm 25 July
8.5mm 26 July
9.7mm 27 July
.8mm 28 July
2mm 29 July

5 August — Several vehicles had skidded off road, and three into fences during previous fortnight
Rain 4.5mm 25 July
8.5mm 26 July
9.8mm 27 July
18mm 28 July
2mm 29 July
2mm 4 August

1978 — August Working with Biala Progress Association in petition to Gunning Shire Council—re Gunning Crookwell Road "Urgently call for immediate regravelling, and upgrading to eventual sealed condition of main Road 52 north from Gunning"

1980

27 February — Pulling my own two trucks through reworked section north of X road
Rain 21.8mm 28 February

2 July — Road closed above Devils Elbow with bogged semi-trailer
Rain 5.2mm 1 July
4mm 2 July

APPENDIX VI—PROPOSED WORKS PROGRAM

PROGRAM OF WORKS ON TRUNK AND MAIN ROADS 1980-81

The following program was proposed by the NSW Department of Main Roads in July 1980. In August 1980 the Council asked that this program be varied to delete bitumen reseal in favour of gravel resheet and to favour MR251 over MR 241. The program was revised accordingly in October 1980.

Reconstruction
TR 52 South reconstruct 1.7 km to bitumen seal $100 000

Maintenance and improvement
The maintenance and improvement program is shown in Table VI.1.

Costing
The following unit costs were used by NSW DMR in deriving the program.

Reconstruction
(8.0m formation, 5.6m bitumen pavement)
- Gravel Base course $34 700 per kilometre
- Bitumen Seal $17 900 per kilometre or $3.20 per m^2

Gravel resheeting
- Approximately 400m^3/km at $6.6 to $7.7/$m^3$

Bitumen reseal
- 10mm thickness $0.76/$m^2$
- 14mm thickness $0.83/$m^2$

Routine maintenance, gravel
- $390 to $440/km annually

Routine maintenance, bitumen
- $440 to $480/km annually

GUNNING SHIRE COUNCIL PROGRAM OF WORK ON SHIRE ROADS 1980

SHIRE ROADS WORKS FUNDED UNDER STATE GRANTS (ROADS) ACT—RURAL LOCAL ROADS, 1980-81

New construction
- Nil

Reconstruction
- Bungendore Rd
  reconstruction 2km to bitumen seal $105 560
- Blakney Creek Rd
  reconstruction 1.5 km to bitumen seal $53 700
  reconstruction 1.5 km to bitumen seal $130 200

The reconstructed pavement of these roads will be 8m wide and 150mm deep with a sealed surface 5.6m wide and 14mm deep.

Specified maintenance
- Collector Breadalbane Rd
  4.5 km of bitumen reseal 7mm deep $5 400

• Blakney Creek Rd 4.5 km of bitumen reseal 10mm deep		$17 600
Unspecified Routine Maintenance		
• Nil		
	Total	$312 460

SHIRE ROADS WORKS FUNDED FROM OTHER SOURCES

New construction		
• Bridgeworks		$135 000
• Drainage in Gunning Village		$18 000
• Footpaths in Dalton Village		$8 440
Reconstruction		
• Broadway Jerrawa Rd concrete causeways		$2 100
• Wheeo Rd short lengths minor reconstruction		$5 800
• Dalton Jerrawa Rd widening of bitumen shoulders		$2 600
• Park Rd		$4 250
Specified maintenance		
• Culvert Repairs Dalton Jerrawa Yass Rd		$900
• Gravel resheeting (short lengths) Bannister Rd Blackburn Rd Iron Mines Rd Berrebanglo Creek Rd Kiowarrah Rd Sheldricks Rd Broadway Jerrawa Rd		$4 900
• Clearing Biala Gurrundah Goulburn Rd		$3 500
• Footpath Repairs Gunning village		$1 100
Unspecified routine maintenance		
• Grading		$25 000
• Bitumen patching		$20 000
• Gravel patching		$20 000
• Miscellaneous		$15 000
	Total	$267 590
	TOTAL SHIRE ROADS	$580 050

TABLE VI.1—MAINTENANCE AND IMPROVEMENT

Road	Bitumen reseal		Gravel resheet		Bitumen routine maintenance		Gravel routine maintenance		Bridge maintenance	Total cost[a]
	Length (km)	Cost ($'000)	Length (km)	Cost ($'000)	Length (km)	Cost ($'000)	Length (km)	Cost ($'000)	Cost ($'000)	($'000)
TR 52	3.3	14.4	7	14.2 (21.5)	23	11.2	36	5.4		59.9 (67.2)
MR 241	2.0 (0.7)	14.2 (3.4)	2 (4)	5.3 (10.6)	13	5.7	28	10.8	7.0	46.9 (41.4)
MR 248					1	0.5	2.3	1.0		1.6
MR 251			(2.6)	(7.3)	3	1.3	40	17.4		21.0 (30.0)
MR 283					5.5	2.4	20	8.6	7.9	21.9
Total	6	28.6	9	19.5	46	21.1	126	53.2	15	151.4[b] (162.1)

a. Includes overheads such as workers compensation insurance premiums. Figures in parentheses are October 1980 revisions.
b. Gunning Shire Council's initial submission for the 1980-81 program was costed at $249 000.

APPENDIX VII—ROAD STANDARDS CURRENTLY USED IN GUNNING SHIRE

Both the Hume and Federal Highways are classified as National Highways by the Commonwealth Government. The construction standards for these roads are found in *Consolidated Set of Design Standards for National Highways in Australia 1976.*

Design standards for Trunk and Main Roads generally conform with those given in the *Policy for Geometric Design of Rural Roads* (NAASRA 1976).

Design standards for all Gunning Shire roads are found in the paper *Shire Roads, Roads Needs Survey,* December 1979.

The principal features of these standards are set out in Table VII.1.

TABLE VII.1—PRINCIPAL FEATURES OF ROAD DESIGN STANDARDS CURRENTLY APPLIED IN GUNNING SHIRE

	Hume and Federal Highways	*Trunk and Main Roads*	*Major Shire Roads*	*Minor Shire Roads*	*Local Access Roads*
Pavement width	7.4m	6.2m	6.0m	3.0m — 5.0m	3.0m — 5.0m
Surface type	Seal	Gravel (or sealed)	Gravel (or sealed)	Gravel	Gravel (or natural surface)
Shoulder width	1.8m	1.8m	1.0m	1.0m	1.0m
Design speed	130 kph	80 — 100 kph	80 kph	45 — 60 kph	30 — 60 kph
Other	Grade separated Inter-sections				
	Access Controlled		Safety contribution of uniformity stressed		

APPENDIX VIII—TRAFFIC DATA

TRAFFIC VOLUME

Units of measurement

Annual Average of Daily Traffic (AADT) is the total number of trips passing a given point on a road during a year, divided by 365. The yearly total may be measured directly or estimated by extrapolation from counts over a shorter period. While AADT is, in the absence of other information, the daily traffic flow rate most likely to be experienced, some roads experience marked day to day fluctuations from this flow rate.

Vehicle Kilometres of Travel (VKT) for a road is the number of trips made multiplied by the length of each trip. It is estimated by counting vehicles on short contiguous road sections of known length and aggregating the results.

In this study, a third measure is also used, Vehicle Hours of Travel (VHT), being the number of trips made multiplied by the duration of each trip.

Shire Roads

Traffic volume is not generally counted on roads that have not been classified under State legislation—Shire Roads in the present case. The most recent estimate of traffic volume on Gunning Shire Roads is that provided by the 1969-72 Australian Road Survey.

In that Survey, 127 Shire Roads were identified and these were subdivided into a total of 160 sections of road. The AADT for an average section was 24 vehicles per day. The variation between roads is illustrated by Table VIII.1.

TABLE VIII.1—DISTRIBUTION OF AADT ON SHIRE ROADS; 1972

AADT vehicles/day	*Road sections with this AADT*	
	(number)	*(per cent)*
0-10	80	50
11-20	20	13
21-30	15	9
31-40	19	12
41-50	12	8
51-60	4	3
61-200	5	3
more than 200	5	3

Source: CBR and NAASRA (1973).

Trunk and Main Roads

The AADT for representative points on the system of Main and Trunk Roads in Gunning Shire are shown in Figures VIII.1 and VIII.2 and expanded in Tables VIII.2 to VIII.6 drawn from NSW DMR (1977) and NSW DMR provisional estimate for 1980.

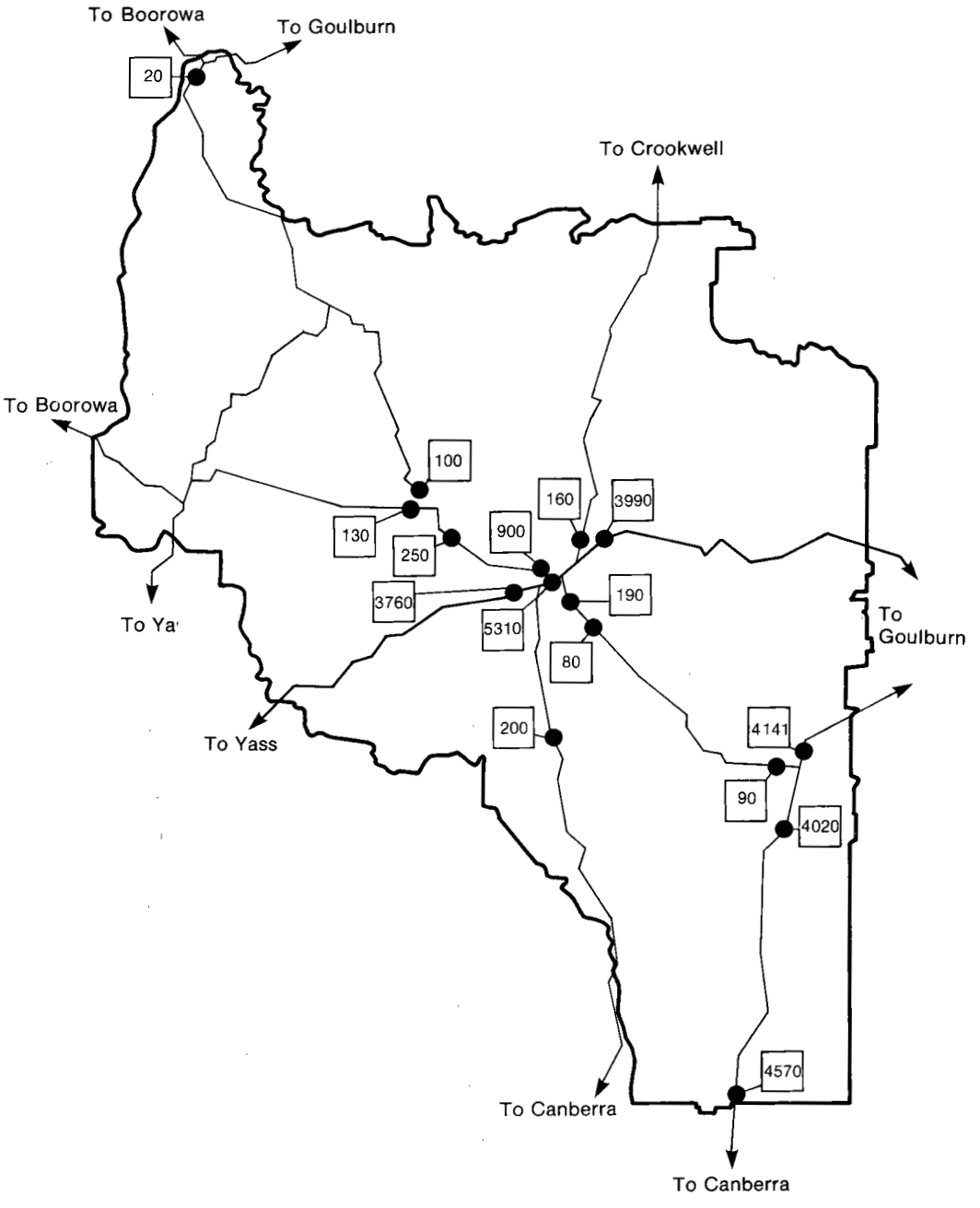
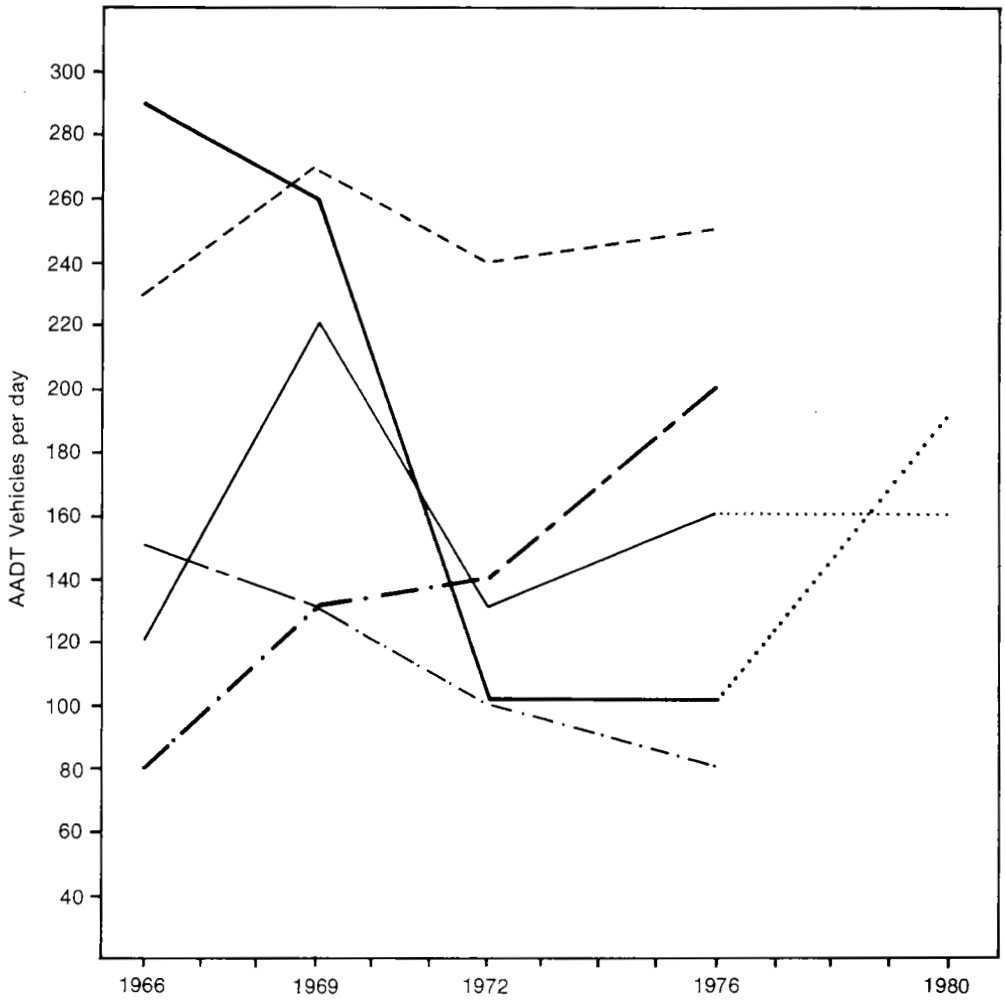


Figure VIII.1. Annual average daily traffic, 1976



Source: NSW DMR (1977)

Note: Estimates for 1980 for TR 52N and MR 251 are NSW DMR provisional values at Dec 80

Figure VIII.2. Main and Trunk Road AADT trends

TABLE VIII.2—TR 52 TRAFFIC VOLUME

	AADT					
Position	*1966*	*1969*	*1972*	*1976*	*1980*	*DMR[a] Station*
Junction SH2 on TR 52S	120	250	230	230	320	94 336
on TR 52S Past. B.B.R.	150	130	140	200	220	94 227
Junction SH2 on TR 52N	120	220	130	160	160	94 170

a. NSW DMR numeric code for geographic location of counter.

TABLE VIII.3—MR 241 TRAFFIC VOLUME

	AADT					
Position	*1966*	*1969*	*1972*	*1976*	*1980*	*DMR Station*
Junction SH2	820	940	540	900	790	94 338
Gunning side of Dalton	230	270	240	250	240	94 245
Boorowa side of Dalton	170	160	240	130	130	94 251

TABLE VIII.4—MR 248 TRAFFIC VOLUME

	AADT					
Position	*1966*	*1969*	*1972*	*1976*	*1980*	*DMR Station*
Boorowa Gunning Boundary	120	20	150	80	130	94 238

TABLE VIII.5—MR 251 TRAFFIC VOLUME

	AADT					
Position	*1966*	*1969*	*1972*	*1976*	*1980*	*DMR Station*
Narrawa side of Dalton	290	260	100	100	180	94 246
Junction MR248-MR25	20	20	10	20	10	94 248

TABLE VIII.6—MR 283 TRAFFIC VOLUME

	AADT					
Position	*1966*	*1969*	*1972*	*1976*	*1980*	*DMR Station*
Junction SH2-MR283	160	280	120	190	230	94 340
At Gunning Village	80	130	100	80	150	94 341
Junction SH3-MR283	60	60	80	90	130	94 243

Outside the immediate environs of Gunning township, the most travelled road is MR241 between Gunning and Dalton. From January to May 1980 inclusive, this road carried 37870 vehicles at an AADT of 249 vehicles per day (NSW DMR 1980). Weekdays averaged 220 per day with no obvious bias toward particular days of the week. Over each weekend an average of 578 trips were made on this road. The maximum number of vehicles counted on the road in one day was 1100 and the minimum 100. There was about an 8 per cent chance of the trip rate exceeding 300 vehicles per day. The maximum seen over a weekend was 1275 vehicles, and weekends exhibited slightly higher variability than weekdays.

On TR52S just south of the Gunning Shire border, where an AADT of 802 vehicles per day was recorded in the same period, the data (NSW DMR 1980) shows a 15 per cent chance of there being more than 850 vehicles per day during the week and 20 per cent chance of there being more than 1000 per day at the weekend.

National and State Highways

The most recently calculated AADT on the Hume Highway at Gunning is 6450 vehicles per day and on the Federal Highway just south of Collector 4100 vehicles per day. Data for other points on these highways is listed in Tables VIII.7 and VIII.8.

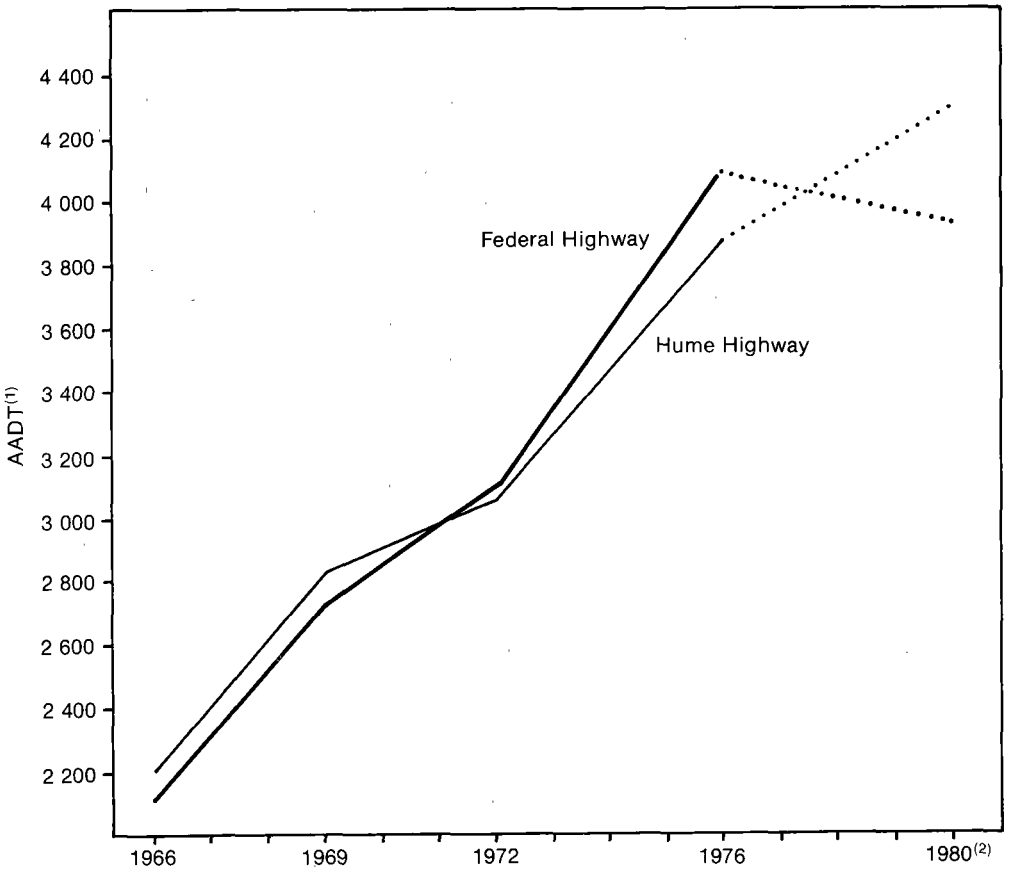
TABLE VIII.7—HUME HIGHWAY TRAFFIC VOLUME

	AADT					
Position	*1966*	*1969*	*1972*	*1976*	*1980*	*DMR Station*
East of TR 52N	2 410	2 890	3 070	3 990	4 730	94 030
North of MR 283	2 530	3 700	3 340	4 300	5 080	94 329
South of MR 283	2 660	3 800	3 550	4 500	4 990	94 330
North of MR 241	2 670	3 950	3 850	5 310	6 450	94 331
South of MR 241	2 590	3 470	3 460	4 520	4 380	94 332
East of TR 52S	2 580	3 140	3 160	3 830	4 670	94 333
West of TR 52S	2 000	2 850	3 040	3 870	5 340	94 334
1 km West TR 52S	2 000	2 760	3 040	3 760	3 860	94 029

TABLE VIII.8—FEDERAL HIGHWAY TRAFFIC VOLUME

	AADT					
Position	*1966*	*1969*	*1972*	*1976*	*1980*	*DMR Station*
Collector N of MR 283	2 150	2 750	3 110	4 410	4 280	94 069
Collector S of MR 283	2 090	2 690	3 040	4 020	3 890	94 068
16 km N of ACT Border	—	2 760	2 960	4 570	4 070	94 446
Hume Highway junction	2 260	2 780	3 310	4 410	4 760	94 046

Data in Table VIII.7 and NSW DMR (1982) indicate that through traffic on the Hume Highway is less than 3800 vehicles per day, and that local traffic is more than 870 vehicles per day. The Canberra Connections Study (BTE 1979) provides the following additional information on Hume and Federal Highway traffic flows.



Note: 1. Average of two points representing through traffic
2. Figures for 1980 are provisional estimates by NSW DMR at Dec 80
3. Federal Highway data is extrapolated from traffic counted during period of less than one year

Source: NSW DMR (1977)

Figure VIII.3. National Highway AADT trends

TABLE VIII.9—FEDERAL HIGHWAY TRAFFIC AT HUME HIGHWAY JUNCTION, 1976

Southern trip-end	*Cars*	*Trucks*[a]	*Average daily total*
Canberra	1 910	690	2 600
Local	210	90	300
Cooma/Snowy Mts	220	40	260
Queanbeyan	200	20	220
Sutton/Gundaroo	10	20	30
Other[b]	100	20	120
Total	2 650	880	3 350

a. 2 axle 6 wheel and larger.
b. Victoria, South coast of NSW.

Source: CBR survey 1974. DMR traffic and classification count 1976.

TABLE VIII.10—FEDERAL HIGHWAY TRAFFIC AT ACT BORDER, 1976

Northern trip-end	*Average vehicles per day*	
Sutton	1 130	
Gundaroo	290	proceeding via TR52S
Gunning/Crookwell	110	
Bungendore/Braidwood	180	
Geary's Gap/Lake George	130	
Collector/Breadalbane	70	
Goulburn	670	
North of Goulburn	1 890	
Total	4 470	

Source: 1975 NCDC Survey. No distinction in destination was made between cars and trucks. The average proportion of heavy commercial vehicles was 17 per cent.

TABLE VIII.11—FEDERAL HIGHWAY TRIP MATRIX, 1976

(Vehicles per day)

	Canberra and beyond via Federal Hwy	*Queanbeyan and beyond via TR52*	*Goulburn and beyond*
Sutton	1 130	na	30
Gundaroo/Gunning	400	na	—
Bungendore	180	na	na
Geary's Gap	130	30	—
Collector	70	20	300
Goulburn and beyond	2 560	640	—

na Not available

Source: 1975 NOC Survey

TABLE VIII.12—STOPOVERS AT URBAN CENTRES, HUME HIGHWAY 1974

Centre	Vehicles stopping per day[a]			
	Private car		Truck	
	Overnight	Fuel, Food	Overnight	Fuel, Food
Albury/Wodonga	80	340	30	410
Holbrook	20	90	—	10
Tarcutta	10	30	—	60
Gundagai	30	300	—	70
Bowning	—	10	—	—
Yass	40	760	—	450
Gunning	—	40	—	10
Goulburn	20	380	—	50

a. Average of weekday and weekend.

Source: Travel survey by CBR, in conjunction with NSW DMR, conducted in 1974.

TRAFFIC COMPOSITION

Shire Roads

The 1969-74 Australian Road Survey estimated the composition of traffic on Shire roads, with the following result. More recent figures are not available.

TABLE VIII.13—TRAFFIC COMPOSITION SHIRE ROADS IN GUNNING SHIRE, 1972

Per cent lorries[a]	Road sections with this percentage lorries	
	(number)	(percentage of total sections)
Less than 10	—	—
10-19	27	17
20-29	59	37
30-39	53	33
40-49	21	13
greater than 49	—	—
Proportion of lorries on average road section = 29 per cent		

a. Includes station wagons, utilities, light trucks, vans, buses, trucks and semi-trailers.

Trunk and Main Roads

The traffic composition on Trunk and Main Roads revealed by the 1969-74 Australian Road survey is shown in Table VIII.14.

TABLE VIII.14—TRAFFIC COMPOSITION TRUNK AND MAIN ROADS GUNNING SHIRE, 1972

(per cent)

Road	Proportion as cars	Proportion as lorries[ab]
Trunk Road 52	75	25
Main Road 241	60	40
Main Road 251	77	23
Main Road 283	69	31
Main Road 248	73	27

a. Includes station wagons, utilities, light trucks, vans, buses, trucks and semi-trailers.
b. Average over all sections.

A one day count by NSW DMR in 1976 gave the results shown in Table VIII.15.

TABLE VIII.15—TRAFFIC COMPOSITION TRUNK AND MAIN ROADS GUNNING SHIRE, 1976[a]

Road	Proportion as Heavy vehicles[b] (per cent)	Location
Trunk Road 52 South	25	Junction Hume Highway
Trunk Road 52 North	19	Junction Hume Highway
Main Road 241	5	Junction Hume Highway
Main Road 251	25[c]	Junction MR 248
Main Road 283	0	Junction Federal Highway
Main Road 283	9	Junction Hume Highway
Main Road 248	13	Junction MR 251

a. Based on one day of counting, 6 am to 6 pm.
b. Heavy vehicles were those with dual wheels or more than two axles.
c. Total count in period was only four vehicles.

Source: NSW DMR (1982).

National and State Highways

Available recent traffic count data does not explicitly show the composition of traffic using the highways in Gunning Shire.

BTE (1979) cited the 1974-76 data in Table VIII.16 for the Federal Highway.

TABLE VIII.16—FEDERAL HIGHWAY TRAFFIC COMPOSITION, 1976

Vehicle type	Proportion as total traffic (per cent)
Private car	22
Business car	52
Lorries	
2 axle 4 tyre	4
2 axle 6 tyre	10
3 axle	3
4 axle	4
5 axle	5

Source: 1974 CBR survey, and 1976 DMR traffic and classification count.

The 1969-74 Australian Road survey made the following estimate of this traffic composition.

TABLE VIII.17—FEDERAL HIGHWAY TRAFFIC COMPOSITION, 1972

(per cent)

Vehicle type	Proportion as total traffic
Cars	67
Light trucks	12
Rigid trucks and buses	17
Semi-trailers	4

Three surveys each of one day duration by NSW DMR gave the following proportions of heavy vehicles on the Federal Highway:

- at the Hume Highway junction, 24 per cent in 1980 and 21 per cent in 1981; and
- at Collector, 18 per cent in 1976.

Acknowledging the limitation of exact vehicle type in each of these categories, this data can be rationalised to give the composition shown in Table VIII.18.

TABLE VIII.18—FEDERAL HIGHWAY TRAFFIC COMPOSITION, 1972 AND 1976

(per cent)

Vehicle type	Proportion as total traffic	
	1972	1976
Cars	67	74
Lorries	33	26

a. Including utilities, panel vans, station wagons, buses, trucks and semi-trailers.

For the Hume Highway, the NSW Department of Motor Transport operates a checking station at Marulan 25 km towards Sydney from Goulburn. The commercial vehicle traffic passing through that station between 1972 and 1979 is set out in Table VIII.19 and VIII.20.

TABLE VIII.19—TRUCK AADT[a] THROUGH MARULAN CHECKING STATION; CARRYING CAPACITY OVER FOUR TONNES

Year	Interstate	Intrastate[b]
1972-73	505	299
1973-74	547	350
1974-75	537	407
1975-76	566	477
1976-77	592	494
1977-78	608	491
1978-79	680	520

a. Includes empty trucks.
b. Includes ACT traffic.

Source: BTE (1982b).

TABLE VIII.20—TRUCK AADT[a] THROUGH MARULAN CHECKING STATION; CARRYING CAPACITY FOUR TONNES OR LESS

Year	*Interstate*	*Intrastate*[b]
1972-73	58	72
1973-74	75	89
1974-75	70	89
1975-76	89	101
1976-77	81	95
1977-78	70	86
1978-79	68	80

a. Includes empty trucks.
b. Includes ACT traffic.

Source: BTE (1982b).

In the month of July 1980 this station recorded the following commercial vehicle traffic.

Interstate	25 604 vehicles
Intrastate (including ACT)	22 271 vehicles

The commercial vehicle count includes vehicles under four tonnes capacity.

All of the interstate traffic counted at Marulan would pass through Gunning. At the time of this study, no information was to hand which would give the proportion of the intrastate traffic passing through Gunning. Considering trips terminating at Goulburn, those diverting to Canberra, and those terminating at Yass or beyond, about 30 per cent of the intrastate traffic measured at Marulan might be expected to pass through Gunning. On this basis, commercial vehicle traffic passing through both Gunning and Marulan may be estimated to have contained, in 1972 and 1976, 24 percent as vehicles over 4 tonnes carry capacity, and 3 percent as smaller commercial vehicles. By 1980 these proportions may have increased to 25 percent and 4 percent respectively. Additional Hume Highway commercial vehicle traffic through Gunning is generated by trips to and from Goulburn and Yass and intermediate points. A one day count by NSW DMR in 1976 reported 29 per cent of highway traffic through Gunning to be heavy vehicles (NSW DMR 1982).

The 1969-74 Australian Road Survey made the following estimate of traffic composition on the Hume Highway in Gunning Shire.

TABLE VIII.21—TRAFFIC COMPOSITION HUME HIGHWAY,1972

(per cent)

Location	*Proportion as Cars*	*Proportion as Light trucks*	*Proportion as Rigid trucks*	*Proportion as Semi-trailers*
East of Gunning	51	10	33	6
Gunning township	62	11	22	5
West of Gunning	60	11	24	5

The NSW DMR currently adopts a figure of 25-30 per cent for commercial vehicles on the Hume Highway. This percentage can be as low as 10 per cent on weekends and as high as 70 per cent on week nights.

VEHICLE WEIGHTS

Insufficient information was available either to prove or to disprove the hypothesis that, in general, a similar or greater quantity of cargo is being transported now compared to earlier years, and that fewer vehicles are now being used for the purpose. However, for the Hume and Federal Highways (BTE 1982b), reports the variations shown in Tables VIII.22 and VIII.23. These are based on six days of sampling in each year.

TABLE VIII.22—ESTIMATE OF HUME HIGHWAY FREIGHT TRAFFIC PASSING THROUGH MARULAN

Year	Total freight			Average truck load[a]		
	Interstate	Intrastate[b] ('000 tonnes)	Total	Interstate	Intrastate[b] (tonnes)	Overall
1972-73	2 643	785	3 428	14	7	11
1873-74	2 876	986	3 862	14	7	11
1974-75	2 813	1 062	3 875	14	7	11
1975-76	3 135	1 498	4 633	15	8	12
1976-77	3 300	1 564	4 864	15	8	12
1977-78	2 926	1 616	4 542	13	9	11

a. Loaded trucks only, and excluding trucks of four tonnes or less.
b. Includes NSW-ACT traffic.

Source: BTE (1982b).

TABLE VIII.23—ESTIMATE OF FEDERAL HIGHWAY[a] FREIGHT TRAFFIC PASSING THROUGH MARULAN

Year	Total freight ('000 tonnes)	Average truck load[b] (tonnes)
1972-73	200	7
1973-74	270	7
1974-75	340	7
1975-76	410	8
1976-77	420	8
1977-78	400	9

a. Excluding traffic through Cooma and to the NSW south coast.
b. Not separately reported, average interstate Hume Highway value adopted.

Source: BTE (1982b).

ROAD SYSTEMS COMPARED

To provide a perspective of the relative rates of utilisation of the components of the road system in Gunning Shire, Table VIII.24 is presented. The data was taken from the 1969-74 Australian Roads Survey.

TABLE VIII.24—RELATIVE UTILISATION OF ROAD SYSTEMS IN GUNNING SHIRE, 1972

Road system	*Annual travel distance (VKT)*	*Annual travel time (VHT)*[b]	*Traffic volume (AADT)*[a]	*Average speed (VKT/VHT km/per hour)*
National and State Highways	99 153 459	1 177 125	3 500	84
Trunk and Main Roads	10 824 475	163 885	190	66
Shire Roads	6 267 050	106 945	24	59
All Roads	116 244 984	1 447 955	—	80

a. Value for an average section of road.
b. Calculated at maximum safe speed for each road section.

APPENDIX IX—SUPPLY SOURCES FOR GUNNING SHIRE

This appendix is intended to illustrate briefly the nature and extent of Gunning Shire's dependence on road transport for the supply of basic commodities.

The information in Table IX.1 was obtained through Gunning Shire Council. In the table, the term 'delay' is used to mean an unexpectedly long delivery time. The study team did not investigate these reported delays.

TABLE IX.1—SUPPLY SOURCES AND DISTRIBUTION SYSTEMS

Commodity	*Nearest large depot or warehouse*	*Location of local depot*	*Local stock resupply frequency*	*Method of transport*	*No of retailers in shire*	*Comments*
Basic foodstuffs						
Vegetables	Goulburn		Twice Weekly	Road	4	
Dairy products	Queanbeyan	Gunning	Daily	Road	3	
Meat	Canberra		Twice Weekly	Road	1	
Bread	Canberra	Gunning	Daily	Road	4	
Flour and sundry groceries	Canberra Sydney			Road Rail	5	Rail involves delays
Potable water	Gunning and Dalton have adequate supplies reticulated from local sources. Remainder of Shire uses stored rainwater.					
Energy						
Liquid petroleum products	Yass, Goulburn Queanbeyan	Gunning	Weekly	Road	4	
Gaseous petroleum	Canberra			Road	2	Natural gas not reticulated
Coal						Negligible usage
Wood						Adhoc local collection only
Electricity	Bulk supply from NSW Electricity Commission via County Council through distributing substations at Yass, Crookwell, Goulburn and Queanbeyan					
Other consumables						
Fertilizer		Gunning Gurrundah			3	
Stockfeed	Harden, Sydney, Yass, Canberra	Gunning	On order	Road	0	Some delays
Seed	Victoria,	Gurrundah	On order	Road	1	Volume & weight of delivery to properties results in access difficulties eg 10x27 tons per day
Agricultural chemicals	Goulburn, Crookwell, Yass					
Construction materials, hardware, timber, steel pipes, joinery, paint	Sydney, Goulburn, Yass		On order	Rail or road	0	Some delays, dependent on volume of order
Stone aggregate, bitumen, concrete, brick	Canberra Canberra		On order	Road	0	Some delays, dependent on volume of order
Pharmaceuticals	Goulburn, Canberra		On order	Road	1	
Machinery and vehicle spares	Canberra, Goulburn, Yass, Crookwell, Queanbeyan	Gunning	On order	Rail or road	1	Significant delays experienced
Durables						
Machinery and vehicle	Canberra, Goulburn, Yass, Queanbeyan		nil	Rail or road	0	
White goods and furniture	Canberra, Goulburn Yass, Queanbeyan		nil	Road	0	

APPENDIX X—ACCESSIBILITY SURVEY

To obtain measures of the trip frequency, route importance and satisfaction of residents in their travel, the study took advantage of another of the Bureau's current work programs. That program is exploring a different approach to the measurement of regional transport adequacy—one which involves evaluation of the degree to which various services and activities are accessible to residents. The prototype evaluation technique developed within that program was applied in Gunning Shire, both to assist in this Case Study, and to test the technique itself.

Definition of rural accessibility

In this study, the terms 'accessibility' and 'mobility' are defined in the following manner.

Personal mobility is related to the ability of individuals to move about in daily life. This depends on three main factors:

- the number of different transport modes that exist and the capacity of each mode;
- the individuals' access to each mode or their ability to use the mode; and
- the quality of each mode.

Accessibility is concerned with the ease with which an individual is able to reach the opportunities for a particular type of activity from a certain origin. Accessibility is 'multi-dimensional', it is a function of three major elements:

- the mobility and spatial location of people;
- the services provided by transport and other communication links; and
- the spatial location of activities (ie services and facilities).

Variation in any of these three elements will affect the accessibility that people experience.

It is important to note that accessibility is only one of several criteria that could be used for the evaluation of alternative transportation systems.

Other criteria such as the capital and maintenance cost of the road network, users benefit, vehicle operation cost and environmental impact could also be considered.

Objectives of the Gunning accessibility study

The present level of transport infrastructure provision in Gunning Shire has been reviewed briefly in Chapter 5. The objective of the Gunning accessibility study was to examine more closely the demographic characteristics and the travel behaviour of the local residents, and to analyse the accessibility problems associated with four major activities, namely, travel to work, shopping, schooling and health care. In addition, problems associated with other activities such as banking, sports and recreations etc were to be examined briefly.

Measurement of rural accessibility

For transport planning and evaluation purposes, the choice of appropriate accessibility measures is affected by the following general, and occasionally conflicting, criteria.

- The measures should be responsive to changes in the performance of the transport system.

- The measures should have sound behavioural basis and should be easily interpreted by the layman.
- The choice of measures is affected by the level of disaggregation of the population and activities.
- The measures should be operationally simple and economically feasible.

Numerous studies have examined the relationship between accessibility and travel behaviour, and the application of accessibility concepts for transport planning evaluation. However, most of these studies are related to the urban environment, and so far as is known, no major works on rural accessibility have been carried out in Australia. Overseas works on rural accessibility were sketchy until the publication of Moseley (1977) in the United Kingdom. There are geographic and socio-economic differences between Australia and the United Kingdom and, further, most of Moseley's work on rural accessibility concentrated on people without access to a car (for all or part of the day or week). For those reasons, Moseley's actual measurements may be irrelevant in Australian conditions.

Moseley outlined three basic measures for evaluating alternative transport and locational policies.

First, the composite accessibility measures which combine two factors and provide an index of 'population potential', based upon the gravity model. That is, the accessibility of an area can be expressed as a function of its proximity (measured in time, distance or generalised cost) to alternative destinations of varying utility (eg number of jobs or area of retail floorspace).

Second, the comparative measures of accessibility which indicate the number of opportunities that become accessible as more and more distance is traversed. Such concepts can be used to describe the mean level of access by residents in all the places within a spatial network. They can also be modified to show access by members of a certain social group (eg pensioners) to the opportunities or activities relevant to them, or access by a certain mode of travel (eg public transport).

The third measure which could be employed was developed by the Swedish school of 'time space geography' pioneered by Hagerstrand (1970, 1973, 1974) and his disciples. With this measure, Hagerstrand has emphasised that evaluation should rest on measuring opportunities rather than predicting behaviour. He argued that the perspective should be that of the single individual. For example, what is his or her 'action space'? What determines its dimensions and, what can be done to expand it, or put more opportunities within its bounds? A detailed discussion of the application of 'time space geography' as a tool for evaluating rural land use and transport policies can be found in the literature cited in this appendix.

With the present study, the approach was to use simple measures of accessibility. A survey of some 200 households in the Shire of Gunning was made using a questionnaire structured in two sections.

Section One of the survey referred to individual members of the households being interviewed. The data collected in this section included demographic characteristics of household members and the accessibility measures on four major activities, namely, work, shopping, medical treatment and school trips.

For these four activities, people were asked to respond to a question on transport convenience based on a five point scale, 'very convenient', 'fairly convenient', 'neither convenient or inconvenient', 'fairly inconvenient' and 'very inconvenient'. This measure was adopted from Moseley (1977), but the interpretation of the result will be different. This is due to the fact that car ownership and car availability in rural Australia is much higher than in the United Kingdom, and that there is effectively no provision of public transport within the Gunning Shire (see Chapter 2).

The following simple index was used as an indicator of accessibility:

$$\text{Index of convenience} = \frac{2VC + FC - 2VI - FI}{\text{Total}} \times 100$$

where

VC = trips described as 'very convenient'
FC = trips described as 'fairly convenient'
VI = trips described as 'very inconvenient'
FI = trips described as 'fairly inconvenient'
Total = total replies, including 'neither convenient nor inconvenient'

Although such an index may be seen as a very crude measure of accessibility, and though the assumption that 'convenience' is a universally appreciated concept may be open to criticism, it was found that none of the respondents had any problem in trying to quantify the degree of convenience in this way.

This index provides an overall picture of perceived convenience of access to different activities relative to one another, with higher values of the index being associated with greater convenience. Use of the index has shown that a value of 100 tends to correspond with accessibility that is neither convenient nor inconvenient.

Section Two of the survey referred to the major activities performed by the household as a whole. The data collected includes car ownership, telephone ownership, transport problems with a number of day to day activities, provision of public transport, ranking of importance for different types of activities and services as perceived by the local residents, their opinions of whether the right amount of money is being spent by the Government to provide better facilities and services, and whether the local residents are prepared to pay more to finance those facilities that are considered to be important to them.

The survey sample

The accessibility survey extended to 200 households in Gunning Shire where the 1976 Census had shown there to be 600 households. A geographically representative distribution was achieved by dividing the sample into small districts, corresponding to telephone exchanges, and using the number of telephone subscribers in a district as an indicator of the number of households in that district. Although the survey overall covered 33 per cent of Census households, it was inadvertently biassed towards the larger households. This bias is illustrated in Table X.1 where it can be seen that the survey covered only 9 per cent of the single person households, but 66 per cent of the seven person households. Because household size is an important determinant of travel patterns, and because the number of single person households in the Shire is relatively large, this bias may be significant.

The survey covered 698 persons, or 36 per cent of the 1976 Census population. Table X.2 compares the distribution of ages in the survey sample with the 1976 Census distribution. The sample contained a smaller proportion of persons over 60 years of age than the Census and a larger proportion between 5 and 20 years of age. This may mean that the single person households missed in the survey were composed largely of people over the age of sixty.

Additional characteristics of the survey sample are shown in Table X.3.

Private vehicle ownership

The distribution of private vehicles among households is shown in Table X.4 for motor cars and Table X.5 for all vehicles. Differences between the 1976 Census figures and those of the accessibility survey may be attributed to the way the questions were

TABLE X.1—SIZE OF HOUSEHOLDS SURVEYED AND OF HOUSEHOLDS COVERED IN 1976 CENSUS

No of persons in households	1976 Census households		Accessibility survey households		Proportion as Census households in accessibility survey
	(number)	(per cent)	(number)	(per cent)	(per cent)
1	122	21.1	11	5.5	9.0
2	178	29.4	53	26.5	29.8
3	90	14.9	48	24.0	53.3
4	96	15.8	40	20.0	41.7
5	74	12.2	26	13.0	35.1
6	34	5.6	15	7.5	44.1
7	6	1.0	4	2.0	66.6
8 or more	6	1.0	3	1.5	50.0
Total	606	100.0	200	100.0	33.0

TABLE X.2—AGE DISTRIBUTION IN 1976 CENSUS AND IN ACCESSIBILITY SURVEY

(per cent)

Age in years	1976 Census		Accessibility survey respondents		NSW average 1976 Census	
	(male)	(female)	(male)	(female)	(male)	(female)
0- 4	10.0	9.8	6.3	7.2	8.9	8.4
5-11	23.0	23.5	16.1	16.0	12.5	11.8
12-16			10.4	10.3	9.3	8.8
17-19	3.4	2.2	6.3	4.2	5.2	5.0
20-24	6.4	7.3	5.7	5.7	8.0	7.9
25-44	25.0	27.5	21.9	24.7	27.4	26.2
45-59	17.3	15.1	21.6	22.3	16.5	16.1
60-64	5.6	6.2	3.8	3.9	4.2	4.5
65 +	9.5	8.5	7.9	5.7	7.6	10.7
Not stated	—	—	—	—	0.4	0.6
Total	100	100	100	100	100	100

framed. For the Census, only vehicles garaged on the premises on the Census night were recorded. In the accessibility survey, all vehicles available to the household for travel on public roads were recorded, irrespective of whether or where they were garaged.

In Table X.6, vehicle ownership in the survey sample is compared with the most recent available data for the Shire as a whole. The sample can be seen to reflect the relatively high rate of ownership apparent in the total Shire population—more than one vehicle per person in the driving licence eligible age bracket.

TABLE X.3—HOUSEHOLD SIZE AND OCCUPATIONAL STATUS IN SURVEY SAMPLE

Household size	*No of households*	*Wage and salary earners*	*Employers*	*Home duty*	*Students*	*Pensioners*	*Unemployed*	*Pre-school children*
1	11	4	4	1	—	2	—	—
2	53	19	37	34	1	15	—	—
3	48	30	48	27	18	13	1	7
4	40	32	40	24	44	4	2	14
5	26	18	24	19	60	—	—	9
6	15	14	13	12	39	2	—	9
7 and more	7	4	8	6	29	—	1	9
TOTAL	200	121	174	123	191[a]	36	4	48
Proportion of total persons in sample (per cent)	17.3	24.9	17.6	27.4	5.2	0.05	6.9	

a. Includes students residing at boarding schools outside the Shire.

TABLE X.4—CAR AVAILABILITY TO HOUSEHOLDS

(per cent)

No of cars per household	Proportion as households: 1976 Census[a] distribution	Proportion as households: Distribution in the accessibility survey
0	4.4	3.5[b]
1	45.4	57.5
2	30.6	28.5
3 or more	17.2	10.5
not stated	2.4	—
Total	100.0	100.0

a. Census figures refer to all vehicles garaged on the Census night.
b. Although 3.5 per cent of households did not own a car, all but one household possessed at least one car or truck for regular use.

TABLE X.5—VEHICLE AVAILABILITY TO HOUSEHOLDS

(per cent)

No of cars per household	Proportion as households: 1976 Census distribution	Proportion as households: Accessibility Survey distribution
0	4.4	0.5
1	45.4	28.0
2	30.6	32.5
3 or more	17.2	39.0
not stated	2.4	—

TABLE X.6—VEHICLE AVAILABILITY TO PERSONS

	Survey sample	Shire total	Sample as proportion of total (per cent)
Number of cars and station wagons	294	788[a]	37
Number of trucks and lorries	173	551	31
Number of motor cycles	70	94[a]	74
Total number of vehicles	537	1 433	37
Number of households	200	600[b]	33
Vehicles per household	2.69	2.39	
Number of persons	698	1 922[b]	36
Vehicles per person	0.77	0.75	
Number of persons of driving age	468	1 270[b]	37
Vehicles per person of driving age	1.15	1.13	

a. NSW Motor Registry data at 30 June 1980.
b. 1976 Census data.
NOTE: Survey permitted utilities to be counted as trucks or as cars.

Origins and destinations of trips

Respondents were asked to indicate the origin and destination of recent trips made by members of their households. The trip types surveyed were: travel to work, major shopping trips, travel to obtain medical services, and travel to schools. The results obtained are presented in Tables X.7 to X.10. A number of respondents did not record the destinations of the trips made by their household, while several recorded mutliple destinations for an activity type.

The significant observations are that, from 192 households responding, 284 persons travelled to work, and that of these 74 per cent worked in the district in which they resided, while 18 per cent travelled outside the Shire.

On the other hand, some 95 per cent of household members indicated that their destinations on medical or shopping trips lay outside the Shire. About 50 per cent went to Goulburn for those purposes, 20 per cent to Yass and 15 per cent to Canberra.

Secondary activities

The survey also reviewed the travel patterns for a number of day to day activities, ranging from attending pre-school play groups to visiting friends or relatives during the last month. Table X.11 illustrates the percentages of the respondents conducting various activities at different places. The results affirm previous evidence that Goulburn, Yass and Canberra are important centres for the local residents and draw attention to Gunning as a secondary activity centre.

Seventy-five per cent of the respondents find it easy to get to these day to day activities and the remaining 25 per cent consider the journey to be difficult. The reasons given for difficulties include rough road conditions (39 per cent of dissatisfied respondents), long distances (32 per cent), service hours not suitable (13 per cent) and busy highway conditions (8 per cent).

Mode of transport

Respondents were asked to designate the means by which members of their household travelled to specific activities. The results are presented in Table X.12 where the predominant modes are self-evident. It should be noted that some journeys involved two modes of transport—particularly the journeys of school children. For the present purpose those journeys are shown against the mode used for the greater part of the journey. A number of respondents did not record modes of travel for the activities of their household.

In the 1976 Census, 15 per cent of the Shire population drove a car to work and 3 per cent rode to work as car passengers. The figures for the survey sample were 16 per cent and 2 per cent respectively.

Trip frequency

The frequency of trips to work between various origins and destinations may be inferred from the data of Table X.7. The frequency of trips to shopping and medical services was surveyed directly and the results are presented in Table X.13. The resultant traffic flow diagrams for work, shopping, and medical trips have been presented in Chapter 7.

The frequency of shopping and medical trips varied widely between households. The maxima observed were 80 trips per month over 45 km for a 4 person 2 driver household, and 26 trips per month for a 2 person 1 driver household.

Travel time

For each of the major activities surveyed, respondents were asked to record the usual

TABLE X.7—ORIGINS AND DESTINATIONS OF TRAVEL TO WORK, NUMBER OF PERSONS.

FROM \ TO	Bannister	Bevandale	Bellmont Forest	Biala	Blakney Ck	Breadalbane	Collector	Cullerin	Dalton	Gundaroo	Gunning	Gurrundah	Jerrawa	Ladevale	Narrawa	Oolong	Boorowa	Canberra	Crookwell	Goulburn	Yass	Wollongong	Other NSW	TOTAL
Bannister	2																							2
Bevandale		13							1		2													16
Bellmont Forest			2								1							2						5
Biala				25							1								3	2		1		32
Blakney Ck					6				1												2			9
Breadalbane						8						2								4			1	15
Collector							17											1		1				19
Cullerin					1		1	11												1				14
Dalton		1		4					24	2	2							4			3		1	41
Gundaroo										20	1							10			1		1	33
Gunning											60	1						3		5	2		1	52
Gurrundah												6								2				8
Jerrawa													4								1			5
Ladevale														4										4
Narrawa																								0
Oolong											2					7								9
TOTAL	2	14	2	29	7	8	18	11	26	22	69	9	4	4		7		20	3	15	9	1	4	284

TABLE X.8—ORIGINS AND DESTINATIONS OF TRAVEL TO SHOPS, NUMBER OF PERSONS MAKING MAJOR TRIPS IN PAST FORTNIGHT.

FROM \ TO	Bannister	Bevandale	Bellmont Forest	Biala	Blakney Ck	Breadalbane	Collector	Cullerin	Dalton	Gundaroo	Gunning	Gurrundah	Jerrawa	Ladevale	Narrawa	Oolong	Boorowa	Canberra	Crookwell	Goulburn	Yass	Wollongong	Other NSW	TOTAL
Bannister																			1	2				3
Bevandale																			6	4	16		1	27
Bellmont Forest																		6					2	8
Biala											1								13	24				38
Blakney Ck																				1	13			14
Breadalbane																				24				24
Collector							2											1		17				20
Cullerin																				14				14
Dalton									3		1							4		17	15			40
Gundaroo																		28					8	36
Gunning											8							14		60	24	1		107
Gurrundah																		1		12			1	14
Jerrawa									1												10			11
Ladevale																		4		4	9			17
Narrawa																								0
Oolong											3									6				9
TOTAL							2		4		13							58	20	185	87	1	12	382

TABLE X.9—ORIGINS AND DESTINATIONS OF MOST RECENT TRIP TO MEDICAL SERVICES, NUMBER OF PERSONS.

FROM \ TO	Bannister	Bevandale	Bellmont Forest	Biala	Blakney Ck	Breadalbane	Collector	Cullerin	Dalton	Gundaroo	Gunning	Gurrundah	Jerrawa	Ladevale	Narrawa	Oolong	Boorowa	Canberra	Crookwell	Goulburn	Yass	Wollongong	Other NSW	TOTAL
Bannister																				3				3
Bevandale																			4	13	4			21
Bellmont Forest																		6						6
Biala																		7	8	6				21
Blakney Ck																		2			23			25
Breadalbane																				25				25
Collector																				44				44
Cullerin																		1		25				26
Dalton																		3		9	13			25
Gundaroo																		28		3			8	39
Gunning											8							11		57	33			109
Gurrundah																				20			1	21
Jerrawa																				2	13			15
Ladevale																		3		2	2			7
Narrawa																								0
Oolong																				4	1			5
TOTAL											8							61	12	213	89		9	392

TABLE X.10—ORIGINS AND DESTINATIONS OF TRAVEL TO SCHOOLING, NUMBER OF PERSONS.

FROM \ TO	Bannister	Bevandale	Bellmont Forest	Biala	Blakney Ck	Breadalbane	Collector	Cullerin	Dalton	Gundaroo	Gunning	Gurrundah	Jerrawa	Ladevale	Narrawa	Oolong	Boorowa	Canberra	Crookwell	Goulburn	Yass	Wollongong	Other NSW	TOTAL
Bannister																								
Bevandale									1															1
Bellmont Forest											2													2
Biala											6									8				14
Blakney Ck									4												6			10
Breadalbane						9														3				12
Collector							15													9				24
Cullerin																				6				6
Dalton									2												10			12
Gundaroo										17								6						23
Gunning											24							1		4	6			35
Gurrundah												10								6				16
Jerrawa																								0
Ladevale											4													4
Narrawa																								0
Oolong											6										1			7
TOTAL						9	15		7	17	42	10						7		36	23			166

TABLE X.11—PLACES VISITED BY PERCENTAGE OF RESPONDENTS FOR VARIOUS ACTIVITIES DURING THE LAST MONTH, SEPTEMBER 1980

(per cent)

	Places Visited								
Activities	*Breadalbane*	*Canberra*	*Collector*	*Crookwell*	*Dalton*	*Goulburn*	*Gundaroo*	*Gunning*	*Yass*
Pre-school play-group	—	—	—	—	—	—	14	63	23
Post office	9	2	1	2	9	9	6	52	10
Bank	1	8	—	1	5	27	—	44	14
Sport or recreation	3	1	1	6	9	17	3	51	9
Hotel, restaurant or social club	3	4	1	1	6	12	4	57	12
Library	—	8	2	—	—	18	—	60	12
Visit to hospital for treatment	—	31	—	—	—	47	—	—	22
Other activities[a]	—	38	—	—	—	—	—	62	—

a. Includes visits to activities such as Church, and service club meetings.

TABLE X.12—NUMBER OF HOUSEHOLD MEMBERS DESIGNATING USE OF A PARTICULAR MODE OF TRANSPORT FOR A GIVEN ACTIVITY

Mode of travel	*Travel to work*	*Travel to shopping*	*Travel to medical services*	*Travel to schooling*
Drive car or truck	113	285	190	7
Passenger in car or truck	17	101	137	46
Ride motor cycle	3	0	0	1
Passenger in school bus	6	2	1	122
Ride bicycle or walk	115	0	0	39
Number of members engaging in activity and designating mode	254	388	328	215

TABLE X.13—NUMBER OF MAJOR SHOPPING TRIPS AND TRIPS TO MEDICAL SERVICES PER MONTH IN 192 HOUSEHOLD SAMPLE[a]

(Vehicles per month)

From	*To*							
	Dalton	*Gunning*	*Canberra*	*Crookwell*	*Goulburn*	*Yass*	*Queanbeyan*	*Other NSW*
Bannister				16	12			
Bevendale	—	2	—	14	17	28	—	4
Bellmont Forest	—	—	18	—	5	—	—	4
Biala	—	8	—	48	37	—	—	—
Blakney Creek	—	—	8	—	2	79	—	—
Breadalbane	—	—	—	—	147	—	—	—
Collector	—	—	4	—	78	—	—	—
Cullerin	—	—	—	—	36	—	—	—
Dalton	11	1	16	—	20	34	—	—
Gundaroo	—	—	47	—	—	—	35	1
Gunning	—	4	40	—	120	84	—	1
Gurrundah	—	—	1	—	122	—	—	2
Jerrawa	4	—	—	—	1	20	—	—
Ladevale	—	2	5	10	7	—	—	
Oolong	—	16	—	—	11	13	—	—
TOTAL	15	33	139	78	618	265	35	12

a. Excludes trips to work which were used for shopping or medical. Trip purpose often included incidental activities. Trips made less frequently than 0.5 per household per month not counted.

one way door-to-door trip time for each of the household members participating in the activity. The results are shown in Table X.14. At the same time respondents were asked to rate the convenience of their household's trips and the results are represented in Figures X.1 to X.4 and in Tables X.14 and X.15.

Intuitively it might be expected that door-to-door trip time would be a reasonable measure of convenience. This appears to be corroborated by the last line of Table X.14 where a general relationship can be seen.

TABLE X.14—TRIP TIME AND CONVENIENCE; ALL TRAVEL MODES

(minutes)

Activity	*Mean trip time*				
	Very convenient	*Fairly convenient*	*Neither*	*Fairly inconvenient*	*Very inconvenient*
Travel to work	20	34	26	52	32
	(97)	(32)	(24)	(4)	(3)
Travel to shopping	37	39	46	39	59
	(169)	(140)	(63)	(26)	(4)
Travel to medical	36	45	52	44	57
	(120)	(118)	(47)	(36)	(30)
Travel to schooling	26	32	22	68	63
	(90)	(62)	(8)	(8)	(13)
All activities	31	40	43	45	58
	(476)	(352)	(142)	(74)	(50)

NOTE: The figures in parenthesis represents number of responses to both travel time and convenience. This number is less than number of responses to convenience only.

In Table X.15 the mean trip time for each activity is compared with the Index of Convenience (defined earlier) for that activity. A distinct correlation can again be observed. However this is not to say that faster roads will increase convenience. The trip time measured includes waiting and walking times as well as road movement times and the relative significance of these components has not been measured.

TABLE X.15—TRIP TIME AND INDEX OF CONVENIENCE; ALL TRAVEL MODES[a]

Activity	*Mean trip time (minutes)*	*Index of convenience*	*Sample size*
Travel to work	25	135	160
Travel to schooling	32	115	181
Travel to shopping	40	110	402
Travel to medical	44	75	351
All activities	38	103	1 094

a. Calculated for respondents to both the travel time questions and the convenience questions.

In order to assess the reliability of this apparent correlation, the responses were divided into two equally sized groups having very similar geographic distributions, and the statistics in Table XIII.14 were examined for each group. While the overall mean travel times to each activity were statistically the same in both groups, and while the proportions registering various levels of satisfaction were not significantly different, results indicate that the apparent correlation between time and convenience is not robust.

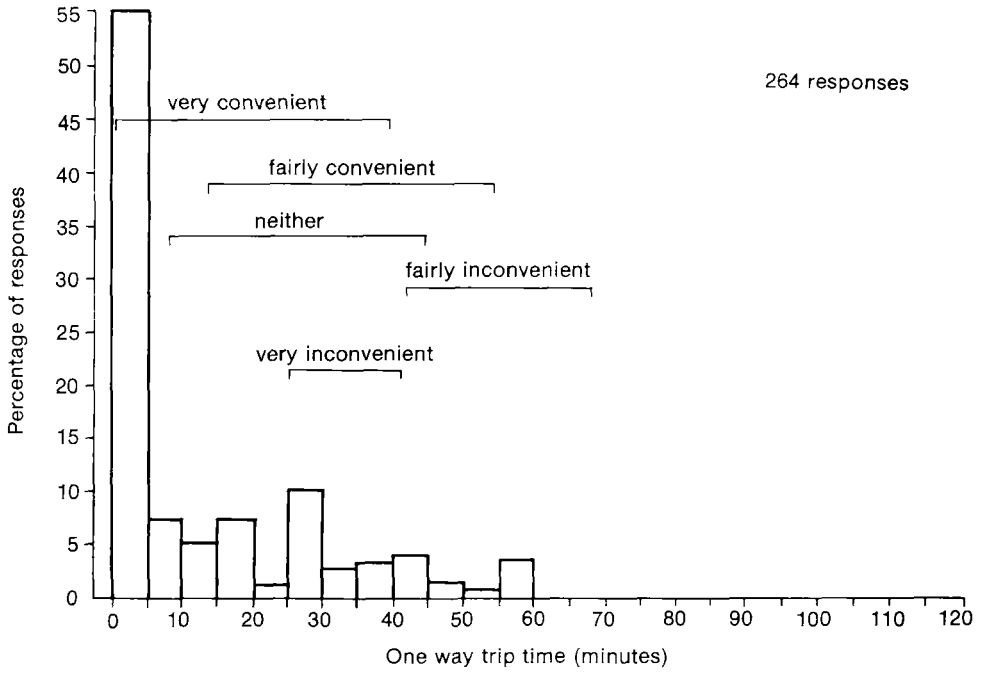


Figure X.1. Distribution of travel time; journey to work

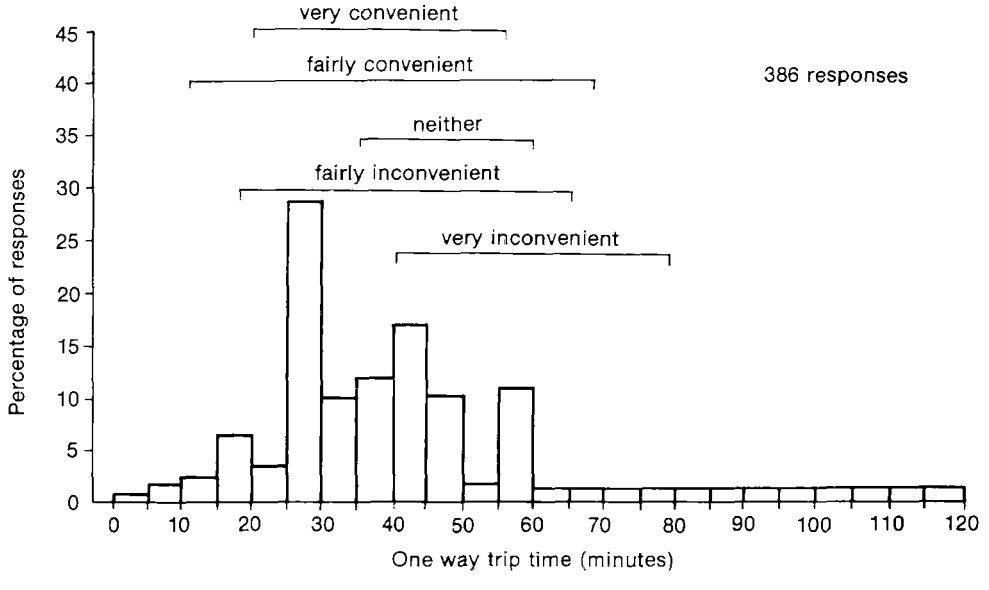


Figure X.2. Distribution of travel time; journey to shopping

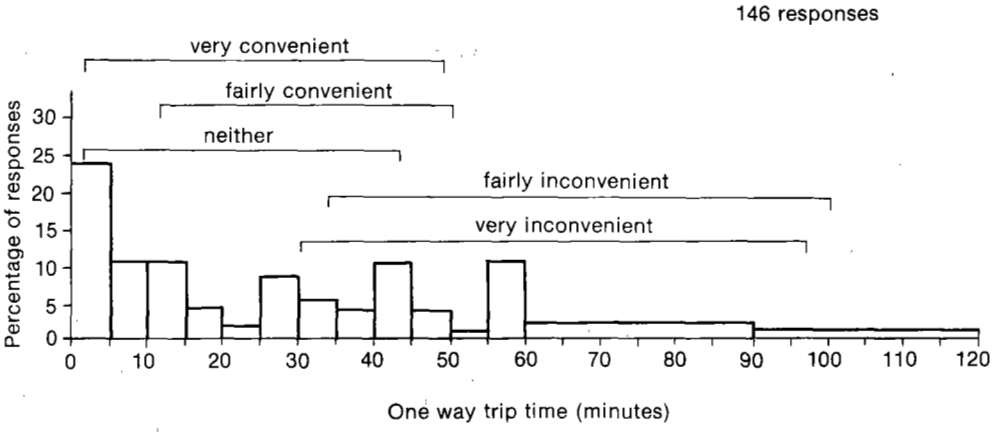


Figure X.3. Distribution of travel time; journey to school

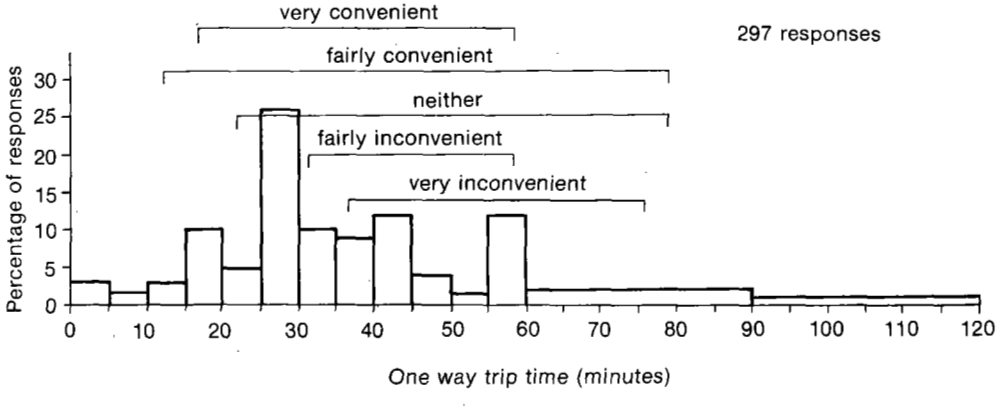


Figure X.4. Distribution of travel time; journey to medical services

Trip convenience

A comparison of the indices of convenience for people using various modes of travel for the four survey activities, and the corresponding figures for all activities and all motor transport modes are shown in Table X.16.

TABLE X.16—INDEXES OF CONVENIENCE FOR VARIOUS ACTIVITIES AND MODES OF TRAVEL

Mode of travel	*Work trips*	*Shopping trips*	*Medical trips*	*School trips*	*All activities*[a]
Drive car	117	105	83	71[b]	99
	(109)	(282)	(184)	(7)	(582)
Passenger in car	130	106	52	77	79
	(17)	(101)	(132)	(46)	(296)
Ride motor cycle	[b]	[b]	[b]	[b]	[b]
School bus	[b]	[b]	[b]	98	97
				(122)	(130)
Truck	[b]	[b]	[b]	[b]	[b]
All motor transport modes[c]	113	104	66	92	92
	(147)	(384)	(328)	(176)	(1 035)

a. Aggregate of results for mode over four survey activities.
b. Sample size too small.
c. Aggregate of results for an activity over all motor transport modes used.

NOTE: The figure shown inside the parenthesis represents the number of responses to convenience question.

The indices of convenience aggregated over modes and activities indicate that the Shire residents rate the convenience of the available motor transport fairly highly. This convenience is achieved by the extensive operations of school buses and through the relatively high rate of car ownership.

In the absence of any useful form of public passenger transport, and in the face of distances travelled to obtain goods and services, car ownership is most important to the Shire residents.

The results indicate that work trips are considered to be the most convenient motor transport trips, followed by shopping, medical and school trips. A contribution to the lower position of school trips in this ranking is made by the inconvenience frequently associated with transporting children to the school bus pick up point by car. The higher convenience of work trips is due in part to the large proportion of persons working on the properties on which they reside.

The low index obtained for car passenger travel to medical services reflects the age group of those regularly attending those services, and is also indicative of some difficulty in adjusting household travel arrangements to meet unexpected and perhaps urgent requirements. For most of the regular or pre-planned trips it seems that travel can be arranged to the convenience of passengers. Because of the nature of the survey, assessments in the car-passenger-to-school bracket were often made from the driver's viewpoint rather than the passenger's. This may explain the relatively low convenience recorded.

The levels of convenience observed in this survey do not necessarily reflect the level of satisfaction with the performance of the road system. It may be that the effects of a poor road system are being offset by a highly convenient type of vehicle, or vice versa. The results do however provide a background against which other assessments of road performance can be viewed.

Trip importance

Householders were asked to rank the importance of five activities from their point of view and also asked to nominate whether any activities other than these five were more important to them. The results given by 135 responses indicate that travel of school children is most important, followed by travel to medical treatment, shopping, work and transport of farm products in descending order. Very few respondents could nominate other activities besides those five mentioned above.

Importance-convenience relationship

A comparison of the indices of convenience aggregated over all motor transport modes for the four survey activities, and the ranking of importance of these activities is shown in Table X.17.

TABLE X.17—RANKING OF IMPORTANCE OF ACTIVITY VERSUS INDEX OF CONVENIENCE

Ranking of importance	*Activity*	*Index of convenience for motor transport*	*Index of convenience for all modes of travel*
First	Travel of school children	92 (176)	112 (214)
Second	Medical trips	66 (328)	66 (328)
Third	Shopping trip	104 (384)	104 (384)
Fourth	Work trips	113 (147)	131 (260)

NOTE: The figure shown inside the parenthesis represents the number of responses to convenience question.

If households are able to adjust their standing transport arrangements to alter the convenience of travel to various activities, one would perhaps expect that they would either:

- change those arrangements to give greater convenience to the more important activities; or
- elect not to change standing arrangements in that way, but to accept inconvenience when it arises knowing that a trip is important.

Examination of Table X.17 for all modes of travel (including walking and cycling) indicates that the second of these proposals applies and that households make standing transport arrangements that give greater convenience to trips that are made more frequently, while retaining the capability to make important unexpected trips.

However, the ability of an individual to achieve convenience is to some extent dependent on his ability to command transport resources, and the personal influence within a household of the person travelling to work may be a significant factor in the convenience rating achieved for that activity.

Comment on inconvenience

A review of the results of this survey confirms that residents' perceptions of inconvenience are related not only to the remoteness of a service or activity centre but also to the degree of dependence upon transport which is not under their immediate control. Such dependence of course is reinforced by remoteness and the absence of choice between modes. Inconvenience seems also to be the consequence of important

activities occurring simultaneously and of necessary changes in transport mode on a single trip. There are suggestions also that inconvenience may be felt as a result of nothing more than the need to temporarily change a standing transport arrangement, and that inconvenience is perceived when transport modes enforce idle waiting time.

Satisfaction

The level of satisfaction with the available transport system is indicated by a comparison of the importance attached to an activity and the prevailing level of convenience. Table X.17 makes such a comparison for Gunning Shire. While such a table shows the relative level of satisfaction it is not clear whether this satisfaction is adequate.

The level of satisfaction which has been attained in the Shire is largely the result of the high rate of private vehicle ownership and of the general suitability of the road system to those vehicles. In considering the results of this survey in relation to the satisfaction of local users overall, it must be remembered that some important local uses of the road system were not studied. These were primarily those uses involving the heavier classes of vehicle in the distribution of goods and services. Further, the activities for which convenience was measured were those for which the majority of residents travelled no further than their local district or travelled to Yass and Goulburn. Travel to secondary activities, involving principally the local road system rather than the highways, was rated as difficult by 25 per cent of respondents.

APPENDIX XI—ROAD QUALITY IN GUNNING SHIRE

Results are conveniently available for two surveys in which Gunning Shire roads were compared with nominal standards. These are the 1969-74 Australian Roads Survey and the 1979 road needs survey by the Gunning Shire Council. The standards nominated for those surveys were as follows.

NOMINAL STANDARDS

Gunning Shire Council 1979 Needs Survey

The following is an extract from Gunning Shire Council (1979), the roads for which this standard was prepared as an assessment tool are all of Functional Class 4. (Refer to definitions in Appendix IV.)

Major and Special Roads

(a) All weather pavement—gravel surface as a minimum, perhaps consider bituminous seal.
(b) Reasonable alignment, both horizontal and vertical, suitable for 80km/h with use of widening on tight crests and curves.
(c) Formation width 7 to 8m.
(d) Table drains 1.6m.
(e) Clearing sufficient for adequate mitre drains.
(f) Waterway structures to provide adequate drainage—whether pipes, box culverts, bridges or concrete causeways etc.
(g) A consistent standard of construction.

Minor Shire Roads

(a) All weather gravel pavement.
(b) Alignment for 45-69km/h.
(c) Formation width 5 to 7m wide.
(d) Table drains 1.6m.
(e) Use of gravel causeways.
(f) A consistent standard of construction.

Local Access Roads

(a) Gravel or, where acceptable, natural surface pavement.
(b) Alignment for 30-60km/h.
(c) Formation width 5 to 6m.
(d) Remainder as for Minor Shire Roads.

1969-74 Australian Roads Survey

The following is a representative abbreviation of material in Section 6 of *Australian Roads Survey 1969-74—Specification Part 1* (CBR and NAASRA 1971).

General Rules—Rural Roads not in Towns

The following standards of formation and pavement should be applied:

Road description	*Standard*
The main access to a property on which there is an occupied residence	
OR	18ft wide
A road used for seasonal traffic such as wheat cartage, timber extraction or recreation.	*formed road*

A regular route for official school bus, milk or cream pickup, or similar essential service (and there is no reasonable alternative route)	
OR	12ft wide
The area is of poor soil which may cause a formed road to become unserviceable under adverse weather conditions (and there is no reasonable alternative route).	*pavement* width adequate drainage
The cost of maintenance of an unsealed road, carrying less than 100 vehicles per day, would be inordinately high because of shortage of materials or other causes	
OR	12ft wide *seal*
Where traffic and local conditions cause serious dust problems affecting traffic safety, crops or freight.	

Operational Rules, Rural Roads not in Towns—Speed

An Average highway speed less than those tabulated, indicates deficient alignment:

Functional class of road	*Type of terrain*		
	Flat	*Undulating*	*Hilly or mountainous*
1 and 2	50 mph	45 mph	35 mph
3	45 mph	35 mph	25 mph
4[a]	34 mph	25 mph	20 mph

a Applies only to Class 4 roads which are at least formed.

Operational Rules, Rural Roads not in Towns—Width

Annual average daily traffic	*Surface type*	*Pavement width (ft)*	*Formation width (ft)*	*Bridge, major culvert, causeway and floodway width (ft)*
10-25	unsealed	0	18	12
26-100	unsealed	16	24	12
101-140	sealed	12	24	18
141-300	sealed	16	24	18
301-1 100	sealed	18	26	20

Structural Rules, Rural Roads not in Towns

The expected structural life of the road is to be ascertained. If reconstruction will be requried at a time prior to July 1979 the road shall be considered to become deficient in the particular year concerned.

Any bridge structure incapable of safely supporting the statutory loading shall be regarded as deficient. Road under rail facilities will be considered deficient, where the clearance will not permit the passage of a vehicle having the maximum legal height and the road can be economically lowered under the structure.

Rural Roads in Towns
For functional Class 4 roads in towns and following width standards apply:

	Residential land use	*Commerical and industrial land use*
Minimum sealed width	18ft	20ft
Minimum formation width or width between kerbs	20ft	28ft

WORKS REQUIRED TO RECTIFY NOMINAL DEFICIENCIES

Comparison of the road network, as it then existed, with the quality expressed in these standards resulted in the following summaries of works needed to bring the network up to the nominal standard.

Gunning Shire Council 1979 Needs Survey

Table XI.1 sets out the work the Shire Council considered necessary following its 1979 survey. The terms 'light', 'medium' and 'heavy' do not have numerical definitions but reflect the Shire Engineer's judgment of the type of work necessary.

TABLE XI.1—SHIRE ROADS WORKS NOMINALLY REQUIRED
(km)

	Reconstruction			*Gravel resheeting*	*Clearing*	
	Light	*Medium*	*Heavy*		*Light*	*Heavy*
Shire major and special roads	12.4	12.6	1.0	28.1	36.7	6.5
Shire minor roads	4.4	4.7	22.5	31.0	12.7	12.6
Shire access roads	14.1	11.0	1.1	27.2	15.5	8.2

In addition, this survey revealed a need for the shoulders of some 57 km of bitumen sealed Shire road to be repaired and for a significant program of culvert lifting and widening.

The Shire Engineer stresses the variability of unit costs per kilometre for road works and gives the following approximate minimum figures.

TABLE XI.2—APPROXIMATE COST OF SHIRE ROAD WORKS; GUNNING SHIRE, 1979
($ per km)

	Reconstruction			*Gravel resheeting*	*Clearing*	
	Light	*Medium*	*Heavy*		*Light*	*Heavy*
Shire major and special roads	1 200	1 800	2 500	1 500	600	1 500
Shire minor roads	1 000	1 200	2 000	1 000	600	1 500
Shire access roads	800	1 000	1 200	800	600	1 500

On this basis the cost of rectifying the nominal deficiencies in Functional Class 4 Shire Roads in the Shire was $293 500 in 1979, plus the cost of bitumen shoulder repair and drainage works.

The Council's survey suggested that the roadworks shown in Table XI.3 were needed on trunk and main roads to bring them to the nominated standard.

TABLE XI.3—TRUNK AND MAIN ROADS, EXTENT AND COST OF WORKS NOMINALLY REQUIRED, 1979 PRICES

Functional class	*Reconstruction to bitumen*		*Gravel resheeting*	
	(km)	*($'000)*	*(km)*	*($'000)*
2 and 3	35	1 699	12	38
4	—	—	34	109

Australian Roads Survey 1969-74 Works Requirement

Nominal deficiencies
The 1969-74 ARS identified the deficiencies shown in Table XI.4.

TABLE XI.4—NOMINAL DEFICIENCIES, GUNNING SHIRE ROADS 1969-74 ARS

Functional class	*Not meeting general rules*	*Other geometric deficiency*	*Structural deficiency*
Number of deficient sections June 1972			
1	0	5	8
3	0	18	0
4	23	48	42
Sub-total length	11.6km	292km	189km
Number of deficient sections forecast for June 1972 to June 1979[a]			
1	0	0	1
3	0	1	0
4	21	3	16
Sub-total length	86km	13km	86km

a. Forecasts were made principally on the basis of estimates of residual pavement life and on projected traffic volumes.

The 1969-74 survey divided roadworks into four classes—'improvements to existing carriageway', 'major realignment bypass', 'completely new road', and 'new or duplicate carriageway'. No requirement for works of the last two categories were identified in Gunning Shire and the only major realignment applied to the Hume Highway. The improvements to existing carriageway postulated as necessary are shown in Table XI.5 together with the costs involved. The proposed spread of costs and workload are shown in Table XI.6.

After examination of individual 1969-74 ARS road improvement project costs, the average unit cost data in Table XI.7 were derived for 'improvements to existing carriageway' in Gunning Shire. Prima facie, these costs appear to be substantially higher than those used in Gunning Shire Council's estimates, for the road classes where comparison is possible, and shown in Table XI.2.

TABLE XI.5—IMPROVEMENTS TO EXISTING CARRIAGEWAY

Road functional class	*Length and Cost of Work*								*Resultant Pavement*
	Due to geometric deficiencies alone		*Due to structural deficiencies alone*		*Due to general rules deficiencies alone*		*Due to multiple deficiencies alone*		
	(km)	*($'000)*	*(km)*	*($'000)*	*(km)*	*($'000)*	*(km)*	*($'000)*	
Required in rectification of nominal deficiencies arising before June 1973									
1			35.0	9 826			31	8 524	48ft bitumen
Subtotal Class 1	—	—	35.0	9 800	—	—	31	8 500	
3	5.8	432							18ft gravel
	3.2	83							12ft bitumen
	56.0	1 907							20ft bitumen
	27.0	995							22ft bitumen
	4.8	525							24ft bitumen
Subtotal Class 3	97.0	3 900	—	—	—	—	—	—	
4							4.6	32	12ft gravel
	9.9	94					106.0	1 032	18ft gravel
	26.0	495							20ft bitumen
	3.2	71	0.8	13	1.3	31	6.5	177	26ft bitumen
							0.7	32	40ft bitumen
Subtotal Class 4	39.0	700	0.8	100	1.3	300	118.0	1 300	
1			10.0	2 865					48ft bitumen
Subtotal Class 1	—		10.0	2 900	—	—	—	—	
3	9.2	88							18ft gravel
Subtotal Class 3	9.0	900	—	—	—	—	—		

TABLE XI.5—IMPROVEMENTS TO EXISTING CARRIAGEWAY (Cont)

Road functional class	*Length and Cost of Work*								*Resultant Pavement*
	Due to geometric deficiencies alone		*Due to structural deficiencies alone*		*Due to general rules deficiencies alone*		*Due to multiple deficiencies alone*		
	(km)	*($'000)*	*(km)*	*($'000)*	*(km)*	*($'000)*	*(km)*	*($'000)*	
4	0.9	88	72.0	744					18ft gravel
									12ft gravel
	2.7	36	0.5	6					20ft bitumen
			1.1	19			8	20	26ft bitumen
Subtotal Class 4	3.6	100	74.0	800	—	—	8	200	

NOTE: All costs in 1972 dollars and prices.

TABLE XI.6—APPROXIMATE SPREAD OF COSTS AND WORKLOAD FOR IMPROVEMENTS

	1972	*1973*	*1974*	*1975*	*1976*	*1977*	*1978*	*1979*	*1980*
Expenditure in year ($m)	1.3	3.4	5.5	3.8	3.6	3.9	3.3	1.2	0.5
Project months work in year	516	148	86	60	135	25	18	12	12
Length of improvement in year(km)	205	78	27	13	82	5	3	2	2

NOTE: Assuming work starts in year deficiency arises. Costs in constant 1972 dollars.

TABLE XI.7—COSTS OF IMPROVEMENTS TO EXISTING CARRIAGEWAY GUNNING SHIRE 1972 *($ per km)*

Functional class	*Resultant pavement*	*Average total project cost per kilometre[ab] ($'000)*
1	48ft bitumen	278.0
3	18ft gravel	75.7
	12ft bitumen	24.1
	20ft bitumen	34.3
	22ft bitumen	37.3
	24ft bitumen	111
4	12ft gravel	7.1
	18ft gravel	10.1
	20ft bitumen	15.9
	26ft bitumen	25.5
	40ft bitumen	45.5

a. Costs in 1972 dollars.
b. These total costs included a land purchase cost component which varied across the following range: Functional Class 1 $9700 per km, Class 3 $3800 per km to $1025 per km, Class 4 town streets $1400 per km, other Class 4 $145 per km to $460 per km.

SUMMARY OF SURVEY RESULTS

The Australian Roads Survey showed that 106 sections of road, totalling about 400 kilometres did not meet the nominal standard, or, in other words, were nominally deficient. The Gunning Shire Council survey showed that some 170 kilometres of Shire road was nominally deficient. Because of the wide variety of deficiencies that were identified, those comparisons do not really result in a singly dimensioned numerical value in either survey. Obtaining such a value, to give an indicator which might permit interregional comparison, necessitates conversion of the deficiency estimate into multiples of the only unit common to all types of deficiencies—dollars. The results of such a conversion are summarised in Table XI.8.

TABLE XI.8—SUMMARY OF WORK TO RECTIFY NOMINAL DEFICIENCIES IN GUNNING SHIRE ROAD SYSTEM, 1979 PRICES

Functional class	*1969-74 ARS standard*				*Gunning Shire Council survey standard*	
	Deficiencies at June 1972		*Deficiencies forecast June 1972 to June 1979*		*Deficiencies existing December 1979*	
	(km)	*($m)*	*(km)*	*($m)*	*(km)*	*($m)*
1	66	46	10	7	not assessed	
3[a]	9	18	9	2	47	1.7
4	159	5	78	2	204	0.4

a. Includes TR 52 which was changed from Functional Class 3 to Class 2 in the period between the two surveys.

While the result shown in Table XI.8 might be applied with more or less validity in a relative way—to compare Gunning Shire with others, it is certainly not an absolute measurement. The standards against which the roads have been assessed are still nominal standards. They may or may not be realistically based. The practicability or

realism of the standards nominated for the two surveys used here may be judged by the total project costs and workload estimates which have resulted.

Prima facie, the standards as written do not seem to represent an unrealistic expectation for rural road quality. Yet, the cost of achieving that quality seems prohibitive. Note too, that the costs tabulated in this Appendix do not include those of the bridging and drainage works required if the nominal standards are to be met.

While some of the deficiencies alleged by the 1969-74 ARS have been corrected in the last eight years, there has not been so much improvement as would explain the difference between the 1969-74 ARS results and those of the Shire Council's 1979 survey. The magnitude of this difference illustrates the consequences of apparently minor variations in assessment standards.

Note though that part of the high cost of the ARS improvement program is due to the standard adopted for new construction. The road resulting from an ARS improvement project would have been of higher quality than the assessment standard.

APPENDIX XII—ROAD ACCIDENTS IN GUNNING SHIRE

This appendix summarises the NSW Traffic Accident Research Unit's (TARU) records of road accidents in Gunning Shire over the period 1976-1979.

TARU records only those accidents which are reported and in which there was personal injury or substantial damage to a vehicle. TARU defines a fatal accident as one in which a person dies within 30 days as a result of injuries received in the accident. The scope of TARU records is further amplified in the last section of this Appendix which also contains a list of the accidents recorded for Gunning Shire in 1979.

Table XII.1 shows the number of recorded accidents in the Shire in the period 1976-79 and the resultant casualties, together with NSW total data for the same period. From the table it may be seen that approximately nine people are killed and 109 injured on Gunning Shire roads each year—about one per cent of the NSW totals.

TABLE XII.1—SUMMARY OF TRAFFIC CRASHES OCCURRING IN THE SHIRE OF GUNNING, 1976-1979

		1976	*1977*	*1978*	*1979*
Crashes on State Highways	Fatal crashes	4	7	9	6
	Persons killed	6	9	13	7
	Non-fatal casualty crashes	67	54	61	50
	Persons injured	111	90	114	85
	Total recorded crashes	134	129	143	115
Crashes on other roads	Fatal crashes	0	0	0	0
	Persons killed	0	0	0	0
	Non-fatal casualty crashes	6	9	8	4
	Persons injured	7	14	9	5
	Total recorded crashes	22	24	15	21
All crashes in Gunning Shire	Fatal crashes	4	7	9	6
	Persons killed	6	9	13	7
	Non-fatal casualty crashes	73	63	69	54
	Persons injured	118	104	123	90
	Total recorded crashes	156	153	158	136
All crashes in NSW	Fatal crashes	1 119	1 118	1 222	1 125
	Persons killed	1 264	1 268	1 384	1 290
	Non-fatal casualty crashes	26 274	26 825	28 229	25 888
	Persons injured	37 327	38 407	40 875	36 984
	Total recorded crashes	69 204	70 535	76 127	66 738

Eighty-six per cent of the recorded accidents in the period and 92 per cent of the casualties occurred on the two National Highways in the Shire. All the fatal accidents were on those highways.

As shown in Appendix VIII, traffic on the highways accounts for approximately 85 per cent of the total annual vehicle kilometres of travel in the Shire. Statistical fluctuations in traffic volumes and accident frequencies are such that the significance of the apparently slightly disproportionate number of casualties on the highways cannot be stated with certainty.

The involvement of locally resident drivers in the recorded accidents is shown in Table XII.2. This data shows that about 92 per cent of recorded accidents involve drivers not resident in Gunning and that those accidents are four times more likely to result in fatalities than are accidents to Gunning residents.

TABLE XII.2—RESIDENT STATUS OF DRIVERS INVOLVED IN CRASHES IN THE SHIRE OF GUNNING, 1976-1979

		1976	*1977*	*1978*	*1979*
Drivers[a] resident of Gunning	Fatal crashes	0	0	0	1
	Non-fatal casualty crashes	3	6	8	2
	All recorded crashes	10	18	12	13
Drivers non-resident of Gunning	Fatal crashes	8	9	18	12
	Non-fatal casualty crashes	105	87	89	62
	All recorded crashes	196	201	203	154
Drivers with unknown postcodes	Fatal crashes	0	1	0	0
	Non-fatal casualty crashes	2	0	2	2
	All recorded crashes	6	5	4	4

a. Residents are those drivers with postcodes recorded as 2581.

There was a widespread belief among Gunning Shire residents that 'most of the bad accidents involve trucks'. Table XII.3 provides data on the accidents directly involving trucks on the Hume Highway during 1978 and 1979. Light trucks and sedan derivatives are excluded from truck data.

TABLE XII.3—ACCIDENTS ON THE HUME HIGHWAY[a] IN THE SHIRE OF GUNNING, 1978 AND 1979

Vehicle involved	*Fatal crashes*		*Non-fatal casualty crashes*		*Total recorded crashes*	
	1978	*1979*	*1978*	*1979*	*1978*	*1979*
Trucks	4	3	12	14	21	23
All types	5	6	21	23	45	62

a. 3.2 kilometres southwest of Cullerin to 18.8 kilometres southwest of Gunning.

This data shows that, on the Hume Highway, accidents involving trucks were:

- 2.5 times more likely to be fatal than were accidents to other vehicle types;
- twice as likely to cause injury as were accidents to other vehicle types; and
- occurring at 70 per cent of the annual frequency of accidents to other vehicle types.

Appendix VIII indicates that trucks comprise about 30 per cent of the Hume Highway traffic volume.

These results indicate that the residents' view of the truck accident record has a reasonable basis in fact.

The frequency with which accidents occur at particular locations can provide a a pointer to road conditions which are a contributory cause of accidents. Six sections of road, each two kilometres long, accounted for one-third of the accidents in Gunning Shire during 1979.

On one two-kilometre section, on the Hume Highway, there were 12 accidents during the year and on another there were nine accidents. On the remaining two-kilometre sections of that Highway in the Shire there were an average of 2.5 accidents per year. The offending sections of road were centred 10 kilometres and 19 kilometres respectively east of Gunning in the Cullerin Ranges.

On the Federal Highway, the two-kilometre section centred on Collector recorded eight accidents during 1979, while the average for the remaining sections of the Federal Highway in the Shire was 2.1 accidents per year.

Map XII.1 shows the approximate locations of accidents in the Shire during 1979.

NSW TRAFFIC ACCIDENT RESEARCH UNIT CRASH STATISTICS

Criteria for reporting crashes

Accidents involving motor vehicles are reported to New South Wales police under Section 8(3) of the Motor Traffic Act (1909) as amended. During 1978 the Act required that all drivers of motor vehicles in New South Wales report to the police any involvement of their vehicle in any accident on streets, roads, lanes, thoroughfares, footpaths, or places open to or used by the public (for fee or otherwise) where there was death, injury, or property damage over $300.

The Motor Traffic Act does not require notification of crashes in which there was no motor vehicle. However, some crashes involving only non-motorised vehicles, for example bicycles, are reported to police.

Criteria for recording crashes

Crashes counted in the crash statistics in this statement have been selected from those reported to New South Wales police. In accordance with recommended definitions for national uniformity in traffic crash records, only crashes occurring on public roads are defined to be traffic crashes. Hence crashes in off-street parking areas, access areas, or beaches and other private property not regarded as a public way are not counted as road traffic crashes.

In addition, the selection criteria exclude crashes where no vehicle was towed away and no person was injured. This exclusion of minor crashes is undertaken to allow attention to be concentrated upon those crashes which contribute most of the trauma and expense arising from motor traffic crashes. The exclusion also keeps out of the statistics a group for which reporting is known to be most haphazard.

All crashes reported to police which involve a bicycle but no motor vehicle, are recorded provided they fulfil the other criteria.

Every attempt is made to count crashes into their correct year. Some reports of non-fatal crashes in one year are received very late into the next year, however, and about 0.5 per cent are counted into the following year totals.

There are crashes involving tow-away or casualty which are not reported in spite of being required by law. There is therefore a need to recognise that the thoroughness of reporting of crashes may vary and that this may be an explanation for some differences which emerge from comparisons.

It is most important to note that prior to July 1st, 1975, all reported crashes were counted in the Statistical Statements. Recorded crash statistics prior to July 1st, 1975 are thus *not* comparable with statistics after July 1st, 1975.

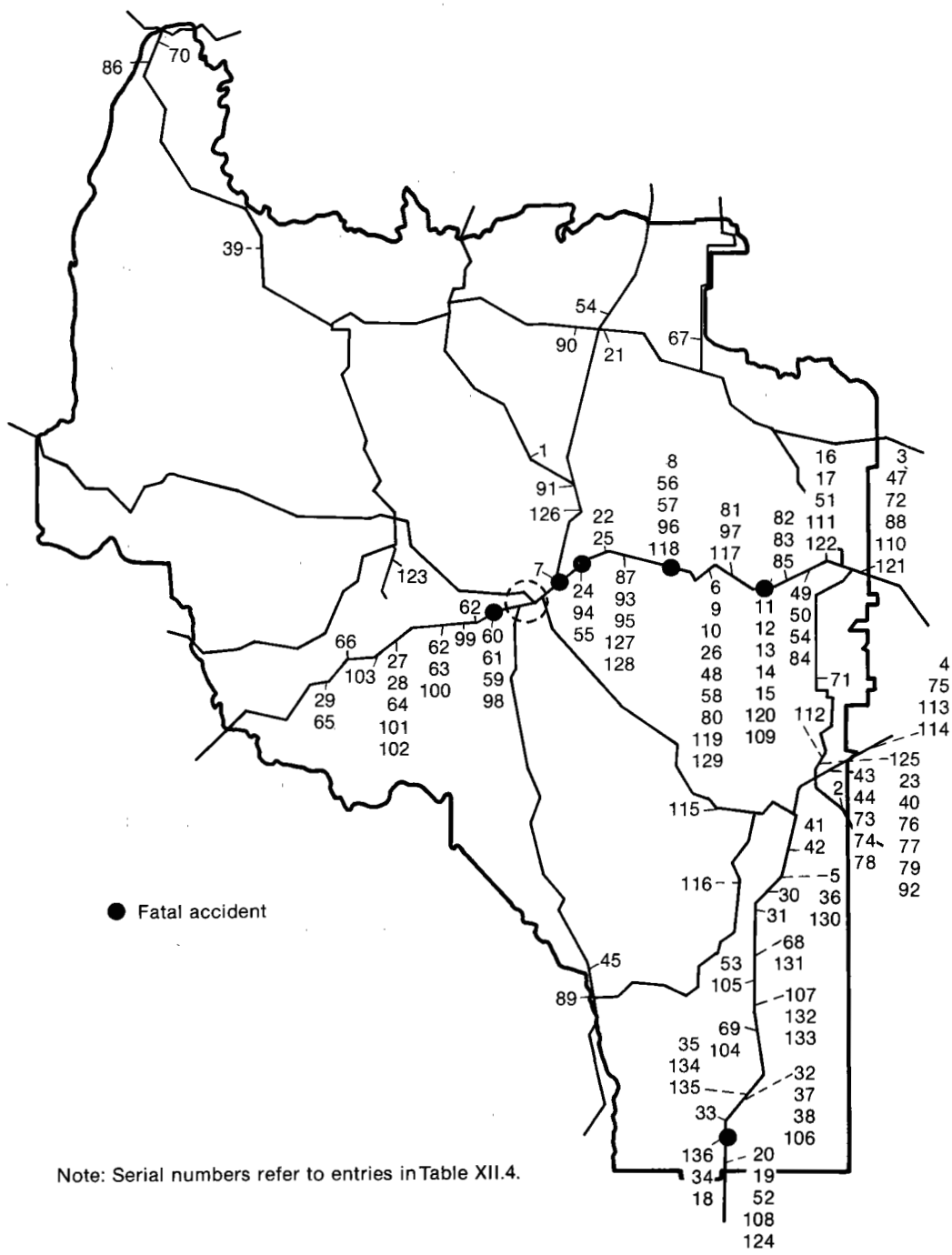


Figure XII.1. Approximate location of traffic crashes 1979

TABLE XII.4—ROAD ACCIDENTS IN GUNNING SHIRE, 1979

No	Date	Major road	Vehicles involved			Casualties		Details
			Car	Truck	Bike Other	Killed	Injured	
1	Mar	Local	1					Hit embankment
2	Mar	Local	1					Hit tree
3	Jan	Hwy (F)	1				2	Going straight
4	Feb	Hwy (F)	1					Hit embankment
5	Jan	Hwy (F)	1		1			Going straight
6	Mar	Hwy (H)	1					Hit safety fence
7	Jan	Hwy (H)	1	2		1	4	Going wrong way
8	Feb	Hwy (H)	1	1			5	Going straight
9	Feb	Hwy (H)	1					Hit embankment
10	Mar	Hwy (H)	1					Hit safety fence
11	Feb	Hwy (H)		1				Going straight
12	Mar	Hwy (H)		1			1	Hit safety fence
13	Jan	Hwy (H)		1				Going straight
14	Jan	Hwy (H)		1			1	Hit embankment
15	Mar	Hwy (H)		1				Going straight
16	Mar	Hwy (H)	1	1			2	Going wrong way
17	Mar	Hwy (H)	1				2	Hit creek
18	Jan	Hwy (F)	1			1	3	Hit tree
19	Feb	Hwy (F)	2					Hit animal
20	Mar	Hwy (F)	1					Going straight
21	Feb	Trunk	1					Going straight
22	Mar	Hwy (H)	1					Hit embankment
23	Mar	Hwy (F)	1				1	Going straight
24	Mar	Hwy (F)	2				1	Hit stationary vehicle
25	Jan	Hwy (F)	1				2	Going straight
26	Jan	Hwy (F)	1					Going straight
27	Jan	Hwy (F)	1				2	Hit tree
28	Feb	Hwy (F)	1	1				Going wrong way
29	Mar	Hwy (F)	1					Hit embankment
30	Jan	Hwy (F)	1					Hit fence
31	Feb	Hwy (F)		2			2	Going straight

TABLE XII.4—ROAD ACCIDENTS IN GUNNING SHIRE, 1979 (Cont)

No	Date	Major road	Vehicles involved			Casualties		Details
			Car	Truck	Bike Other	Killed	Injured	
32	Feb	Hwy (F)	1				1	Hit embankment
33	Mar	Hwy (F)			1		1	Hit embankment
34	Mar	Hwy (F)			2		2	Going straight
35	Feb	Hwy (F)	1				1	Hit tree
36	Feb	Hwy (F)	1					Nil
37	Feb	Hwy (F)	2					Going straight
38	Jan	Hwy (F)	1				1	Hit embankment
39	Apr	Main	1					Going straight
40	Jun	Hwy (F)	2				1	Going wrong way
41	May	Hwy (F)	2				1	Stationary Station Wagon
42	May	Hwy (F)	1				2	Animal
43	Jun	Hwy (F)	1				1	Going straight
44	Apr	Hwy (F)	1					Hit safety fence
45	May	Trunk	1					Hit safety fence
46	Jun	Hwy (H)	1					Going straight
47	Jul	Hwy (H)	1					Going straight, hit embankment
48	May	Hwy (H)	1					Going wrong way, hit safety fence
49	Jun	Hwy (H)	1					Going straight, hit safety fence
50	Apr	Hwy (H)	1					Going straight, hit safety fence
51	May	Hwy (H)	1					Going wrong way, bridge
52	Jun	Hwy (F)	1					Going wrong way, hit tree
53	Apr	Hwy (F)			1		1	Going straight, hit stray animal
54	Apr	Trunk	1					Going straight, hit kerb
55	Apr	Hwy (H)	1	2			2	Truck broken down
56	Apr	Hwy (H)	2					Going straight, hit embankment
57	May	Hwy (F)		1				Going straight, hit kerb
58	Apr	Hwy (H)		1			1	Going straight
59	Jun	Hwy (H)	1			1		Going straight
60	May	Hwy (H)	1					Going straight, hit embankment
61	Jun	Hwy (H)	2					Going straight

TABLE XII.4—ROAD ACCIDENTS IN GUNNING SHIRE, 1979 (Cont)

No	Date	Major road	Vehicles involved			Casualties		Details
			Car	Truck	Bike Other	Killed	Injured	
62	Apr	Hwy (H)	1					Hit safety fence
63	Apr	Hwy (H)	1					Hit embankment
64	May	Hwy (H)	1					Falling object
65	Apr	Hwy (H)	1				1	Going straight
66	May	Hwy (H)		1			1	Going straight
67	Apr	Local	1					Going straight
68	Apr	Hwy (F)	1				1	Going straight, hit tree
69	Apr	Hwy (F)	1				1	Going straight, hit embankment
70	Aug	Main	2					Going straight
71	Jul	Local					1	Going straight, hit embankment
72	Aug	Hwy (H)		1				Going straight
73	Sep	Local	1	1				Parked
74	Aug	Hwy (F)	1		1		1	Going straight
75	Jul	Hwy (F)	1				1	Going straight
76	Sep	Hwy (F)	1					Mounted kerb
77	Aug	Hwy (F)	1					Straight into building
78	Sep	Hwy (F)	1					Going straight, hit safety fence
79	Aug	Hwy (F)	1				2	Going straight, hit kerb
80	Sep	Hwy (H)		1			1	Going straight, hit embankment
81	Sep	Hwy (H)		1			1	Going straight
82	Aug	Hwy (H)		1			1	Going straight, hit safety fence
83	Aug	Hwy (H)	1					Going straight, hit embankment
84	Jul	Hwy (H)		1			1	Going straight, hit embankment
85	Sep	Hwy (H)	1					Going straight, hit safety fence
86	Sep	Main						Hit kerb
87	Sep	Hwy (H)	1				1	Going straight, hit embankment
88	Jul	Hwy (H)	1					Going wrong way
89	Jul	Trunk	1					Going straight
90	Sep	Local	1					Going straight
91	Aug	Trunk	1					Going straight, hit embankment

TABLE XII.4—ROAD ACCIDENTS IN GUNNING SHIRE, 1979 (Cont)

No	Date	Major road	Vehicles involved			Casualties		Details
			Car	Truck	Bike Other	Killed	Injured	
92	Jul	Local	1					Hit other object
93	Aug	Hwy (H)		1				Going straight, hit embankment
94	Jul	Hwy (H)	2			2	1	One car going wrong way
95	Jul	Hwy (H)	1					Hit other object
96	Aug	Hwy (H)	2	1		1	3	One car going wrong way
97	Aug	Hwy (H)	1				1	Road surface
98	Aug	Hwy (H)	1				1	Going straight
99	Aug	Hwy (H)	2					Going straight
100	Sep	Hwy (H)	3					Going wrong way
101	Aug	Hwy (H)	1				1	Going straight, hit embankment
102	Sep	Hwy (H)	1				6	Going straight, hit tree
103	Sep	Hwy (H)	1				1	Going straight
104	Sep	Hwy (F)	2	1			2	Hit stationary vehicle
105	Aug	Hwy (F)	1				1	Going straight, hit tree
106	Aug	Hwy (F)	2					Hit stationary vehicle
107	Aug	Hwy (F)	1					Hit stationary animal
108	Jul	Hwy (F)	2					One car going wrong way
109	Dec	Hwy (H)	2	1		1		Car going wrong way
110	Nov	Hwy (H)	1				1	Going straight, hit embankment
111	Dec	Hwy (H)	1					Going straight, hit embankment
112	Dec	Local	1				1	Going straight
113	Oct	Hwy (F)	1				1	Pedestrian crossing, road
114	Nov	Hwy (F)	1					Hit embankment
115	Dec	Local	1					Going straight, hit tree
116	Oct	Local	1					Going straight, hit tree
117	Nov	Hwy (H)	1					Going straight, hit guide post
118	Nov	Hwy (H)	1					Going straight, hit bridge
119	Nov	Hwy (H)	1				1	Going straight
120	Dec	Hwy (H)		1			1	Going straight, hit safety fence
121	Oct	Hwy (H)	1	1			1	Semi going wrong way

TABLE XII.4—ROAD ACCIDENTS IN GUNNING SHIRE, 1979 (Cont)

No	*Date*	*Major road*	*Vehicles involved*			*Casualties*		*Details*
			Car	*Truck*	*Bike Other*	*Killed*	*Injured*	
122	Dec	Hwy (H)	1	1				Car going wrong way
123	Nov	Local	1				1	Going straight, hit building
124	Dec	Hwy (F)	2					One car going wrong way
125	Oct	Local	1				2	One vehicle going straight
126	Dec	Trunk	1					Going straight, hit embankment
127	Nov	Hwy (H)	1				2	Going wrong way
128	Dec	Hwy (H)	2					One vehicle pulling out
129	Oct	Hwy (H)		1				Going straight, hit embankment
130	Nov	Hwy (F)		1				Going straight
131	Oct	Hwy (F)	1				4	Going straight, hit embankment
132	Oct	Hwy (F)		2			1	Going straight
133	Dec	Hwy (F)	1					Going wrong way
134	Oct	Hwy (F)	1					Going straight
135	Nov	Hwy (F)	1					Going straight, hit embankment
136	Oct	Hwy (F)	1					Going straight

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