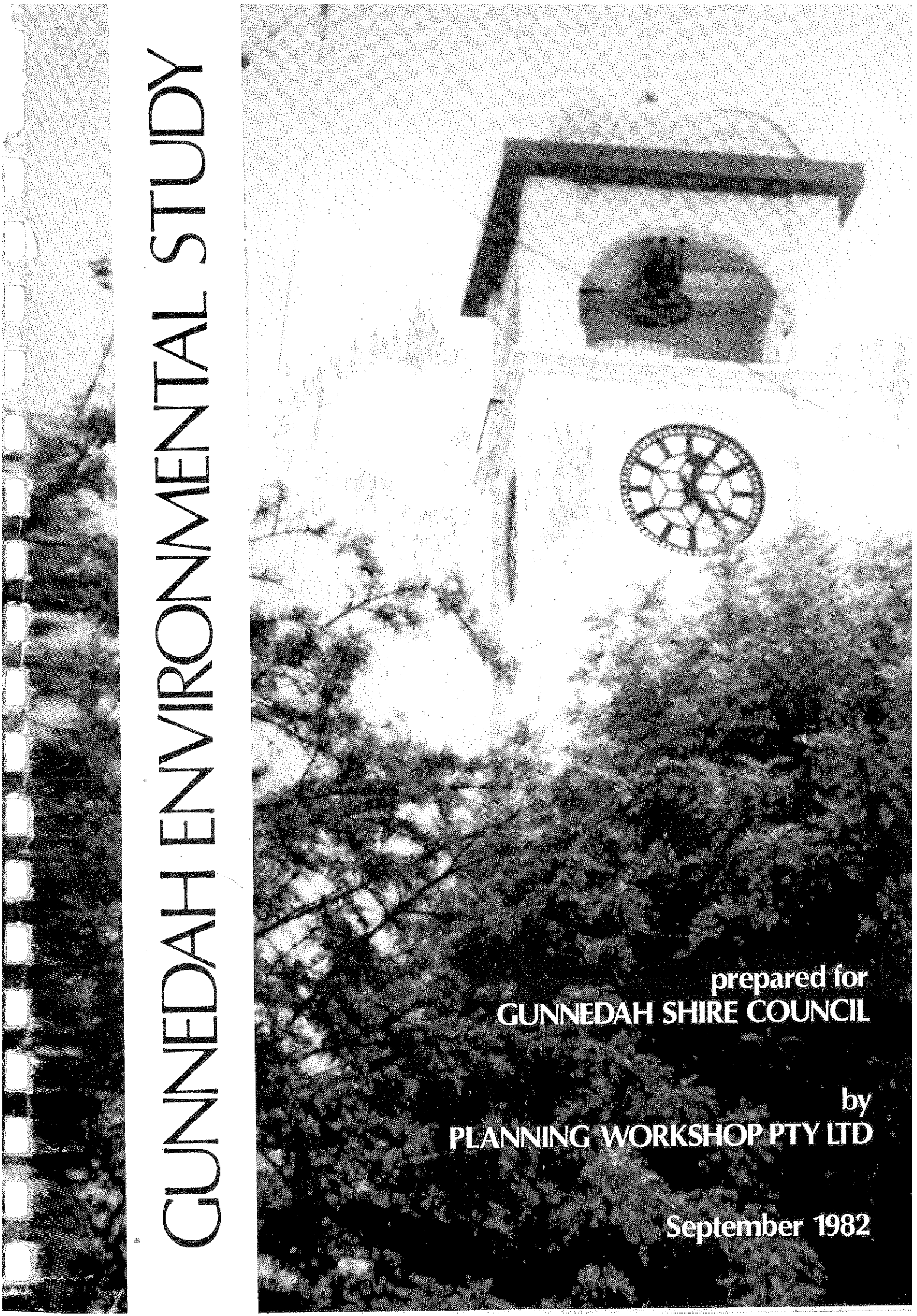
GUNNEDAH ENVIRONMENTAL STUDY



prepared for
GUNNEDAH SHIRE COUNCIL

by
PLANNING WORKSHOP PTY LTD

September 1982

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346 Kent Street Sydney 2000

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ACKNOWLEDGEMENTS

This study has been prepared by Planning Workshop with the assistance of Sinclair Knight and Partners Pty Ltd and F.L. Gennaoui and Associates.

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1. INTRODUCTION

1.1 Terms of Reference

On 15th February 1982, Gunnedah Shire Council resolved to prepare a Local Environmental Plan in accordance with Section 54 of the Environmental Planning and Assessment Act, 1979.

The preparation of such a Plan is preceded by the preparation of an Environmental Study. The Study provides a background and context for the preparation of the Plan and outlines the objectives of Council in preparing it.

Planning Workshop Pty Ltd was appointed by Council on 5th March, 1982, to undertake the Study and prepare the Plan.

The terms of reference of the Study were determined by the following four factors:

* The legal requirements of the Environmental Planning and Assessment Act, 1979.

* Study specifications issued by Council.

* Additional specifications issued by the Regional Office of the Department of Environment and Planning.

* Directions issued by the Minister for Planning and Environment under Section 117 of the Act.

Approval for the Study and Plan was given by the Department of Environment and Planning.

1.2 Scope of the Study

Following consultation with Council on the content of the Environmental Study, it was determined that the Study would be designed to address a number of key issues emerging in the area. These were identified as the following:

Urban Growth Issues

* The demand for and supply of additional urban land, including an analysis of housing type needs together with an investigation of the likely demand for, and the most appropriate location of, rural residential subdivision.

* The provision of community facilities, particularly should an increase in population of differing socio-economic characteristics occur. Staging the provision of such facilities requires close attention as does the possible sources of finance.

* The adequacy of the present provision of industrial and commercial land use zonings and the appropriate location for additional land.

* The reinforcement and expansion of the existing town centre.

* The preservation, where possible, of the present character of the urban areas; identification and protection of historic buildings, precincts and townscapes; and the integration of new growth with the existing physical and social fabric.

* The impact of flooding on potential land uses and the effects of flood mitigation strategies.

* The extent and likely impact of industrial growth in the area, and the identification of opportunities to broaden the industrial base of the town.

* The effects of growth on the physical, social and economic structure of the town.

* Examination and review of existing planning schemes, land use zones and development controls, with a view to a simpler, more flexible system, more responsive to present-day market needs.

Transport Issues

* The redirection of through traffic, particularly heavy vehicles, from the central area of Gunnedah by appropriate low cost measures.

* The effects of expected development on the transport system, including the broad identification of any existing or potential land use/transport conflicts.

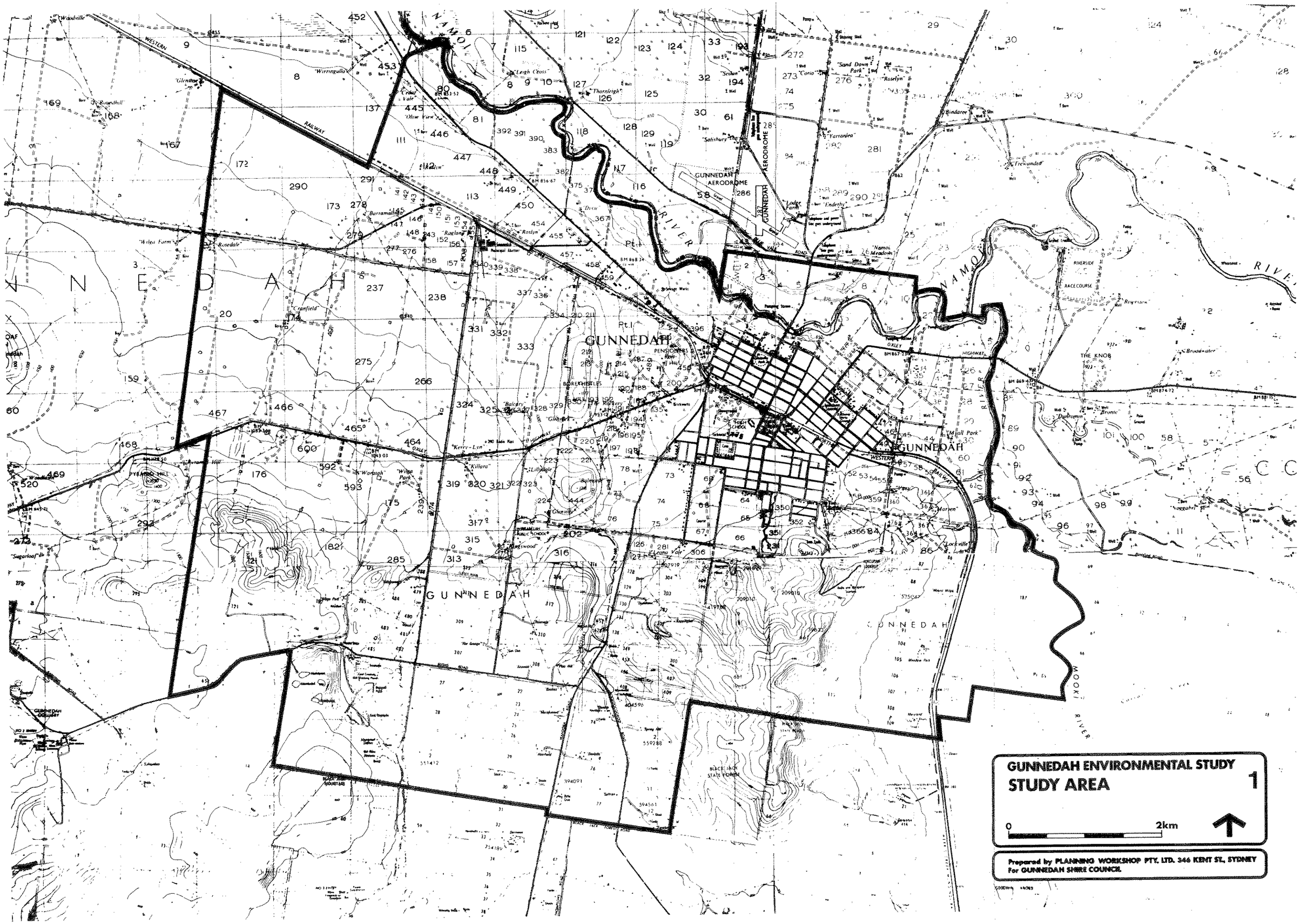
Organisational and Administrative Issues

* The mechanisms for co-operation between Councils and various public and private agencies to enable the provision and financing of facilities when and where required.

* The feasibility of Council involvement in the land conversion process.

The purpose of the Environmental Study was determined as to properly identify and document these issues, and to make recommendations for their resolution that could be incorporated into a Draft Local Environmental Plan.

In spatial terms, the scope of the study was limited to an area slightly larger than the boundaries of the former Gunnedah Municipality, but considerably smaller than the area of land covered by Local Environmental Plan No. 1 - Shire of Gunnedah. In effect, the Study Area was defined as the township of Gunnedah, and those immediate environs of the town which could potentially be involved in the urban expansion process within approximately the next ten years. The precise Study Area is shown on Map 1.



GUNNEDAH ENVIRONMENTAL STUDY

STUDY AREA

1

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For GUNNEDAH SHIRE COUNCIL

1.3 Study Objectives

The overall objective of the Study was consequently to ultimately devise a legal mechanism by which Council can direct the future development of the town in a desirable, efficient and environmentally sensitive manner. This mechanism was to be a Local Environmental Plan which would replace the existing Gunnedah and Liverpool Plains Planning Scheme, various Interim Development Orders which apply to Gunnedah, and that part of Local Environmental Plan No. 1 which is contained within the Study Area.

The need to substantially revise the existing planning instruments was necessitated by a number of developments which have occurred in recent years:

* The amalgamation of the local Councils of Liverpool Plains and Gunnedah, providing the opportunity to extend planning control outside the area presently covered by the Gunnedah Planning Scheme.

* The recently enacted Environmental Planning and Assessment Act 1979 providing a new planning framework and the opportunity for Councils to take an increasingly important and more active role in the environmentally sensitive and economically sound development of the local area, and providing a new legal framework for updating and improving the existing prescribed scheme.

* The continual and constant growth of the township necessitating a review of the existing urban structure of the town and the identification of areas for future industrial, commercial and residential growth. The intensity of these growth pressures has been increased by the possibility of coal mining developments in the Gunnedah area.

The Study is intended to provide the basis on which changes such as these can be accommodated.

1.4 Study Methodology

The Study methodology adopted followed guidelines issued by the Department of Environment and Planning in two publications:

* Local Planning Manual (Draft) - December 1981.

* Rural Land Evaluation Manual - November 1981 (where relevant).

The approach of the Department to various issues, e.g. dual/multiple occupancy, rural planning, development of flood prone lands, as expressed in a series of guidelines, technical bulletins and policy circulars issued by the Department fron time to time, has also been taken into consideration.

In accordance with Section 62 of the Act, the following series of public and private agencies and authorities were consulted during the course of the Study in order that a comprehensive information base could be formulated:

* Department of Environment and Planning.
* Department of Education.
* NSW Heritage Council.
* Bureau of Meteorology.
* Department of Sport and Recreation.
* Department of Tourism.
* Land Board Office.
* Department of Youth and Community Services.
* Health Commission.
* Department of Social Security.
* Water Resources Commission.
* National Parks and Wildlife Service.
* Department of Public Works.
* Department of Agriculture.
* Pastures Protection Board.
* Housing Commission.
* Department of Mineral Resources.
* National Trust of NSW.
* Gunnedah Chamber of Commerce.
* Department of Technical and Further Education.

Where information has been received from these authorities, it has been incorporated into the Study where appropriate.

The Study has used existing information sources and previous studies where they have been available. These have included:

* An Atlas of New England; University of New England, 1976.

* Gunnedah Sewerage and Water Supply Development Strategy Reports; Sinclair Knight and Partners Pty Ltd, 1981.

* The various documents of the Namoi Valley Flood Mitigation Study; Water Resources Commission, 1980.

* District Technical Manual, Soil Conservation Service of NSW, 1976.

* Study of Gunnedah and the Liverpool Plains, University of New England, 1974.

* Various Environmental Impact Statements relating to nearby coal mining proposals.

A third and invaluable source of information has been the community of Gunnedah itself, and of course, Gunnedah Shire Council. The planning exercise involved, in its earliest stages, a series of lengthy discussions with Council officers and representatives of various community and local groups. At a later stage, the public will be asked to make comment on the findings of the Environmental Study, and the recommendations embodied in the resultant Draft Local Environmental Plan. These are the two avenues of public involvement provided for in the planning process by the Environmental Planning and Assessment Act, 1979. In this manner, the subject Environmental Study can provide a basis for public discussion on those matters which are addressed during the preparation of a Local Environmental Plan. In particular, the Study will specify the kinds of aims, objectives, policies and strategies which the Draft Local Environmental Plan should adopt.

2. DESCRIPTION OF THE PLANNING PROCESS

2.1 Past and Existing Statutory Controls

The town of Gunnedah grew in a relatively orderly manner from the time of the original Crown Survey in 1856. While Gunnedah Municipal Council had for some years been applying the principles of town and country planning to the growth and development of Gunnedah, it was not until the early nineteen-fifties that it resolved to prepare the town's first joint Planning Scheme in association with Liverpool Plains Shire Council.[1]

This joint action, which resulted in the preparation and operation of the Gunnedah and Liverpool Plains Planning Scheme, was a natural outcome of the location of the Municipal area more or less centrally in the Shire, and its development, until comparatively recently, right to its boundaries. Consequently, as an early town planning report explained:

> ". . . any development which may take place close to the town, but within the Shire area, would have its effect on the growth of the town. If that development was unsuitable to the type of development within the Municipality adjacent to it, the effect could be a hotch-potch of industrial or commercial development next to residential, with resultant problems of nuisance, ugliness, traffic, noise and the like."
>
> (Gunnedah Municipal Council
> Report of the Health Surveyor, 1970, p.1)

The joint Gunnedah and Liverpool Plains Planning Scheme was not proclaimed until 6th January, 1966. In the meantime, an Interim Development Order over the Municipality and that part of the Shire involved in the Scheme was introduced and became operational on 6th December, 1957. The power to implement this Interim Development Order was vested in an Interim Joint Planning Authority which continued in existence until after the Scheme was proclaimed and Town Planning Control was vested in the individual Council of the area in which the particular development was to take place.

The same kinds of pressures which led to the formulation of a joint Scheme eventually led to the amalgamation of the two Councils in 1980 to form the present Gunnedah Shire Council. Faced with the proliferation of 22 amendments to the existing Scheme in the form of Interim Development Orders, and the lack of planning control over some rural parts of the Shire, the new Council prepared and gazetted a Local Environmental Plan under the new environmental planning legislation introduced in 1980.

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1. Gunnedah and Liverpool Plains Town Planning Report (to accompany preparation of original Scheme).

Local Environmental Plan No. 1 - Shire of Gunnedah, gazetted on 27th November 1981, finally placed the remainder of the Shire of Gunnedah under town planning control.

2.2 Past and Existing Planning Principles and Policies

The development of statutory planning instruments over time in Gunnedah has reflected various changes in the planning philosophy applied to the town and Shire.

The joint Planning Scheme was developed to pursue several specific objectives relating to the direction of growth of Gunnedah. Until the time of the Plan, the growth of Gunnedah had been progressing largely along commercial and administrative lines with little focus on industrial development other than of a rural service nature. Council recognised the opportunity presented by the good transport facilities of the area to extend this sphere. The Plan consequently set aside ample space for industrial development should it occur.

Similarly, while the plan was prepared on the assumption that the town would have a population of 15,000 by 1980, it also allowed space for extension of residential zones into areas set apart for rural purposes, should the population have grown more rapidly than was anticipated.

The Plan also enveloped other matters of concern to Council at that time. In particular, it was stated that:

> "To a certain extent, the planning of Gunnedah was undertaken as a measure to enable development in areas subject to periodic flooding, to be controlled."
>
> (ibid, 1970, p.2)

This was considered to explain the intention of such zonings as Non-Urban B, Residential E, and Residential C.

The majority of Interim Development Orders introduced to make alterations to the gazetted Scheme over the years involved only 'spot' changes to permitted land use. Some extension to industrial zonings occurred and significant extensions of residential areas into rural areas occurred as the need arose. Other changes, however, acknowledged and made allowance for a new land use trend appearing in Gunnedah - the development of residential flat buildings; while the introduction of a 7(d) Scenic Protection Zone, marked the acceptance of new environmentally oriented planning philosophies.

The trend toward residential flat buildings as a dwelling form in fact warranted Council to produce a specific policy guideline outlining the criteria which Council considered desirable in the erection of residential flats. These guidelines were adopted on 5th November, 1973, as the Residential Flat Policy for the Municipality of Gunnedah. In an introduction to the Policy Statement, Council indicated that the adopted standards were not be be considered 'unbreakable' but only a basic guide to persons wishing to carry out development of that type. Further, it was made clear that the policy was to be considered only an interim measure until the development of a new town planning scheme.

In considering this type of development of Gunnedah, Council considered that the present character of Gunnedah as a rural service town of relatively low density should be preserved, while allowing the development of types of accommodation not previously available in Gunnedah.

To achieve these ends and to determine areas suitable for the erection of residential flat buildings, Council considered that factors to be taken into account should include the existing development, the character of existing neighbourhoods, the areas and dimensions of existing allotments. By taking into account such factors, Council hoped to eliminate such problems as obstruction of views, buildings being 'out of scale' with existing buildings, or overshadowing of other buildings.

Council resultantly adopted the view that in order to keep the intensity of development in the southern part of the town to a 'country town' level, the height of buildings in that part of town should be limited to two storeys in height, exclusive of underfloor parking area. It also indicated that it was desirable for at least 50 per cent of the units in any residential flat building to have at least two bedrooms, basically to prevent the generally unpopular 'bachelor flat' image (Residential Flat Policy, Municipality of Gunnedah, 1973). A map showing the areas considered suitable for development of flats of varying heights accompanied the Policy Document, and is discussed at a later stage in the report.

A major addition to planning provisions occurred with the formulation of Gunnedah Local Environmental Plan No. 1 in 1981 to extend zoning controls over all rural areas of the Shire. This Plan:

* redefined the non-urban zoning categories into 5 classes of rural land uses;

* introduced a 2(V) Village or Township zone to permit the categorisation of the Shire's villages;

* required all general industrial development to be subject to the consent of Council; and

* redefined the Open Space 6(C) zoning.

In addition it contained various special provisions relating to:

* rural subdivision;

* permissible uses within rural areas and factors to be considered in their approval;

* development in flood prone areas; and

* the then pending development consent for the Black Jack Coal Mine.

Several of these concerns remain pertinent to the formulation of future planning provisions. Some have become no longer relevant; or can now be more desirably controlled in a different manner. New concerns have also arisen over various issues in the interim, and require resolution by either statutory means or policy resolution.

This study provides the opportunity to review and redefine the direction in which the planning of Gunnedah is progressing, under a new and streamlined planning legislation.

The procedure by which this can occur is outlined in the following section.

2.3 The New Legislative Planning Procedures

The preparation of Environmental Studies and Draft Local Environmental Plans is basically a legal process, the requirements for which are outlined in the Environmental Planning and Assessment Act 1979. There are a number of rules, guidelines and policies issued by the Department of Environment and Planning that substantially govern the content and operation of Local Environmental Plans and thus the studies. These policies and guidelines refer to the following:

* Specifications of the Department on the content of the Study;

* Directions under Section 117 of the Act;

* State Environmental Planning Policies No.'s 1, 4, 5;

* Regional Environmental Plans - no regional environmental plans apply for the area at this point in time.

The applicable first three guidelines are reproduced in Appendices 1-3.

The new legislative planning procedures embodied in the new Act came into effect in 1980. Broadly the steps involved in this formal procedure are:

* **Council resolves to prepare a Local Environmental Plan:** and notifies the Department of Environment and Planning.

* **Preparation of an Environmental Study:** The Environmental Study is a prerequisite to the preparation of a Local Environmental Plan. It gives wide and detailed consideration of the physical, economic and social attributes of the area and develops the most appropriate forms of future development of the area. In essence, it provides background information and a context for the preparation of a Local Environmental Plan.

* **Exhibition of Environmental Studies:** Once a study has been adopted by Council it is then placed on public exhibition together with the requirements of the Department of Environment and Planning. The study is to be exhibited for a minimum period of one month and the public is invited to make submissions on the study during that time within the context of the guidelines and directions issued by the Department.

* **Preparation of a Draft Local Environmental Plan:** Armed with the study and the submissions from the public and other interested bodies, Council and its consultants then prepare a Draft Local Environmental Plan which consists of a land use zoning map and a written legal statement. This legal document implements the recommendations of the study and is designed to encourage appropriate forms of development in appropriate locations and outlines various controls on the use of land.

* **Certification by the Department of Environment and Planning:** Once the Draft Local Environmental Plan is prepared, it is sent with the study and the submissions to the Director of the Department of Environment and Planning for approval for exhibition. Once this approval is given by way of a certificate from the Director, the Draft Local Environmental Plan can then be used as a basis for determining development applications.

* **Exhibition of the Draft Local Environmental Plan:** The Draft Local Environmental Plan is also exhibited for public comment. Such comment is usually of a more specific nature relating to details of the Plan.

* **Gazettal of the Local Environmental Plan:** After the exhibition period, the Plan, public submissions and letters of compliance with state policies and Ministerial Directions are sent to the Department for presentation to the Minister for gazettal.

Thus the new legislative planning procedures provide for a high level of community involvement and comment on the Plan during the stages of its preparation as well as in its final form.

2.4 Possible Control Mechanisms

The most important control mechanism available to Council is the Local Environmental Plan. This is the mechanism by which development can be controlled and encouraged within the Shire.

It is the direct equivalent of the town and country planning schemes and Local Environmental Plan No. 1 which applies to the rural areas of the Shire, including the introduction of a Local Environmental Plan for the urban area of Gunnedah will consequently complete the placing of the Shire under this new legislative method of control.

Sections 24 - 36 of the Environmental Planning and Assessment Act set out the legal requirements of Local Environmental Plans.

The basic purpose of the plan is:

"(a) to encourage -

(i) the proper management, development and conservation of natural and man-made resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment;

(ii) the promotion and co-ordination of the orderly and economic use and development of land;

(iii) the protection, provision and co-ordination of communication and utility services;

(iv) the provision of land for public purposes;

(v) the provision and co-ordination of community services and facilities; and

(vi) the protection of the environment;

(b) to promote the sharing of the responsibility for environmental planning between the different levels of government in the State; and

(c) to provide increased opportunity for public involvement and participation in environmental planning and assessment."

The matters that the plan may cover are:

"26. Without affecting the generality of section 24 or any other provision of this Act, an environmental planning instrument may make provision for or with respect to any of the following:-

(a) protecting, improving or utilising, to the best advantage, the environment;

(b) controlling (whether by the imposing of development standards or otherwise) development;

(c) reserving land for use for the purposes of open space, a public place or public reserve within the meaning of the Local Government Act, 1919, a public cemetery, a public hospital, a public railway, a public school or any other purpose that is prescribed as a public purpose for the purposes of this section;

(d) controlling the demolition of buildings or works;

(e) protecting or preserving trees or vegetation;

(f) controlling any act, matter or thing for or with respect to which provision may be made under paragraph (a) or (e);

(g) controlling advertisements within the meaning of section 510 of the Local Government Act, 1919; and

(h) such other matters as are authorised or required to be included in the environmental planning instrument by this or any other Act."

The Act makes provision for some developments to be designated if they are considered to be likely to be of substantial environmental significance. This ensures that Council has adequate information on which to determine such applications, in the form of an Environmental Impact Statement. Developments designated by Council would be in addition to those outlined in Schedule 3 of the Regulations accompanying the Act that apply to all local government areas.

Local Environmental Plans generally contain a set of land use tables outlining the types of development permissible under certain circumstances in a number of land use zones. Different kinds of development are usually identified in such a table such as development permissible without consent, development permissible subject to conditions, development requiring Council consent etc.

The Department issues guidelines on the land use zones that may be applicable although the Council is under no obligation to adopt them fully.

The Act also suggests that the Local Environmental Plan adopts a set of Model Provisions made by the Minister under Section 33 of the Act. It is important to realise however, that those Model Provisions do not have to be adopted in their entirety, and clauses of the Provisions may be deleted where appropriate. The Local Environmental Plan for Gunnedah will adopt relevant clauses of the 1980 Model Provisions as does Local Environmental Plan No. 1 - Shire of Gunnedah.

As well as the land use tables outlining which uses are permissible in certain locations with or without consent, the Local Environmental Plan also contains special provisions relating to development in an area. For example, development standards for various types of development (subdivision, residential flat buildings etc.) can be included.

Another important provision the Local Environmental Plan can include is the requirement for dedication of a contribution toward the provision of public services and community facilities. The plan does not have to identify the exact level of contribution however.

The Act requires that the Local Environmental Plan is not substantially inconsistent with any State environmental planning policy, regional environmental plan or relevant direction under section 117 of the Act. The Minister has issued two sets of Directions under section 117:

* 27th August 1980;

* 14th April 1982.

Where the plan is inconsistent with these Directions or Plans, such inconsistency has to be justified.

While the Act is quite specific on the form or content of the Local Environmental Plans, particularly with reference to section 117 directions, there is still a degree of flexibility available to Council on the control of development. This is rightfully so since Council is the consent authority with responsibility for these matters.

As well as the Local Environmental Plan, there are a number of other planning instruments that can be used as a control mechanism. Of importance here are Development Control Plans which are usually more specific than the Local Environmental Plan, addressing development of a particular area or development of a particular type (residential flat buildings etc.). Development Control Plans should conform with the provisions of the Local Environmental Plan and be compatible with it.

In summary it should be pointed out that the ultimate aim of the Local Environmental Plan is to control development in the most desirable fashion. It gives Council the powers to approve desirable developments and to disallow undesirable or unwanted developments. Furthermore, it designates areas most suitable for particular uses. Thus there are two functions of the Local Environmental Plan - one being direct and the other indirect:

* The direct function is development control and the orderly development of the Shire, based on firm environmental principles developed in the Study. This also covers financial aspects insofar as provision can be made in the Local Environmental Plan to enable Council to recover some costs incurred by development.

* The indirect function is more positive. It involves accommodating and encouraging the more appropriate forms of development. The Local Environmental Plan cannot specifically attract growth and development - this is largely the role of the market although the Council and the community can assist the operation of the market through promotional activity. Rather the Local Environmental Plan accommodates growth by:

  . making provision in the plan for various types of uses such as motels, tourist development etc., thus responding to market forces;

  . identifying areas suitable for various uses;

  . identifying lands that should be protected from different forms of development for reasons such as preservation of good agricultural land, scenic areas, sensitive environmental areas etc.

3. ANALYSIS OF THE ENVIRONMENT OF GUNNEDAH

3.1 The Natural Environment

3.1.1 Regional Location and Setting

The Shire of Gunnedah lies within the drainage basin of the Namoi River in the Northern Statistical Division of NSW. In functional terms it is commonly considered part of the New England Region. As noted by the Report of the Department of Geography of the University of New England in 1974, while the Shire occupies an acentric position to the west and south of the Northern Statistical Division, and indeed the New England Region, it nevertheless may be considered, in its landscapes and economies, as representative of the transition from the higher, broken country of the east to the open plains of the west. Within the Shire itself, the town of Gunnedah occupies an almost centric position. Gunnedah in turn, is ringed by a series of small satellite villages: Curlewis to the south; Carroll to the east; and Mullaley to the west. Its nearest neighbour of substantial size is the town of Boggabri to the north, just over the boundary with the Shire of Narrabri.

The Shire of Gunnedah occupies a total area of 5,092.14 square kilometres, of which the area of the town itself comprises 7.36 square kilometres. With a Shire population at the 1981 Census of 13,173 persons, the overall population density of the Shire is less than 2.6 persons per square kilometre. Rural densities are even lower.

With the exception of the small town area, then, the region is relatively sparsely, albeit fairly evenly settled due to the intensity of agricultural activity. In 1980 there were 656 rural establishments in the Gunnedah Shire, with a total area of 448,657 hectares. The average size of holdings is consequently 584 hectares, a figure which does not reflect the true range in size of holdings across various crop and livestock activities.[1]

Given the absence of alternate centres of any substantial size, the town of Gunnedah consequently acts as service centre to a rural hinterland virtually as wide as the Shire itself. Since it has also been the administrative centre for the whole Shire area, these are the two major functions of the township - rural service centre and administrative centre. In past years the rural service function of Gunnedah has expanded to be an even wider than Shire function. This function was predicted as early as 1873, an article appearing in the Town and Country Journal predicting that:

> "It is the first town on the Namoi of any importance and though at present in a lethargic state, it is likely from its position, to become ultimately the chief depot of the extensive pastoral district of the Liverpool Plains."

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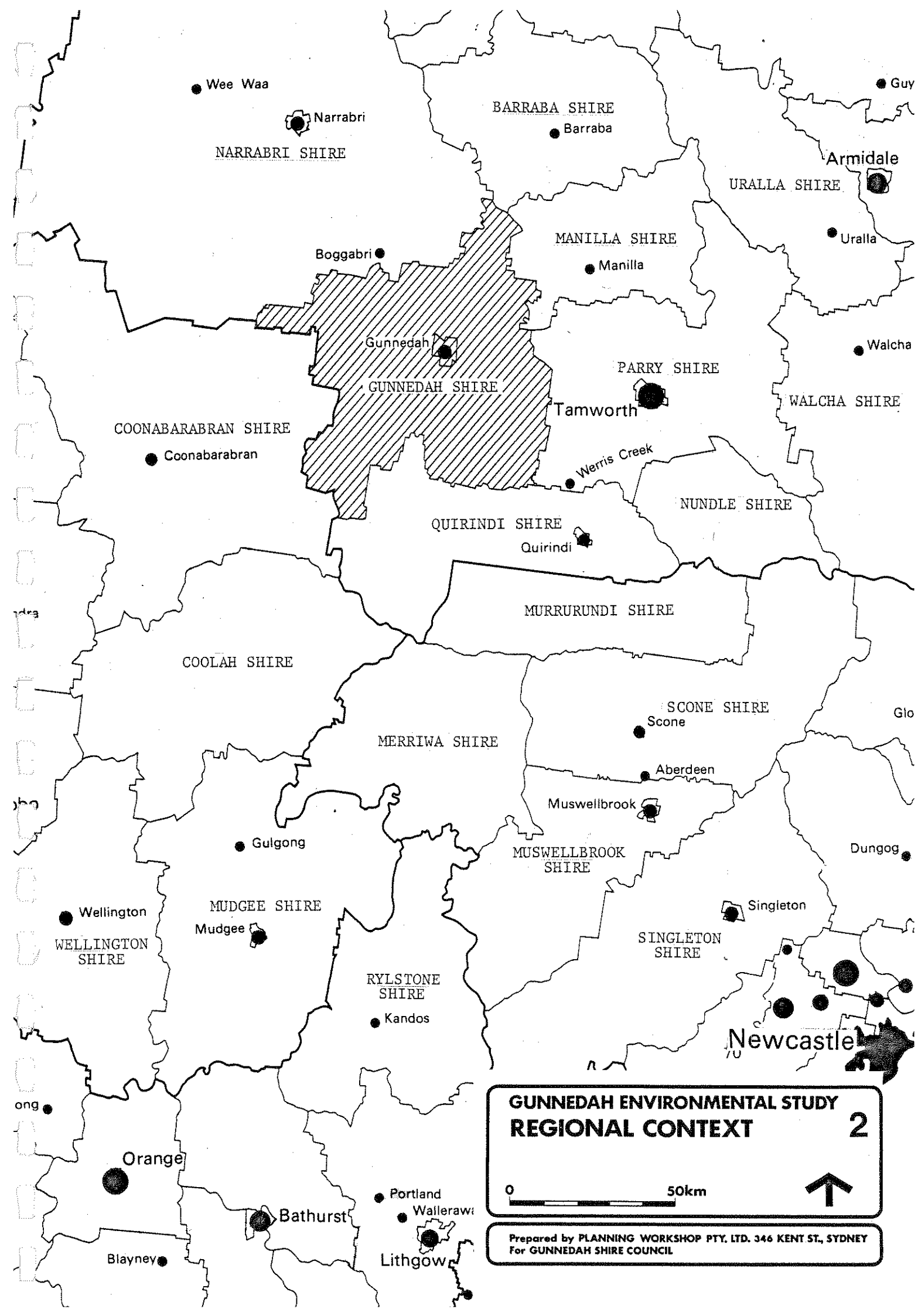
1. Handbook of Local Government Statistics, NSW, 1981, Australian Bureau of Statistics.


Wee Waa
Narrabri
NARRABRI SHIRE
BARRABA SHIRE
Barraba
Guy
Armidale
URALLA SHIRE
Uralla
MANILLA SHIRE
Manilla
Boggabri
Gunnedah
GUNNEDAH SHIRE
PARRY SHIRE
Tamworth
Walcha
WALCHA SHIRE
COONABARABRAN SHIRE
Coonabarabran
Werris Creek
NUNDLE SHIRE
QUIRINDI SHIRE
Quirindi
MURRURUNDI SHIRE
COOLAH SHIRE
SCONE SHIRE
Scone
Glo
MERRIWA SHIRE
Aberdeen
Muswellbrook
MUSWELLBROOK SHIRE
Dungog
Gulgong
MUDGEE SHIRE
Mudgee
Wellington
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Singleton
SINGLETON SHIRE
RYLSTONE SHIRE
Kandos
Newcastle
Orange
Portland
Wallerawa
Bathurst
Lithgow
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GUNNEDAH ENVIRONMENTAL STUDY
REGIONAL CONTEXT
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For GUNNEDAH SHIRE COUNCIL

The linkages of the town within the Shire and the Shire within the Region reflect these foci. The transport infrastructure of the region has evolved over a period of 150 years since the arrival of the first settlers. By 1850 the eastern section of the New England Region was already served by the New England Highway. The expansion of pastoralism and gold discoveries made in the 1850's led to the development of transverse routes, and in the words of the commentary to the Atlas of New England (1977, p.239), "heralded the arrival of the continuing problem of east/west transport." Gunnedah is currently well connected by road to Tamworth to the east as its nearest higher-order centre. However, connections further east are made difficult by the topography of the Great Dividing Range. To the west, as the country begins to flatten out, Gunnedah also has a good road connection with Coonabarabran, from which the Newell Highway leads north to Narrabri and Moree.

While road connections in other directions are categorised according to Atlas of New England only as 'second class' despite high levels of usage, for instance, between Gunnedah and Narrabri, Gunnedah was connected to a direct north/south rail line as early as 1879 when the initial branch line was extended from Werris Creek Junction to Gunnedah. Gunnedah remains today on a direct rail link between Sydney and Moree. Again there are no east/west rail links.

On a within-Shire basis, main axial roads in a diagonal pattern cross at Gunnedah, serving as a feeder system to connecting all but the most distant northern part of the Shire to the town. This area has more direct functional linkages with Boggabri.

It is within this setting that the township of Gunnedah plays a major regional role. The importance of its natural location as the centre of a prosperous agricultural Shire, will become evident as other aspects of the environment of Gunnedah are described.

3.1.2 Topography

The Study Area is situated on the Liverpool Plains in the Namoi River Valley. The Liverpool Plains are described by Greenwood (1982) as ". . . near level plains developed from the deposition of alluvium in the broad, deep valleys of the Mesozoic surface. In places, the Mesozoic surface projects above the Quaternary fill as strongly weathered residual ridges of isolated low hills".

Three such residual hill-ridge systems occur centrally and on the eastern and western margins of the Study Area. These ridges are aligned in a north/south direction, with general elevations being from 350 to 500 metres above sea level. The highest point in the Study Area is Blackjack Mountain which reaches a height of 670 metres. Other significant hills are Porcupine Hill (450 metres) to the south-east of Gunnedah, and Borethistles Hill (360 metres) and Pensioners Hill (340 metres) to the west of Gunnedah.

The hill-ridge systems are largely asymmetrical in form, with steep to precipitous slopes (slopes greater than 25 per cent) along the eastern face, and relatively gentle slopes (15 to 25 per cent) to the west of the ridge. Precipitous scarps up to 50 metres in height occur along the eastern faces.

The remainder of the Study Area is flat to undulating with slopes ranging from less than 1 per cent along the floodplains of the Namoi and Mooki Rivers to 15 per cent in the valleys separating the ridge systems.

The main drainage lines within the Study Area are the Namoi and Mooki Rivers, which form the northern and eastern boundaries, respectively, of the Study Area, Blackjack Creek to the west of the Wandobah Road, Ashford's watercourse to the east of Links Road. Smaller drainage catchments in the Study Area are Stock Road catchment, Osric Street catchment, Killara catchment and Meadow Park catchment. The Namoi River, one of the major tributaries of the Barwon-Darling River System, flows in a north/north-west direction from the slopes of the Great Dividing and Liverpool Ranges in the east to Walgett in the west. The Mooki River, which drains the area to the east of the Porcupine Hill ridge system, forms one of the major tributaries of the Namoi. Blackjack Creek and Ashford's Watercourse drain the area between the Central Ridge system and the Porcupine Hill Ridge system. The undulating country to the west of the Central Ridge system is drained by a number of small northerly flowing creek systems.

3.1.3 Geology

Regional Geology

The Study Area is situated in the Gunnedah Basin which forms the central depression in the Sydney-Gunnedah-Bowan Basin Region. the Gunnedah Basin extends from Bellata, which approximates the boundary between the Gunnedah and Bowan Basins in the north, to the Liverpool Ranges which forms the boundary between the Gunnedah and Sydney Basins. The Mooki fault system forms the eastern boundary of the basin, with the western boundary lying in the vicinity of Coonabarabran. The basin was formed during the Late Carboniferous/Early Permian on the approximate site of the volcanic chain that had supplied great quantities of sediments to the Tamworth Belt, to the east, in the Devonian and Carboniferous periods (Harrington 1977).

A shallow sea occupied the Basin during the early Permian. Infilling of this sea by alluvial material during the Permian resulted in the formation of extensive peats which now form the coal seams of the Upper Coal Measures. Deposition continued into the Triassic period (early Mesozoic), forming beds of sandstones and mudstones which outcrop in a belt parallel to the Mooki and Goondiwindi fault zones dipping gently westward and thinning in the same direction, forming a non-marine wedge that was derived in part from the New England Tablelands (Harrington, 1977).

Late in the Triassic or early in the Jurassic, basalts erupted locally in the Mullaley district between Gunnedah and Coonabarabran. In addition, the western edge of the Gunnedah Basin between Coonabarabran and Coonamble began to sink, resulting in the formation of part of the new Surat Basin. During the tertiary, further volcanic activity occurred, resulting in the volcanics of the Liverpool Range.

The deposition of sediments eroded largely from the Liverpool Ranges to the south and the New England Tablelands to the east, resulted in the

Quaternary Alluvium: Stream alluvial deposits, including riverine plain deposits, sandy to silty, minor gravels.

Tertiary Basalt

Narabeen Group: Quartzose and quartz lithic sandstone, silty sandstone, mudstone, lithic sandstone, polymictic congolmerate.

Black Jack Formation: Sandstone, shale, conglomerate, tuff, coal and limestone.

Black Jack Formation: Outcrop obscured by residual soil and talus.

Gladstone Formation: Sandy shale, shaley sandstone and coal.

Porcupine Formation: Lithic sandstone, conglomerate, shale and limestone.

Conadilly Formation: Shale, labile sandstone, polymictic conglomerate.

Gunnible Formation: Shale and Sandstone.

Boggabri Volcanics: Acid Flows (i.e. rhyolite tuff and rhyodacite)

Werrie Basalt: Amygdaoidal basalt.

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formation of the Liverpool Plains. The Liverpool Plains consists of Quaternary alluvium overlying eroded Mesozoic sedimentaries.

Stratigraphy

Information on the geology of the stratigraphy and surface geology of the Study Area was compiled from the Geological Survey of NSW, Tamworth and Manilla 1:250,000 Geological Sheets, and Branagen, D.F. 'The Northwestern Coal Field' in Packham, G.H. (ed.) The Geology of New South Wales, 1969. The surface geology is given in Map 3.

The main geological units outcropping in the Study Area are the Mesozoic sedimentary and volcanic rocks to the south and west of Gunnedah, the Quaternary alluvium of the Liverpool Plains, and isolated remnants of Tertiary Basalt.

The Werrie Basalt, which outcrops in the area to the east of Porcupine Lookout, is the oldest formation outcropping in the Study Area. This formation consists essentially of amygdaloidal basalt with interbedded rhyolite, trachyte and andesite lavas and rhyolitic tuffs. The tuff bands are thin, while the acid lavas are lenticular. The Boggabri volcanics are associated with the Werrie Basalt, and outcrop at Pensioners Hill. These volcanics consist almost entirely of acid lavas and tuffs. The lavas are comprised of rhyolites, felsites, trachytes, andesites and basalts.

The Gunnible formation, which has an approximate thickness of 51 metres, rests disconfomably on the Werrie Basalt. The formation which is comprised of shale, well jointed sandstones, and numerous poor quality coal seams, underlies the central and eastern portions of Gunnedah township.

The Conadilly Formation overlies, conformably, the Gunnible formation. This formation is lense shaped and contains up to 36 metres of poorly exposed shales with thin horizons of labile sandstone and polymitic conglomerate. The Conadilly Formation outcrops in the area to the west of the Wondabah Road.

The Porcupine formation which overlies the Conadilly Formation, forms prominent escarpments at Porcupine Hill and in the hills immediately to the west of Gunnedah. This formation is 38 to 45 metres thick and consists mainly of sandstone with some conglomerate beds. Bands of Limestone occur near the top of the sequence, however shales are only present to a minor extent.

The Gladstone formation overlying the Porcupine formation, exceeds 90 metres in thickness and is comprised of shales with thin bands of sandstone and carbonaceous or coaly matter, and limestone. This formation outcrops to the west of Blackjack Road.

The youngest formation in the Mesozoic sedimentary-volcanic sequence is the Blackjack formation. This formation has a maximum thickness of 165 metres and outcrops in the south-west of the Study Area, near Blackjack Mountain. It is comprised of sandstone, shale, conglomerates, 'cherts', coal seams and thin bands of limestone. Two of the coal seams, the Hoskisson and Melville seams, are of commercial grade. These seams have a maximum thickness of 4.8 metres and 2.4 metres respectively.

Other formations in the Study Area are Tertiary Basalts and Quaternary Alluvium. The Tertiary Basalts are located in the south-western portion of the Study Area and form remnant caps on Blackjack Mountain and the surrounding hills. These basalts are olivine in composition. The Quaternary Alluvium is comprised predominently of material eroded from the Liverpool Ranges. This alluvium has been deposited along the Namoi and Mooki Rivers in the northern and eastern portions of the Study Area and in the valleys between the ridge systems near Gunnedah. The alluviam is comprised mainly of sand and silt with some gravel.

Economic Geology

Economic geological resources refer to geological materials, such as metallic minerals, non-metallic minerals, construction materials and mineral fuels which can be utilised profitably by men. The main economic resources within the Study Area are the coal seams of the Blackjack formation to the south of Gunnedah, and hard rock aggregate and river gravel construction materials (Map 4). No metalliferous mineral deposits have been recorded in the Study Area. Coal is by far the most significant resource.

Coal Reserves

The Coal Reserves of the Gunnedah Basin are relatively unexplored, however the inferred coal reserves have been estimated (on the basis of limited samples) to total 102,444 million tonnes. This represents 20 per cent of NSW inferred reserves. To date, measured and indicated reserves only total 972 million tonnes or 4.3 per cent of the State's measured and indicated reserves (NSW Coal Strategy Report, 1981).[1] It should be noted that within the Basin, some coal reserves have been extensively intruded by igneous sills and dykes. This, in conjunction with localised faulting and folding has downgraded the potential of these reserves. The principal coal seams within the Basin are the Hoskinson and Melville Seams of the Blackjack formation. These seams have a maximum thickness of 4.8 metres and 2.4 metres respectively (Branagan, 1969). Sampling undertaken by the Gollin Wallsend Coal Company Limited[2] in the area surrounding Blackjack Mountain indicates that Melville seam consists of an upper and lower seam each containing high volatile bituminous coal with low levels of sulphur and phosphorous. Tests indicate that the coking properties of this seam vary with the section being worked.

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1. Report for the NSW Government prepared by the Coal Resources Development Committee (1981).

2. James B. Croft and Associates Pty Limited (1981). Environmental Impact Statement for an open cut coal mining operation to produce 0.3 million tonnes per year of coal at Gunnedah NSW. Prepared for Gollin Wallsend Coal Company Limited.

EXISTING RESOURCES

AREAS OF MINING LEASES

AREAS OF GRAVEL EXTRACTION

POTENTIAL SOURCES

HARDROCK AGGREGATE

SAND AND RIVER GRAVEL

RIDGE GRAVEL

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A number of prospecting and exploration authorisations and coal leases have been taken out within the Basin. The main authorisation is Authorisation No. 216 taken out by the Department of Mineral Resources as a prospecting lease. This authorisation covers a substantial part of the Basin. The location of authorisation and leases is shown by Map 4.

The main existing and proposed projects within the Gunnedah Basin include:

* The Gunnedah Colliery holding operated by the Gollin Wallsend Coal Company Limited. This is an underground colliery located near Blackjack Mountain to the south of Gunnedah. This operation involves the mining of the Hoskisson seam, reserves of which have been estimated at 30.8 million tonnes. The present production of raw coal is, on average, 570,000 tonnes per annum from which approximately 498,000 tonnes of saleable material is produced. At this stage there are no plans to mine the Melville seam in this area.

  The Gollin Wallsend Coal Company also holds a number of prospecting authorisations in the area surrounding the existing mine, and a second mine is proposed for Authorisation 138. This proposed operation will involve the open cut mining of the upper and lower Melville seams. It is estimated that this mine will produce 300,000 tonnes of coal per annum.[1]

* The Vickery Joint Venture: This proposal relates to Authorisation 151 and Coal Lease area C1 to the north of Gunnedah and is a joint venture between Coal Cliff Collieries Pty Ltd[2] (the major partner) and Vickery Coal Pty Ltd. The proposal is currenty at the final feasibility stage with mining expected to commence during 1984. It is estimated that this proposal will produce 3 million tonnes per annum over 32 years.[3]

* Boggabri Joint Venture: This proposal is a joint venture between Amax Iron Ore Corporation (Coal Division) and BHP and related to Coal Lease area C2 to the north of Gunnedah. This project is also in the final feasibility stage and it is currently estimated that the venture will produce 4 million tonnes of coal per year over 40 years.

* Kembla Coal and Coke Pty Ltd is investigating a mine in the Maules Creek exploration area E4, however this Study is only in the pre-feasibility stage.

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1. James B. Croft and Associates Pty Ltd (1981) Report.

2. Subsidiary of Kembla Coal and Coke Pty Ltd.

3. NSW Coal Strategy Report.

The implications of these proposals on the Study Area are discussed in Sections 4.1 and 5.2 of this report.

A substantial part of the Study Area is subject to Authorisation No. 216, which is a prospecting authorisation held by the Department of Mineral Resources. Discussions with the Department indicate that Stage 1 of the exploration programme will involve drilling a grid pattern with dimensions 12 kilometres by 24 kilometres. The Department states that no drilling is scheduled for the Study Area.

The northern extremity of Authorisation No. 128 held by Gollin Wallsend Coal Company Limited is located on the southern boundary of the Study Area to the west of the Wandobah Road. An open cut mine is proposed for this authorisation, however the mine is to be located to the south of the Study Area.

The remainder of the Study Area is within the Gunnedah Colliery Holdings. This area contains the oldest workings of Gunnedah Colliery, the associated surface installations and the coal loading facilities which link the Colliery to the Gunnedah-Narrabri Railway line.

Construction Materials

The following information on construction materials was supplied by the Department of Mineral Resources and the Gunnedah Shire Council.

River gravel, sand and ridge gravel are extracted both within, and in close proximity to, the Study Area. Sand and river gravel extraction occurs on the Namoi River just beyond the north-east corner of the Study Area. This extraction is undertaken by Pioneer Quarries Pty Ltd. This operation and other adjacent operations indicate that the alluvial sediments of both the Namoi and Mooki Rivers are potential sources of sand and gravel which are suitable for coarse and fine aggregate purposes.

The Gunnedah Shire Council is currently quarrying Ridge gravel on Portions 328 and 329 in Mullaley Road to the west of Gunnedah. Council indicates that reserves in this area are nearly exhausted. The Department of Mineral Resources has identified the weathered sections of conglomerate and sandstone rock units as potential sources of fine and course aggregates.

Hardrock aggregate is not quarried within the Study Area. The only quarry operating in the Shire is located to the east of Carroll. This is a low key operation worked by private contractors. The Department of Mineral Resources has identified the Boggabri Volcanics and Tertiary Basalts of the Study Area as being potential sources of such aggregate.

3.1.4 Soils

A soil reconnaissance survey of the Gunnedah District was undertaken by the NSW Soil Conservation Service in the preparation of the 'Gunnedah District Technical Manual' in June 1976. As part of this survey, soils within the region were categorised into six soil mapping units on the basis of the following criteria:

* soil texture;
* surface cracking of the soil;
* apparent erodibility;
* topography.

The six soil mapping units and the dominant soil types within each unit are summarised as follows:

Mapping Unit	Dominant Soil Types
Cracking Clay Soils	Black Earths, Red, Brown and Grey Clays
Clay and Loam Soils associated with river floodplains.	Red, Brown and Grey clays covered by a thin layer of recent alluvium.
Duplex and 'Gravelly Soils'.	Solodic soils and gravelly red brown earths.
Clay Loam Soils with Red Clay Subsoils, Neutral to Alkaline Reaction Trends.	Euchrozems
Highly erodible-hard setting loamy soils.	Red Brown Earths, Structured Loams and Non-Calcic Brown Soils.
Skeletal Soils	Lithosols

The distribution of these mapping units within the Study Area is shown on Map 5. Due to the scale of the survey, local variations in soil type (as a result of topographic position, parent material etc.) cannot be separated satisfactorily within the soil mapping unit. Also, the boundaries of these soil mapping units are not sharp delineations as shown on the map, but tend to be gradational.

Within the Study Area, a soil survey was undertaken to provide more detailed information on the dominant soil types within each mapping unit. The following descriptions of the soil mapping units/dominant soil types was compiled from Soil Conservation Service 'Gunnedah District Technical Manual' (1976), Greenwood, P.W. (1982), and field reconnaissance.

Cracking Clay Soils

In the Study Area, the black earths are the dominant soils within this mapping unit. The black earths are located along the floodplain of the Mooki River which forms the easterly boundary of the Study Area. These black earths are formed largely from basaltic alluvium and colluvium derived from the Werrie Basalt which outcrops to the east of the Porcupine Lookout Ridge.

The black earths are characterised by a uniform textured profile of well structured clay, which ranges in colour from very dark grey (7.5 YR 3/1), very dark brown (10 YR 2/2) to black (7.5 YR 2/1) when moist.

The surface soil is generally composed of an organic layer (A_0) overlying the A_1 horizon which is a dark coloured, medium to light textured clay soil. The A_1 horizon ranges in depth from 2 to 10 centimetres. The structure of this horizon is fine block or crumb and is self mulching. The A_1 horizon generally grades into a well structured medium to heavy clay B_1 horizon. The A_2 horizon appears to be absent.

The B_1 horizon is similar in colour to the A_1 horizon and is comprised of predominantly dense blocky aggregates. The B_1 horizon grades into the B_2 horizon which is composed of yellowish-brown or grey-brown medium to heavy clay. The B_2 horizon has a strong coarse lenticular macrostructure with many large slickensides. The B_3 horizon grades into colluvial and alluvial material at depth. Calcium carbonate nodules are present in the lower B_1 and B_2 horizons.

The clay content of the black earths ranges from 50 to 80 per cent. A prominent feature of these soils is their extensive cracking in dry weather. This cracking is caused by the high content of montmorillonite, an expanding lattice clay mineral which causes considerable swelling and shrinking on wetting and drying respectively. This results in volume expansion figures generally between 20 and 40 per cent. This expansion and contraction has resulted in problems such as foundation movement, underground pipe displacement, cracking of roads, paths etc., warping and displacement of fences and the cracking of small earth dams etc. in dry weather.

The black earths are reasonably fertile and do not, in general, have trace element deficiencies. These soils tend to be slightly acid to neutral in the surface horizons. The pH increases down the profile to moderately alkaline at depth (pH 8-9).

In virgin black earths, well developed gilgai, with a vertical interval of 10-30 centimetres are associated with the deeper soils. According to Soil Conservation Service (1976), the gilgais occur in two distinct patterns depending on topographic position:

* On gently colluvial slopes linear forms occur with a wavelength commonly in the range of 5 to 7 metres.

CRACKING CLAY SOILS

CLAY AND LOAM SOILS ASSOCIATED WITH RIVER FLOOD PLAINS

DUPLEX AND "GRAVELLY" SOILS

CLAY LOAMS WITH RED CLAY SUBSOILS

SKELETAL SOILS

SOURCE: SOIL CONSERVATION SERVICE 1976

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SOILS

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* On the broad near level plains the gilgai take the form of mounds, crudely circular in plan, and varying from two to several metres in width.

In terms of erodibility, few problems arise in the alluvial situation, except for sheet erosion as a result of high intensity summer storms. In sloping areas, the expansion and contraction characteristics of this soil may result in failure during periods of heavy rainfall.

Other soils in this mapping unit include red, brown and grey cracking clays. These clays have similar characteristics to the black earths, with the exception of colour and the fact that they are not associated with gilgai formation. The distribution of these latter soils within the Study Area appears to be limited.

Clay and Loam Soils

The loam textured soils of this mapping unit are largely associated with the Rangari Creek floodplain, which is outside the Study Area, while the clay soils have formed on the Namoi River floodplain in the north of the Study Area.

Within the Study Area, the clay soils appear to be similar to the black earths and cracking clays, except that they have a thin bend of recent alluvium on the surface. This alluvium is subject to seasonal cracking. The clay soils tend to grade from black earths (heavy clay) adjacent to the river to brown medium to light clays along the periphery of the floodplain.

The black earths have been described in the previous section. The light to medium clay soils have weakly differentiated profiles and range in colour from dark brown (7.5 YR 3/2 moist) to very dark brown (10 YR 2/2 moist). These soils are self mulching. The A_1 horizon has an earthy fabric with rounded peds, and ranges in depth from 5 to 20 centimetres depending on topographic position. The B horizon has an angular blocky structure with shiny smooth faced peds. The B horizon ranges from medium to heavy clay with depth.

The upper 50 centimetres of the profile is generally neutral to slightly alkaline (pH 7.0 to 8.0) becoming increasingly alkaline with depth (pH 8.0 to 9.5). Calcium carbonate nodules are present in the B horizon.

These soils have similar cracking characteristics as the 'Cracking Clay Soils'. The shrink-swell potential of these soils is high, ranging from 16.8 per cent (air dried) at the surface, to 18.8 per cent at 50 centimetres and 1 metre. The linear shrinkage values of the oven dried samples ranged from 18.4 per cent at the surface to 21.2 per cent at depth.

Duplex and 'Gravelly' Soils

Gravelly red brown earths form the dominant soil type in this mapping unit within the Study Area. These soils are associated with the mesozoic sedimentary and volcanic rocks of the ridge systems.

The gravelly red-brown earths are characterised by dark grey to brown (7.5 YR 4/1 to 7.5 YR 5/2 moist) sandy loam to loam A horizon, grading into a reddish-brown (5 YR 5/6 moist) clay B horizon. Gravel is present throughout the profile. The A horizon ranges in depth from 10 to 50 centimetres (depending on topographic position), and has a weak crumb to block structure which is hard when dry. In the eastern part of the Study Area (Ashford's Watercourse Catchment Area) the A horizon tends to have a higher clay content, and appears more subject to cracking than the gravelly red brown earths formed on the central ridge system.

The boundary between the A and B horizon is abrupt to clear. The B horizon is typically reddish brown, and ranges in texture from a medium clay on the central ridge system to heavy clay in the eastern part of the Study Area. The structure of the B horizon ranges from strong prismatic to block in the upper 15 centimetres, to blocky at depth. Clay skins are well developed and peds separate readily. Carbonate nodules are present throughout the B horizon.

The pH of the gravelly red earths range from mildly acid at the surface (pH 6 to 6.5) to alkaline with depth (pH 8 to 8.5). Linear shrinkage tests undertaken indicate that these soils have a low to medium shrink-swell potential. Linear shrinkage values ranged from 10 per cent (air dried) at the surface to 11.2 per cent at 50 centimetres, 13.6 per cent at 100 centimetres and 16.4 per cent at 200 centimetres depth. The corresponding shrinkage values for oven dried samples were 10.4 per cent (surface), 11.6 per cent (50 centimetres), 14.0 per cent (100 centimetres) and 16.4 per cent (200 centimetres).

These soils are subject to sheet erosion and rill and gullying (sloping areas) when the surface cover is removed.

Clay Loams with Red Clay Subsoils

The dominant soil within this mapping unit is the Euchrozems. These soils occur around Gunnedah and in the area to the west of the central ridge system.

Typically, the Euchrozem is a gradational red to reddish-brown and brown (2.5 YR 4/6 to 5 YR 4/4 to 7.5 YR 5/2 moist) soil which grades from a clay loam or light clay, into a medium to heavy textured clay soil at depth. The pH of these soils range from about 6.5 at the surface to 7.8 to 8 at depth.

The A_1 horizon is generally less than 15 centimetres in depth and is self mulching. The structure of this horizon varies from a weak to strong crumb structure at the surface to a fine to medium blocky structure at depth. The A_2 horizon appears to be absent, with the boundary between the A_1 and B_1 horizon being gradual. The B_1 horizon has a coarser blocky structure, with smooth faced and dense peds. The consistency is moderately friable when moist, but hard when dry. The B_1 horizon overlies the B_2 horizon which is more massive but often comprised of gravelly clay. Some calcium carbonate nodules were present in the B horizon.

These soils are subject to severe sheet, rill and gully erosion when disturbed. The surface soil is moderately dispersible and considerable soil loss can occur in disturbed areas under intense rainfall.

The shrink-swell potential of these soils is low to moderate ranging from about 11 per cent (oven dried) at the surface to 16 per cent at 1 metre depth (oven dried).

Skeletal Soils

Lithosols are the dominant soil type within this mapping unit. These soils occur on the ridge crests and steeper slope and consist of thin accumulations of soil grading into parent rock. These soils tend to be discontinuous, very shallow (2 to 20 centimetres) and contain large amounts of weathered parent material. The stone content of these soils is generally high.

3.1.5 Vegetation

Sources of Information

The following description of the major vegetation formations within the Study Area are based on information provided in the following studies, together with general field observation:

* Soil Conservation Service of NSW (1976), Gunnedah District Technical Manual.

* Greenwood, P.W. (1982), Late Quaternary Environmental Change in Northeastern New South Wales. MSc Thesis, University of Sydney.

* Urwin, N. (1981), Conservation of Natural Grasslands in the Breeza-Gunnedah District NSW (prepared for the Department of Environment and Planning).

* James B. Croft and Associates (1981) Environmental Impact Statement for an Opencut Mining Operation to produce 0.3 million tonnes per year of Coal at Gunnedah NSW, prepared for Gollin Wallsend Coal Company Limited.

The nomenclature adopted for this Study is that used by the Soil Conservation Service.

Description

Two distinct plant formations have been identified within the Study Area:

* Open forest;

* Plains Grass.

The open forest formation is comprised of two vegetation communities; the White Cypress Pine (Callitris hugelii) - tall woodland and shrub woodland community; and the Yellow Box/White Box/Bimble Box (E. melliodora-E. albens-E. populnea) - tall woodland and savannah woodland community.

The White Cypress Pine communities dominates the ridges and hills within the Study Area, while the Yellow Box/White Box/Bimble Box community is restricted largely to the lower slopes and alluvial plains of the Namoi and Mooki Rivers. Much of this latter community has been cleared and is used for cropping and grazing. The soil conservation service has identified the dominant and subdominant species within these communities (Table 3.1).

Table 3.1: Dominant and Subdominant Species Association

	Botanical Name	Common Name
White Cypress Pine		
Dominant Species	Callitris hugelli	White Cypress Pine
Subdominant Species	Eucalyptus crebra	Narrowleaved Ironbark
	E. albens	White Box
	E. melliodora	Yellow Box
	E. blakelyi	Blakely's Red Gum
	E. dealbata	Hill Red Gum
	Acacia cheelii	Motherumbah
	Brachychiton populneum	Kurrajong
	Casuaring cristata	Belah
Yellow Box/White Box/Bimble Box		
Dominant Species	Eucalyptus melliodora	Yellow Box
	E. albens	White Box
	E. populnea	Bimble Box
Subdominant species	E. camaldulensis	River Red Gum
	E. blakelyi	Blakely's Red Gum
	Angophora floribunda	Rough-barked Apple
	Casuarina cristata	Belah
	Brachychiton populneum	Kurrajong
	Geijera parviflora	Wilga
	Heterodendron oleifolium	Rosewood
	Acacia aneura	Mulga
	Acacia pendula	Myall

The White Cypress Pine community within the Study Area ranges from poor scrubby woodland on the steeper slopes and exposed ridges to tall woodland on the gentler and more protected slopes. E. dealbata and A. cheelii are the main subdominant species in the drier areas, with E. crebra displacing these species as the main subdominant in the wetter areas. The understorey is typically comprised of Acacia spp. and young eucalypts and pines. The ground cover is predominantly grasses with Aristida spp. (wire grasses), Stipa spp. (spear grasses), Cymbopogon refractus (barbed wire grass), Eragrostis spp. (love grasses) and Bothriochloa decipiens (red grasses) being the main types (Soil Conservation Service, 1979).

The Yellow Box/White Box/Bimble Box community incorporates a number of associations, the main ones within the Study Area being the White Box (E. albens) and Bimble Box (E. populnea) associations. The white box association tends to dominate the basaltic slopes in the eastern part of the Study Area, while the Bimble Box association occurs on the alluvial floodplains along the Namoi and Mooki Rivers. The main grass cover species are Stipa spp., Aristida spp., Bothriochloa ambigua (red grass), Dicanthium sericeum (blue grass), Chloris spp. (windmill grass), Eragiostis spp. and Paniculum spp. (panics).

The Plains Grass Community is dry tussock grassland dominated by Stipa aristiglumis. This community formerly dominated the areas of heavy textured cracking black soils of the Liverpool Plains. The soil conservation service has identified the major subdominant species within the community.

Panicum spp.	Panics
Dichanthium sericeum	Blue Grass
Chloris spp.	Windmill Grasses
Aristida spp.	Wire Grasses
Stipa spp.	Spear Grasses
Danthonia spp.	Wallaby Grasses

According to Greenwood (1982), the plains grasses grow to heights of about 2 metres, and ground cover is comprised mainly of fallen organic matter and small creepers.

Within the Study Area, much of this community has been cleared and the areas used largely for wheat cultivation. Remaining uncleared areas are very small in size and have been infested by exotic weeds such as Bassia birchii (Galvanised Burr) and Xanthium spinosum (Bathurst Burr).

Conservation Value

* Plains Grass Community

The Plains Grass Community[1] has been identified by a number of researchers: Anderson and Carolin (1971), Specht (1974) and Urwin (1981), as being a community of high conservation status.

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1. Information on the Plains Grass Community is taken from Urwin 1981.

In 1971, Anderson and Carolin in the Parks and Reserves Scientific Committee Report to the Minister for Lands recommended that:

> "Plains Grass (Stipa spp.)
>
> Large areas of this community occur on the Liverpool Plains and some outliers to the west. Almost all the areas are alienated. It is recommended that the Service seeks sites in this system suitable for reservation. It is probable that a regeneration program would need to be initiated on these sites."

According to Urwin (1981) these 'large areas' no longer exist.

Specht (1974) assessed the conservation status of this community by how well it is represented in existing parks and reserves in Australia. He concluded that:

> "Stipa aristiglumis . . . Grassland/Herbland . . . preserved in one large reserve . . . Comment: 'Poor'."
>
> "Stipa aristiglumis . . . Open Grassland/Open Herbland . . . preserved in no reserves . . . Comment: 'Nil'."

The single 'large reserve' mentioned above is the Mount Kaputar National Park. This park contains a small area of Plains Grass community along the southern park boundary.

Urwin (1981) further reinforced the findings of the earlier studies by stating that:

> "The fact that the Plains Grass community is a remnant of the original floristic environment embodies a number of conservation values:
>
> (a) It provides a scientific record of endemic vegetation.
>
> (b) It is a repository of the natural gene pool, the vigour and diversity of which may have future use in agriculture.
>
> (c) It is an historic landscape type reported by the early explorers (Oxley, Cunningham and Mitchell).
>
> To these conservation values can be added the fact that, due to the intensity of agricultural land use, the Plains Grass community has decreased in size to the point where any remnant areas which still exist, though they comprise relatively common species, now would be considered uncommon to rare communities."

The Department of Environment and Planning is currently preparing a map showing the distribution of any remaining Plains Grass. Discussions with the Department indicate that there is little or no remaining Plains Grass in the Study Area, however remnants of this community are present within other parts of the Gunnedah Shire.

* Open Forest Formation

The main associations comprising the open forest formation within the Study Area are well represented on the Liverpool Plains and surrounding districts, and as such, these associations have a relatively low conservation status in terms of representativeness in existing parks and gardens.

On the local scale, the conservation status of these associations, as measured in terms of scenic and aesthetic value, increases significantly. Within the Study Area, the open forest is confined largely to the steeper slopes and ridges to the south and west of the township of Gunnedah. These slopes and ridges are visually prominent from most parts within the township and, as such, it is recommended that the remaining open forest community in these prominant areas be conserved.

3.1.6 Climate

The Australian Bureau of Meteorology operates climatic stations at Gunnedah Memorial Pool[1] within the Study Area, and at the Gunnedah Soil Conservation Service (SCS) Research Station to the east of the area. The following analysis is based on information recorded over 93 years at Gunnedah Radio Station 2MO and the Memorial Pool, and 25 years at the SCS Research Station.

Rainfall

Rainfall within the Gunnedah District:

> "results from the passage of one of three major rainfall influences across the area, or from localised convectional storms. Rain may be associated with:
>
> (a) the regular passage of cold fronts across New South Wales, whenever these fronts extend north into the area; or
>
> (b) the passage of moist upper atmosphere low cells into the area from Queensland; or
>
> (c) the passage of inland tropical cyclones or low pressure systems which have been located over the Pacific Ocean.

---

1. Until 1975, the Climatic Station was located at Radio Station 2MO.

> The last two effects occur mostly during the warmer months, when convectional storms are also most frequent. These produce most of the area's total rainfall with falls during this period often of high intensity." (Soil Conservation Service 1976)

Rainfall in the Study Area is seasonally distributed with the period November to February being the wettest. December is the wettest month at Gunnedah Memorial Pool and May the driest, while January is the wettest month at SCS and July the driest. The Study Area experiences an annual median rainfall in the order of 550 to 650 millimetres. The median rainfall is that rainfall experienced or exceeded on 50 per cent of occasions. Monthly Median Rainfalls, the monthly 25 and 75 per cent quartiles, and the median and percentage deviations are given in Tables 3.2 and 3.3. The quartile measures indicate variations from the monthly median rainfall, with the first or 25 per cent quartile being that value below which rainfall has been recorded in 25 per cent of the years. Similarly the third or 75 per cent quartile represents the value above which rainfall has been recorded in 25 per cent of the years. The median deviation gives the value by which half of the recorded falls differ from the median; the higher the value the greater the variability. The median deviation is expressed as a percentage to give percentage variability.

Table 3.2: Median Monthly Rainfall Gunnedah Memorial Pool (1878-1881, 1883-1890, 1892-1972)

Month	1st Quartile	Median	3rd Quartile	Median Deviation	% Deviation
January	25	49	100	27	55
February	19	44	104	33	55
March	13	34	62	23	68
April	12	34	56	22	65
May	10	29	58	22	76
June	18	38	59	20	53
July	19	32	59	17	53
August	19	38	60	19	50
September	14	34	53	19	56
October	26	53	79	26	49
November	22	50	77	27	54
December	30	58	90	30	52
Total	478	562	693	117	21

Table 3.3: Median Monthly Rainfall Gunnedah Research Station (1948-73)

Month	1st Quartile	Median	3rd Quartile	Median Deviation	% Deviation
January	35	74	100	32	43
February	31	67	117	42	63
March	9	36	63	26	72
April	13	36	51	17	47
May	12	37	57	20	54
June	16	36	47	14	39
July	12	28	43	16	57
August	27	34	59	16	47
September	19	34	47	13	38
October	40	66	98	27	41
November	22	68	122	46	68
December	36	57	92	23	40
Total	495	642	742	109	17

Source: Soil Conservation Service, 1976.

The percentage variability of the annual rainfall in the Study Area is relatively low being around 20 per cent. Monthly percentages variability is however, significantly higher, ranging from 49 to 76 per cent at Gunnedah Memorial Pool and from 38 to 72 per cent at SCS Research Station.

Heavy (intense) rainfall may occur over the Study Area at any time of the year, however it is more prevalent during summer due mainly to the increased incidence of thunderstorn activity. The percentage distribution of monthly rainfall by intensity class is given in Table 3.4.

Table 3.4: Percentage of Monthly Rainfall by Intensity Class

Class (mm/Hr)	J	F	M	A	M	J	J	A	S	O	N	D
0-6.4	36.3	40.3	29.5	49.1	52.8	72.2	68.8	61.5	52.8	43.7	35.9	31.7
6.4-12.7	17.0	12.5	14.3	15.8	19.4	14.1	19.2	21.2	20.4	22.6	18.3	15.2
12.7-19.1	6.3	7.9	11.1	8.7	7.3	4.6	3.6	7.0	7.0	8.3	6.4	7.2
19.1-25.4	5.7	5.8	11.4	8.5	8.4	3.2	2.8	2.6	5.4	6.1	5.7	6.6
25.4-31.8	4.1	4.8	4.6	5.5	3.8	1.8	2.5	1.8	2.7	3.9	3.6	5.5
31.8-38.1	1.6	4.1	1.9	1.4	1.6	1.8	1.3	0.4	3.0	2.0	2.8	2.2
38.1-44.5	2.6	3.2	1.7	0.9	0.7	0.4	0.3	0.5	1.0	1.7	2.0	2.1
44.5-50.8	1.7	3.0	5.2	2.6	0.8	0.8	0.0	0.7	1.9	1.1	2.8	2.1
50.8+	24.7	18.4	20.3	7.5	5.2	1.1	1.5	4.3	5.8	10.6	22.5	27.4

Source: Soil Conservation Service 1976

The percentage distribution of intense rainfalls is greatest during summer, with 24.8 per cent of the monthly rainfall exceeding 50.8 millimetres per hour, while only 2.6 per cent of the winter monthly rainfall exceeds 50.8 millimetres per hour. Most of the winter rain (8.56 per cent) occurs at less than 12.7 millimetres per hour compared to 51 per cent of the summer rain. The highest monthly rainfalls and mean number of raindays are also higher during the summer months (Table 3.5).

Table 3.5: Highest Recorded Monthly Rainfall (mm) and Mean Number of Rain Days

Month	Gunnedah Memorial Pool		SCS Research Station	
	Highest Rainfall	Raindays	Highest Rainfall	Raindays
January	202	6	204	7
February	253	6	256	7
March	368	4	173	5
April	151	4	190	4
May	145	5	132	6
June	172	6	109	6
July	145	6	150	5
August	138	6	124	7
September	119	5	117	6
October	161	6	193	8
November	259	6	228	6
December	158	6	146	7
Yearly	1,137	65	1,137	74

Source: Soil Conservation Service 1976

Temperature

The Study Area experiences hot summers and cool to cold winters. The mean maximum temperatures exceed 30.8°C during the summer months while mean minimum temperatures during winter fall to less than 5.8°C. January is the hottest month and July the coldest. Spring and Autumn are transitional periods which experience rapid fluctuations in temperature. The mean monthly maximum and minimum temperatures are given in Table 3.6.

In the summer months very hot conditions occur when north-westerly winds bring hot dry continental air from Central Australia. Temperatures exceeding 32°C occur frequently from November to March, while temperatures exceeding 37.7°C are not uncommon during summer. Extreme minimum temperatures, lower than -5°C have been experienced in the Study Area.

Table 3.6: Mean Monthly Maximum and Minimum Temperatures (°C)

Month	Gunnedah Memorial Pool		SCS Research Station	
	Maximum.	Minimum	Maximum	Minimum
January	32.0	18.0	31.4	18.0
February	31.8	18.2	30.8	18.2
March	29.3	16.0	28.9	16.4
April	26.3	11.8	25.1	12.5
May	20.3	7.7	19.5	7.9
June	18.0	5.3	16.7	5.8
July	17.0	2.7	15.7	4.0
August	18.4	5.0	17.3	5.5
September	21.1	6.8	20.8	8.0
October	26.3	11.6	24.7	11.7
November	28.3	13.7	28.1	14.4
December	30.7	16.6	30.8	17.0

Source: Soil Conservation Service 1976

Frosts

Altitude and location in relation to local relief features will affect the incidence of frosts experienced within the Study Area. Light frosts (screen temperatures less than 2.2°C) may be experienced from April through to November, while heavy frosts could be expected from June to August throughout the Study Area. The mean number of frost occurrences is given in Table 3.7.

Table 3.7: Mean Frost Occurrence - SCS Research Station

Month	Terrestrial Temperatures less than 0°C	Screen Temperatures less than 2.2°C
January	0.0	0.0
February	0.0	0.0
March	0.0	0.0
April	0.1	0.0
May	4.6	2.0
June	8.5	5.1
July	14.3	10.7
August	9.6	5.6
September	4.0	1.3
October	0.5	0.0
November	0.1	0.0
December	0.0	0.0
Year	41.7	33.7

Wind

Local wind patterns in the Study Area are related to conditions such as the surrounding relief. Wind data is not recorded at Gunnedah Olympic Pool, however wind analyses have been undertaken for the Soil Conservation Service Research Station. The average wind direction for each season is given in Table 3.8.

Table 3.8: Wind Direction at 9 am (percentage distribution) - SCS Research Station

Direction	Summer	Autumn	Winter	Spring
Calm	0.9	1.3	3.9	1.4
North	10.3	8.3	7.5	10.7
North-east	15.5	14.6	12.5	17.3
East	21.5	24.8	20.7	23.9
South-east	21.4	28.5	18.8	17.0
South	7.1	7.2	10.9	3.7
South-west	2.9	3.7	4.3	4.7
West	4.5	3.4	5.8	5.0
North-west	15.9	8.2	15.6	16.3
Total	100.0	100.0	100.0	100.0

Source: Soil Conservation Service - Gunnedah

The dominant wind directions appear to be from the east, south-east and north-east, however it is likely that the south-west, west and north-west vectors from this station are under-represented, due to the sheltering effects of hills bordering the western side of the station.

Wind speed and direction are recorded at Boggabri and Coonabarabran which have similar topographical features to Gunnedah. Data from these stations indicate that the highest velocity winds occur from the north-west, west and south-east during the year.

Strong winds (winds in excess of 50 kilometres per hour) are experienced all year round, with the period June to September having the highest frequency. Strong winds are usually associated with one of the following meteorological conditions.

* Strong south-easterly winds associated with deep depressions off the mid and north coast of NSW. Wind gusts from this source may exceed 70 kilometres per hour.

* Violent squalls associated with severe local storms such as thunderstorm or frontal squalls. The strongest gusts in the Study Area would be expected under these conditions.

The Water Conservation and Irrigation Commission (1970) has provided estimates for the eastern Namoi Valley of extreme wind gusts, expected for given return periods. These estimates are shown in Table 3.9.

Table 3.9: Wind Gusts in the Eastern Namoi Valley

Return Period (Years)	Wind Gust Equalled or Exceeded (km/hour)
10	75
20	80
50	90
100	100

Relatively Humidity

The relative humidities recorded in the Study Area reflect its inland location. The average monthly relative humidity for SCS Research Station is given in Table 3.10. The relative humidity is a function of air temperature and is the highest during the winter months when temperatures are lowest.

Table 3.10: Relative Humidity - SCS Research Humidity (%)

Month	Relative Humidity (%)
January	52
February	58
March	57
April	61
May	68
June	74
July	74
August	69
September	61
October	55
November	49
December	48

Sunshine

Estimates on the average number of hours of bright sunshine per day in each month for the Namoi Valley are provided by the Water Conservation and Irrigation Commission of NSW (1970). these estimates are based on cloud observationos and are shown in Table 3.11.

Table 3.11: Estimated Average Duration of Bright Sunshine

Month	Sunshine (hours per day)
January	10.2
February	9.3
March	8.9
April	8.3
May	7.4
June	6.3
July	7.0
August	7.9
September	8.7
October	9.2
November	10.3
December	10.3
Year	8.6

3.1.7 Flooding and Hydrology

Hydrology of the Area

The town of Gunnedah is situated on the Namoi River, approximately 4 kilometres downstream from the confluence of the Namoi and Mooki Rivers. To study the hydrology of the catchment at Gunnedah it is necessary to look at the river system as a whole. The Namoi River is one of the major tributaries of the Barwon-Darling Rivers system and drains an area of about 43,000 square kilometres (17,100 square kilometres at Gunnedah), extending from near Walcha, westward to Walgett. It rises as the Macdonald River in the New England Plateau, where elevations range between 600 and 900 metres with a maximum of 1,500 metres on some isolated peaks, and flows in a general north/north-west direction to the Barwon floodplain at elevations of less than 150 metres.

The Mooki River is one of the main headwater tributaries and drains the south-eastern sections above Gunnedah. High flows from the Mooki catchment area can be a significant factor in flooding at Gunnedah and further downstream, when coinciding with major flows in the Namoi River itself. The other main headwater streams, the Manilla and Peel Rivers, join the Namoi River above Gunnedah.

The drainage pattern of the Namoi River catchment is influenced by the geomorphology of the basin. The major fault zone which runs in a north/north-west direction from Quirindi through Carroll to the west of Barraba divides the basin in three major geomorphological zones. Upstream of the fault zone, the drainage systems are entrenched and the development of alluvium is restricted both in width and depth. When flooding occurs, it chiefly takes the form of short duration, localised flooding.

Downstream of the fault zone as far as Narrabri, the topography is mature, the alluvium is both deep and extensive, the river gradient is low and lateral slopes over the floodplain alluvium are flat. Gunnedah is located in this section of the drainage system. In this section of the river, overbank flooding can be expected at reasonably frequent intervals. For floods of relatively low frequency of occurrence, widespread shallow innundation on each side of the main channel can be expected.

Downstream of Narrabri, the entire valley floor is overlain with alluvial deposits and the river assumes the characteristics of an inland delta with poor drainage. Major flooding will result in extensive shallow flooding, with 50 per cent or more of the total area inundated.

It should be noted that irrigation and town water supplies are obtained from the river in the area shown in red hatching on Map 6. The bores range in depth from 15 to 55 metres and the yields from 7.5 to 35 litres per second. The actual supplies obtained depend on the type, depth and thickness of water bearing sands and gravels present and these vary from place to place.

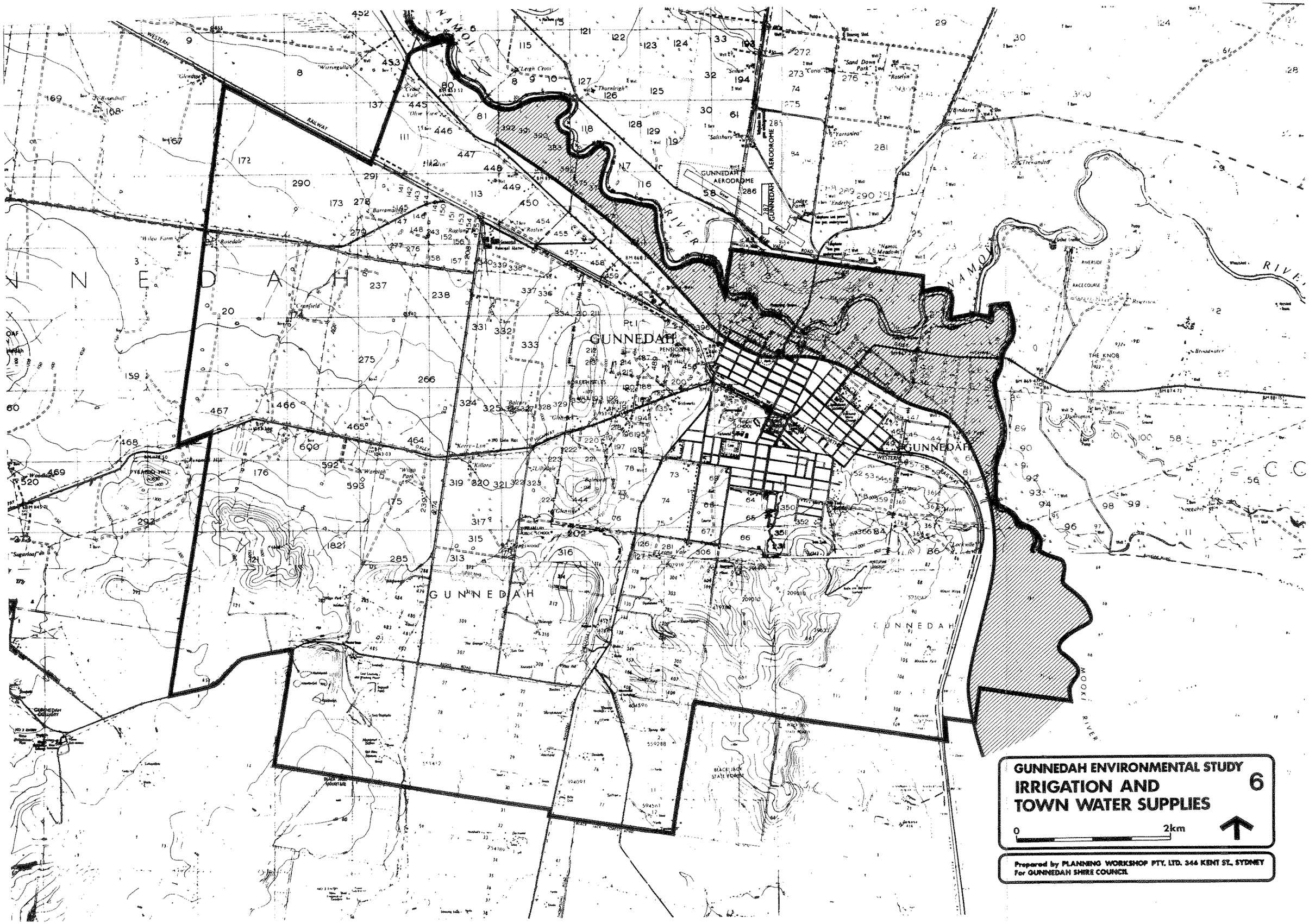
Flood Behaviour

Flooding has always been a problem in Gunnedah. Periodically waters from the Namoi River and Peel and Mooki sub-catchments flow into the northern section of the town. Local flooding is also caused by two local creeks - Ashfords Watercourse and Blackjack Creek. Reliable records of floods at Gunnedah are available since 1892.

The following indicators of critical flood levels have been used in studies of flooding in the area.

* The Namoi Valley Flood Mitigation Study, by Laurie Montgomerie and Pettit Pty Ltd, states that the critical level for flooding at Gunnedah is reached at 7 metres (23 feet) on the Gunnedah gauge, when minor flooding of urban areas commences. Over the period 1892 to 1980, sixty-eight floods exceeded this level.

* Floods in the Namoi Valley by the Water Resources Commission uses the 'danger height' as an indicator of flooding problems. The danger height is defined as the gauge height at which land holders situated in flood liable areas in the vicinity of the gauge would have to be alerted. At Gunnedah, this height is 5.8 metres and floods have exceeded this height on 119 occasions since 1892. The Water Resources Commission's Flood Inundation Map refers



GUNNEDAH ENVIRONMENTAL STUDY

6

IRRIGATION AND TOWN WATER SUPPLIES

Prepared by PLANNING WORKSHOP PTY. LTD. 344 KENT ST., SYDNEY
For GUNNEDAH SHIRE COUNCIL

to a critical height of 7.0 metres, at which level overflow from the main channel begins to affect development in Gunnedah. This critical height has been registered in 39 years (70 occasions) of the continuous record period.

* The Gunnedah Municipal Engineer's Report R3/2, tabled at the meeting of Gunnedah Municipal Council, held on 27th April, 1976, gives the following indicators relative to gauge readings at Cohen's Bridge (Chandos Street):

  . 21 feet 6 inches (6.6 metres) - river breaks its bank in the vicinity of Cohen's Bridge;

  . 22 feet 9 inches (6.9 metres) - water crosses O'Keefe Avenue;

  . 24 feet 3 inches (7.4 metres) - water crosses Maitland Street between Marquis and Chandos Streets;

  . 25 feet 4 inches (7.7 metres) - water begins to enter homes;

  . 26 feet (7.9 metres) - considered a major flood, very little housing affected below this level;

  . 31 feet 6 inches (9.6 metres) - highest recorded flood (February 1955).

Using these indicators, the Namoi River at Gunnedah has broken its banks on 91 occasions and major flooding (7.9 metres and above) has occurred on 17 occasions or on the average of once every 5 years.

Over the period of record, since 1892, floods occurred at Gunnedah in all months of the year but were less frequent in April and May. The most common months in flooding were January, February, June, July and October as shown by Table 3.12.

It should be noted that no two floods are the same and water behaviour varies from flood to flood. This is due to the many sources of floodwaters, the large catchment area involved and whether floods in different sub-catchments coincide.

Major floods since 1955, which was the year of the highest recorded flood at Gunnedah since 1864, have occurred in 1964, 1971, 1974, 1976 and 1977.

Table 3.12: Monthly Distribution of Flooding at Gunnedah and Narrabri froom 1892 to 1977 for GH Greater than or Equal to Danger Height

Month	Number of Events	
	Gunnedah	Narrabri
January	11	6
February	11	3
March	8	3
April	2	1
May	5	2
June	15	3
July	15	6
August	9	2
September	8	5
October	14	2
November	8	4
December	9	1

Source: Water Resources Commission, Floods in the Namoi Valley p.8.

Flood Mitigation Measures

Structural flood mitigation measures, such as dams, levee banks and floodways and non-structural measures, such as flood warning systems, floodplain zoning and catchment area management, may be used to reduce the adverse effects of flooding.

* Flood Mitigation Dams

In terms of structural measures, Keepit Dam on the Namoi River, 55 kilometres upstream of Gunnedah, can provide a mitigating effect on downstream flood levels. However, the dam is primarily operated as a conservation storage. Any mitigating effect is most noticeable close to the dam.

> "It would be expected that even if part of the Keepit Storage were used for flood mitigation, its effect on flood peaks in areas such as Gunnedah would not be great during the prolonged wet periods when many floods occur, since the storage level would be high during such periods. For example, at the onset of the major flood in February 1971, the storage was full as a result of previous wet conditions and the effect of the dam on the peak flood level at Gunnedah was negligible."[1]

1. Water Resources Commission (1978) Flood Inundation Map, Namoi

One of the findings of the Namoi Valley Flood Mitigation Study by Laurie Montgomerie and Pettit Pty Ltd was that:

> "Split Rock Dam, if constructed, will effect useful mitigation in most flood events on Manilla River floods at least to Gunnedah and possibly further downstream."[1]

There is no period set for construction as yet due to financing problems.

The Laurie Montgomerie and Pettit Pty Ltd Study concluded that construction of major dams specifically for flood mitigation was not a viable strategy due to the large number of flood producing tributaries and the long duration and large volumes of runoff experienced in major floods, among other factors.

* Levee Banks

The possibility of erecting a levee bank around the northern perimeter of the town was investigated by Gunnedah Municipal Council. However, it would appear that such a measure would not be cost-effective because of the relatively small number of properties which are affected by flooding. In addition, it appears that adequate flood-free land is available for expansion of the town.

* Non-Structural Measures

Gunnedah is a key location in the Namoi Valley flood warning system as it is the most upstream location where the four major rivers of the Namoi system - the Namoi, Manilla, Peel and Mooki - can be gauged in a single channel.

The Laurie Montgomerie and Pettit Study found that:

> ". . . the present flood warning system for Gunnedah is probably adequate although prediction of the time of peak could be improved. However, the general consensus is that the height predictions by the Bureau of Meteorology are reasonably accurate". (p.74)

3.1.8 Significant Natural or Archaeological Features

Being a largely already developed area, the likelihood of the existence of significant natural features is relatively low. However given that an objective of this Study is to assess the suitability of areas surrounding the existing urban area for development, it is important to establish whether any natural features of significance are located in these areas.

---

1. Laurie Montgomerie and Pettit Pty Ltd Namoi Valley Flood Mitigation Study.

The National Parks and Wildlife Service is the government instrumentality responsible for the identification and management of natural areas of regional or natural significance.

The National Parks and Wildlife Service currently manages no such lands within the Study Area and has no areas currently under investigation within or adjoining the Study Area.

It does note, however, that there is one recorded site of Aboriginal, archaeological or historic significance in the Gunnedah area. This is the aboriginal burial site of Cumbo Gunnerah or the Red Chief, which lies within the built-up area of the town and is marked only by an inconspicuous historic site town tour sign. It is believed that plans are underway between the Aboriginal community and the National Parks and Wildlife Service to erect a monument to commemorate the site. However, it does not appear possible to highlight the significance of the site in any further way due to the fact that it has been developed for urban purposes. It appears, in fact, that the burial site may actually have been under the Church opposite, rather than at the spot commemorated by the plaque.

Another site of some significance is known to exist some kilometres from town on the Tamworth Road. This site, consisting of a rocky knoll, was popularised by the author Ian Idriess. It is believed that the site has been subject to some vandalism in the past, by the removal of stones from the rocky outcrop.

While publications such as the Atlas of New England note the existence of axe-grinding grooves near Gunnedah, and finds of Aboriginal implements are common on properties in the area, the National Parks and Wildlife Service considers that "it is unlikely that there are other sites of significance in the Study Area". There are known to be caves of Aboriginal interest on the Soil Conservation Service Research Station to the south of the Study Area.

In a different area of concern, the Service notes that according to reports, the Gunnedah area appears to have quite a good population of koalas, and that there have been reports of koalas in close proximity to the town itself. The Service states that:

> ". . . if there are natural areas within or adjoining the Study Area known to contain koalas or through which koalas are known to move, then this should be taken into account in the event of future development".

3.2 The Socio-Economic Environment

3.2.1 Population Distribution and Age Structure

At the 1976 Census, the population of Gunnedah Municipality was 8,689 persons (9,000 adjusted). The population of Liverpool Plains Shire at the 1976 Census was 3,969 persons (4,150 adjusted). Therefore at the 1976 Census, the population of the area now known as Gunnedah Shire was 12,658 persons (13,150 adjusted).

Preliminary 1981 Census data gives a population of 8,909 persons in Gunnedah Urban Centre (which corresponds to the old Gunnedah Municipality) or 9,062 (adjusted). The 1981 population of Gunnedah Shire is 13,173 persons.

Therefore, in 1976, 68.6 per cent of the population of Gunnedah Municipality and Liverpool Plains Shire combined, lived in the urban centre and in 1981, 67.6 per cent of Gunnedah Shire lived in Gunnedah urban centre.

Table 3.13 shows the distribution and age structure of the population of Gunnedah Shire in 1976 and 1981. Figures are also given for NSW for the purposes of comparison.

Table 3.13 indicates that in 1976 and 1981 Gunnedah Shire had a relatively young population, consisting mainly of families with school age children. In 1976, 30.4 per cent of the population was under the age of 15 years and in 1981, 28.8 per cent of the population was under the age of 15 years. This slight decrease in the proportion reflects a state-wide decrease in the population in that age group.

The largest age group was the 20 to 39 years group, which forms the parent group of these children. This group increased by 7.5 per cent between 1976 and 1981. There was no significant change in the age structure of the Shire's population between 1976 and 1981. However, the proportion of the population below 20 years of age decreased slightly and above 20 years, increased slightly.

In 1976 and 1981, the distribution and age structure of the Shire was generally similar to that of NSW as a whole. However, Gunnedah Shhire had a slightly greater proportion of the population under 20 years of age and slightly lower proportion of the population over 20 years of age, than NSW as a whole.

Between 1976 and 1981, the proportion of the Shire's population in the 0 to 4, 5 to 14 and 60 and over year age groups decreased in similar proportions as NSW as a whole. However, between 1976 and 1981 the proportion of people in the 15 to 19 years age group decreased at a greater rate than NSW, the proportion of people aged 20 to 39 increased at a lower rate than NSW and the proportion of people aged 40 to 59 years increased slightly while there was a small decrease in the population in that age group in NSW.

3.2.2 Employment

Table 3.14 shows the distribution of the labour force in Gunnedah Shire (Gunnedah Municipality and Liverpool Plains Shire combined) and NSW in 1976. The table indicates that the workforce participation rate was fairly high, with approximately 62 per cent of working age adults (over 15 years) in the labour force in 1976. This is marginally higher than the workforce participation rate of NSW (60.8 per cent).

Table 3.13: Distribution and Age Structure of Population - Gunnedah Shire, 1976 and 1981

Age	1976 Gunnedah Shire* No.	%	1976 NSW %	1981 Gunnedah Shire No.	%	1981 NSW %	% Change Gunnedah	NSW
0 - 4	1,186	9.4	8.6	1,112	8.4	7.5	-1.0	-1.1
5 - 14	2,657	21.0	17.6	2,695	20.4	16.9	-0.6	-0.7
15 - 19	1,269	10.2	8.8	1,158	8.8	8.4	-1.4	-0.4
20 - 39	3,473	27.4	29.4	3,733	28.3	31.2	0.9	1.8
40 - 59	2,569	20.2	21.9	2,790	21.3	21.3	1.1	-0.6
60+	1,494	11.8	13.6	1,681	12.8	14.4	1.0	0.8
TOTAL	12,658			13,174			4.0	

Source: 1976 and 1981 Australian Bureau of Statistics Census figures.

* Figures for Gunnedah Municipality and Liverpool Plains Shire were combined.

Table 3.14: Labour Force Distribution, 1976

	Employed		Unemployed		Not in Labour Force (over 15 years)			Population over 15 years		Workforce Participation Rate (%)	
	Male	Female	Male	Female	Male	Female	Force	Male	Female	Male	Female
Gunnedah Shire*	3,570	1,659	135	102	803	2,547	5,466	4,508	3,705	82.2	40.9
NSW	1,302,587	728,377	70,351	41,322	364,383	1,014,660	2,142,637	1,737,322	1,372,938	79.0	43.1

* Gunnedah Municipality and Liverpool Plains Shire were combined.

The male workforce participation rate in the Shire (82.2 per cent) was higher than that for NSW (79 per cent), while the female participation rate (40.9 per cent) was lower than that for NSW (43.1 per cent). A large proportion of females not in the labour force would be married women. The occupations in which the Shire's population was engaged in 1976 is shown in Table 3.15. The main occupations of the employed population of the Shire were:

* Professional/Administrative, Clerical and Sales Work - 29.5 per cent of the population.

* Production and Processing Work - 23.9 per cent of the population.

The high proportion of people employed in the professional/ administrative and agricultural sector reflects Gunnedah's role as a rural service town.

Table 3.16 gives a breakdown of employment by industry in Gunnedah Shire and NSW in 1976. This table shows the importance of the primary industry sector, employing 31.3 per cent of the employed population (particularly in comparison to NSW) and the tertiary sector, employing 31 per cent of the employed population. In terms of specific industries, agriculture employs the highest proportion of the population (27.7 per cent), followed by the wholesale/retail industry (18.5 per cent). Secondary industry only employs a small proportion of the Shire's population (17.6 per cent) compared to NSW (29.2 per cent).

Table 3.17 presents the employment status of the Shire's population in 1976. In 1976, the total labour force was estimated at 5,466 persons, of whom 237 (1.9 per cent) described themselves as unemployed. As at June 1981, 159 people were receiving unemployment benefits. The proportion of unemployed people in the Shire in 1976 was lower than that in NSW.

As could be expected of a community based on agriculture, there is a relatively high percentage of self-employed persons (11.2 per cent of the Shire, compared to 5.3 per cent of the State), probably reflecting the proportion of the population which are farmers.

3.2.3 Household Income

Household income refers to the total gross income of each household at the 1976 Census as shown by Table 3.18. The table indicates that low to middle income earners formed the largest income groups in the Shire in 1976. Household earniing over $15,000 per annum in 1976 were 6.6 per cent less than households in the Sydney Statistical Division and 3.4 per cent less than households generally in NSW. The greatest proportion of households earned between $5,000 and $9,000 per annum.

Table 3.15: Employment by Occupation - Gunnedah Shire, 1976

1976	Gunnedah Municipality	Liverpool Plains Shire	Total Shire No.	Total Shire %	NSW No.	NSW %
Professional/Administrative/ Clerical/Sales	1,354	187	1,541	29.5	744,467	36.7
Farming	217	1,235	1,452	27.8	125,292	6.2
Mining	88	20	108	2.1	13,537	0.7
Production/Processing	1,060	192	1,252	23.9	606,206	29.8
Transport/Services	493	104	597	11.4	268,204	13.2
Other	202	77	2779	5.3	133,259	6.6
TOTAL EMPLOYED	3,413	1,815	5,228		2,030,965	

Table 3.16: Employment by Industry, 1976

	Gunnedah Municipality	Liverpool Plains Shire	Total		NSW	
			No.	%*	No.	%
Primary Industry						
Agriculture	183	1,266	1,449	27.7	116,807	5.8
Mining	161	29	190	3.6	25,229	1.2
Secondary Industry						
Manufacturing	547	60	607	11.6	425,502	21.0
Electricity, gas, water	27	4	31	0.6	40,617	2.0
Construction	222	62	284	5.4	125,102	6.2
Tertiary Industry						
Wholesale, retail	867	98	965	18.5	371,897	18.3
Transport and storage	109	54	163	3.1	108,945	5.4
Communications	54	11	65	1.2	41,752	2.1
Finance	201	23	224	4.3	161,556	8.0
Public Administration/Defence	175	29	204	3.9	116,168	5.7
Community Services						
Health	154	26	180	3.4	110,628	5.4
Education	190	37	227	4.3	99,941	4.9
Other and undefined	67	17	84	1.6	45,723	2.2
Entertainment	222	27	249	4.8	106,408	5.2
Other, NEI, N/S	235	71	306	5.9	134,690	6.6
TOTAL EMPLOYED	3,413	1,815	5,228		2,030,966	

* Percentage of total employment

Table 3.17: Employment Status, 1976

	Gunnedah Municipality	Liverpool Plains Shire	Gunnedah Shire		NSW	
			No.	%*	No.	%
Employed						
Employers, self-employed	498	919	1,417	11.2	253,860	5.3
Wage, salary earner	2,883	7873	3,666	29.0	1,751,424	36.7
Other	32	112	144	1.1	25,680	0.5
TOTAL EMPLOYED	3,413	1,815	5,228	41.3	2,030,964	42.5
Unemployed	155	82	237	1.9	111,673	2.3
Total in Labour Force	3,569	1,897	5,466	43.2	2,142,637	44.8
Not in Labour Force	2,592	758	3,350	26.5	1,379,043	28.9
Under 15 years of Age	2,528	1,314	3,842	30.4	1,255,421	26.3
TOTAL POPULATION	8,6898	3,969	12,658		4,777,101	

* Percentage of total population.

Table 3.18: Household Income, 1976

1976	Less than $5,000	%	$5,000-$9,000	%	$9,000-$15,000	%	Over $15,000	%	Not Stated	%	Total Household
Gunnedah Municipality	442		626		702		464		232		2,466
Liverpool Plains Shire	158		332		238		224		118		1,070
Total	600	17.0	958	27.1	940	26.5	688	19.5	350	9.9	3,536
Sydney SD		15.5		21.0		27.3		26.1			
NSW		17.1		23.0		26.8		22.9			

3.2.4 Education

In 1976, 27.4 per cent of the Shire's population was still attending school (compared to 16.1 per cent in NSW). Approximately 8.4 per cent of the population were of pre-school age (0–4) not attending school. 55.6 per cent of the population left school at the age of 15 or younger and 31.9 per cent left school between the ages of 16 and 19 years.

Of the population aged over 15 years in 1976, 72.1 per cent had no tertiary qualifications (67.3 per cent in NSW), 12.6 per cent had either a technicians or trade certificate (16 per cent in NSW) and 4 per cent had a bachelors degree or similar (4.2 per cent in NSW). The reasons for the Shire's below average figures for tertiary education is probably linked to the distance factor between the Shire the tertiary education institutions and also to the limited opportunities that would have existed in 1976 for employment within the Shire for people with tertiary qualifications.

3.2.5 Housing

The following table shows the number of occupied and unoccupied dwellings in 1976 and 1981.

Table 3.19: Dwellings in Gunnedah

Dwellings	1976	1981
Private, Occupied	3,536	3,986
Private, Unoccupied	352	416
Non-Private	25	N.A.
Total Dwellings	3,913	4,402

The number of dwellings has increased by 12.5 per cent between 1976 and 1981.

Table 3.20 shows the nature of dwelling occupancy in private occupied dwellings in 1976. The 1976 Census showed that 62.3 per cent of persons within private occupied dwellings owned or were purchasing their home. This is only slightly lower than the corresponding figure for NSW (68 per cent). In 1976, 26.6 per cent of persons within private occupied dwellings were tenants. 7.4 per cent of the population in private occupied dwellings were tenants of the Housing Commission (compared to 5.5 per cent in NSW) and 19.2 per cent were private tenants.

The Housing Commission has constructed a total of 417 dwellings as at March 1982. The discrepancy between this figure and the total given in Table 3.20 (i.e. 228) is caused by the sale of Housing Commission dwellings to private owners. The Commission has four land reserves in Gunnedah with the potential for 6 dwelling houses, 3 Teacher Housing Authority units, and 8 units for aged persons.

Table 3.20: Nature of Dwelling Occupancy - Gunnedah Shire, 1976

Nature of Occupancy	Number of Persons						Number of Dwellings					
	Gunnedah Mun.	Liverpool Pl. Shire	Gunnedah Shire		NSW		Gunnedah Mun.	Liverpool Pl. Shire	Gunnedah Shire		NSW	
			No.	%	No.	%			No.	%	No.	%
Owner/Purchaser	4,979	2,458	7,437	62.3	3,112,900	68.0	1,506	686	2,192	62.0	975,270	65.4
Tenant - Housing Auth.	881	4	885	7.4	250,803	5.5	226	2	228	6.4	71,988	4.8
Tenant - Other	1,832	457	2,289	19.2	882,845	19.3	564	130	694	19.6	323,070	21.7
Total Population in Occupied Private Dwellings												
Total Occupied Private Dwellings	8,163	3,766	11,929		4,575,084		2,466	1,070	3,536		1,491,826	

Table 3.21: Motor Vehicle Ownership, 1976

	None	One	Two or more	Not Stated	Total Occupied Private Dwellings
Gunnedah Municipality	318	1,202	892	54	2,466
Liverpool Plains Shire	42	378	636	14	1,070
Total Gunnedah Shire	360	1,580	1,528	68	3,536
% Total Occupied Dwellings in Shire	10.2	44.7	43.2	1.9	
NSW	272,404	715,280	444,998	59,144	1,491,826
% Total Occupied Dwellings in NSW	18.3	47.9	29.8	4.0	

Source: Australian Bureau of Statistics, 1976 Census

In terms of demand, there are currently 64 approved applications, including 11 elderly single persons and 5 elderly couples, awaiting accommodation. It is therefore apparent that there is inadequate low income accommodation presently available in Gunnedah. Pressures for growth in Gunnedah and the gradually increasing proportion of retired people are likely to emphasise this need.

3.2.6 Motor Vehicle Ownership

Motor vehicle ownership in 1976 was fairly high in Gunnedah Shire, with 87.9 per cent of the population having one or more cars. A higher percentage of people in occupied dwellings in the Shire had two or more cars (43.2 per cent) than in NSW (29.8 per cent). This reflects the use of motor vehicles in agricultural activities and the long distances from home to community facilities in a rural area (see Table 3.21).

3.2.7 Social Security Benefits

The following table shows that the number of people receiving various social security benefits as at 2nd February 1982 (sickness benefits as at June 1981) was 10.3 per cent of the population.

Table 3.22: Persons Receiving Social Security Benefits

	Gunnedah Shire		NSW	
	No.	% 1981	No.	% 1981
Age Pension	939	7.1	504,787	9.8
Invalid Pension	154	1.2	81,260	1.6
Widows A	68	0.5	33,803	0.7
Widows B	38	0.3	28,863	0.6
Supporting Parents	85	0.6	44,045	0.9
Deserted Wives Pension	56	0.4	902	0.02
Sickness Benefit	21	0.2	21,000	0.4
Endowed Families	1,561		743,549	
Total		10.3		14.02

From the table, it is clear that the proportion of people in Gunnedah Shire receiving each type of benefit in 1976 is similar to NSW as a whole, although slightly less people receive the age pension, and slightly more the deserted wives pension. The percentage of the population receiving social security benefits in Gunnedah Shire is slightly lower than NSW as a whole.

3.2.8 Provision of Community Facilities

The existing infrastructure of community facilities in Gunnedah has been ascertained from the Directory of Social Welfare compiled by discussions with Council planning and social work officers, and responses received from various community-related government instrumentalities.

Generally, again in its position as the functional and spatial focus of a very wide rural hinterland, Gunnedah township is well endowed with a wide range of community facilities.

Health Services and Facilities

The health of the town and hinterland is attended to by some:

* 3 doctor's surgeries (with 9 servicing doctors);
* an ambulance service;
* 1 acupuncturist/naturopath;
* 1 chiropodist;
* 1 optometrist's office;
* 1 pathological laboratory;
* 4 dental (5-6 dentists) surgeries;
* a school dental service at Gunnedah Primary School; and
* Gunnedah District Hospital.

It also lies within the region of the Tamworth Base Hospital, which is served by specialists in most areas, many of whom travel around the region as required. It is, for instance, served by visiting pediatricians and dieticians provided as a Health Commission service. The Health Commission also provides a baby health care Sister, who carries out pre-natal care, some post-natal care and general counselling. A physiotherapist operates within the hospital.

Gunnedah District Hospital currently contains 71 beds and the following staff as shown by Table 3.23. The Health Commission has closed 6 beds in the last 12 months, making this hospital one of the lowest bed per capita facilities in the region. The loss of these beds was particularly significant in the maternity section, which lost 6 of the 13 beds. Although the maternity bed occupancy rate was formerly only 38 per cent and is now only 65 per cent, the loss of 6 out of 15 maternity beds has been felt at times when 10 to 11 bookings exist in some months. According to the Health Commission, however, this would seem an acceptable standard.

The Health section of the Public Works Department has advised that a development brief was prepared in May 1981 for the Gunnedah District Hospital. This brief envisaged redevelopment mainly by replacement of old facilities. It might be noted that refurbishment has been a continual process.

The Public Works Department also advised, through an examination of the population figures forecast by the then NSW Planning and Environment Commission, that an allowance in total hospital bed needs had been made for the proposed coal mining ventures and the possible increase in patients.

Table 3.23: Gunnedah District Hospital Present Staffing (July 1982)

Department		Full Time	Part Time
Administration		6	-
Pharmacy		-	1
Radiography		2	-
Maintenance		6	-
Ancillary		4	-
Domestic	- Food and Dietary	11 (1 vacant)	7 (1 vacant)
	- Cleaning	12 (1 vacant)	1
Nursing	- Trained	26	2
	- Permanent Relief	2	2
	- Untrained*	31	1
	- Trainees (Supernumerary)	6	

* 'Untrained' includes trained nurse-aides as distinguished from trained 'Sisters'.

Source: Gunnedah Hospital records.

The adequacy of existing and planned hospital beds must also be viewed in the light of use of some 21 of the total number of beds for long term geriatric use. This function has devolved to the hospital by way of the absence of any alternative facilities for aged persons, such as a nursing home or adequate aged person's accommodation.

However, if suitable aged person care is established in the town, it is feared that the present geriatric beds within the hospital may be closed by the Health Commission, retaining a total of 50 beds for a town population of some 9,000 and a region population of some 13,000. These figures result in ratios of around 0.18 and 0.26 beds per 1,000 head of population. Assessment of the adequacy of these ratios awaits a Health Commission reply to our enquiries. However on the general standard used of 1 hospital per 15-20,000 people, it can generally be inferred that Gunnedah is adequately served by hospital facilities.

Welfare Services and Facilities

Responsibility for the general welfare and mental health of the community is shared basically by the Council, the Health Commission, and the Department of Youth and Community Services.

A district office of the Department of Youth and Community Services is located in the State Office Block and has a staff of 2. The Gunnedah District supervised by this staff includes the whole of the Gunnedah Shire and parts of Quirindi and Narrabri Shires, including the town of Boggabri.

The role of the NSW Department of Youth and Community Services is stated as to ". . . promote, protect, develop, maintain and improve the well-being of the people of this State, particularly those who are disadvantaged."

The Department has five programme areas within which its work is conducted. They are:

* Care and development of children.

* Individual and family life development.

* Emergency assistance to individuals and families.

* Development of people with handicaps.

* Community development.

It appears that its major active role in Gunnedah is to fund welfare groups and services. It currently licenses and part-funds 2 pre-school kindergartens and an occasional child care centre, as well as jointly funding the Gunnedah Community Information Centre which operates in the Community Centre, Marquis Street, the Community Social Worker employed by Gunnedah Shire Council and a Home Help Service.

The Council employs a Social Worker who counsels local residents where appropriate, provides community help (e.g. the support of groups, arranges emergency accommodation etc.), conducts a community counselling course, and undertakes various research including a recent youth survey. Council has also recently constructed the Gunnedah Community Centre which has 4 halls or rooms of sizes ranging between a seating capacity of 10 and 80 persons available for public hiring. Local groups may book these rooms for purposes other than political meetings, regular religious services or profit making enterprises.

The Health Commission provides a staff of 5 (excluding the baby health Sister) comprised of:

* 3 community Nurses (who act as educators and counsellors as well as playing an active role in relation to particular health issues and school preventative medicine);

* 1 Social Worker (shared with the Hospital);

* 1 mental health Counsellor (responsible for psychiatric counselling, referrals etc. on drug and family-related problems).

However, while these are full time staff, their time is shared in a large area which includes Boggabri, where they are based at the Hospital.

Existing welfare facilities include:

(i) For Young Children:

* The Mary Rankin Occasional Child Care Centre: This facility provides for short term minding of 20 children. It is located right in the town centre, although in confined premises which prohibit significant expansion. The centre is designed to cater for the needs of mothers who wish to have children cared for while they attend medical, dental or business appointments, shopping or the like, without interruption. Age admission is 0-5 years. The centre is run by a trained nurse, a full-time assistant, two part-time assistants and volunteer help is requested to keep down charges. The centre operates from 9.30 am to 3.30 pm Tuesday to Friday and is filled virtually to capacity every operating day.

* Two Pre-School Kindergartens:

  . the Gunnedah Community Pre-School, Elgin Street, licensed for 32 children between 3-5 years;

  . the Gunnedah Baptist Community Pre-School, Reservoir Street, licensed for 40 children, 0-5 years.

  One of these is a 2 unit pre-school, the other a 1 unit, which restricts the numbers of children. The Baptist Pre-School is presently operative at full capacity with no spare room; the Gunnedah Pre-School has very little spare capacity. The 2 unit pre-school is limited in the possibility of expansion for its facilities.

* The Children's Services Council: This Council aims for public awareness and the setting up of various services.

* The Nursing Mother's Association: This group is represented in town.

* The Playgroup Association of NSW: A number of playgroups have been established in Gunnedah. At least one of these is quite large, supplemented by a couple of smaller groups.

* The Oranga Family Mobile Resource Unit: This is a travelling resources unit equipped with toys and educational equipment designed to support playgroups in local villages and on the farm itself. Recently funded by the Department of Youth and Community Services, it plans to set up a toy lending library in the Country Women's Association rooms in Gunnedah.

(ii) For Adolescents

* A Police Boys Club: Having outgrown the existing premises in Elgin Street, this Club is presently constructing new premises on the land formerly owned by the Soil Conservation Service in View Street adjoining the Showground.

* An Informal Youth Group: This group meets one afternoon per week. It contains approximately 12 members between 12-20 years of age, the majority of whom are 12-15 years old. The group acts as an after school gathering activity held in a church hall.

* Various Formal Youth Groups: These include Brownies and Girl Guides (who share a hall in the Showground); Cubs (who have their own hall in the Showground); and Boy Scouts and Venturers, who share a hall at the same location. Facilities for all of these groups are believed to be adequate.

(iii) For Adults

Facilities/activities other than counselling facilities mentioned lie largely in the cultural,entertainment area.

* Amateur Dramatic Group: This group uses the Smithhurst Theatre (built as an annex to the Town Hall). It is believed that this theatre is inadequate for most theatrical purposes although it is still used in conjunction with the Town Hall for other functions. For drama productions, the stage is fairly small and number of dressing rooms limited.

* Eisteddfod Society: This group has a large following in town. It uses the Town Hall and Presbyterian Church Hall for its performances and practice.

* Gunnedah Shire Band: This group has its own clubhouse in the recreational area on Anzac Hill. A relatively new Clubhouse, this was financed by Council which is being repaid the debt by the Band Society. The Band has a large following in town. As well as concerts, bingo is held in the hall; a junior band has also been formed; and the hall is used for purposes such as wedding receptions.

* Lapidary Club: This club has its own headquarters at the Showground.

* Pottery Club: This club is believed to use premises located on the Showground.

* Gunnedah Art Society: This club is believed to require club room and display room.

* Service Groups: These include 2 Rotary Clubs, Lions Club, Apex, Quota, Rotaract, a formative Jaycees Club, a Country Womens Association, Toastmistresses Club, and View Club. All of these groups share the facilities of other groups, an arrangement which appears satisfactory to those concerned.

* Music Makers' Club: This group practices and conducts recitals in the Council Community Centre, a relatively new resource built by Council in 1976, or otherwise in private homes.

* Film Makers' Club: This group shows films in the Community Centre.

* Bridge Club: The Bridge Club is quite active, meeting at the Servicemen's Club fortnightly.

* Various other small passive leisure groups: Several smaller groups operate either in private premises in the town, in the smaller meeting rooms of the Community Centre, or in the Clubhouses of the larger organisations.

(iv) For Aged/Infirm/Disadvantaged Persons

* Combined Pensioner's Association: This Association meets in town, and has over 300 members.

* 'Day Centre': While the 'day centre' held at the Community Centre is open to all comers, it tends to function largely for aged persons, attracting some 30-40 visitors on operational days.

* Geriatric Section of Hospital: As noted above, this Section provides 21 beds for elderly persons, 16 of which could be accommodated in nursing-home type care.

* Convent of Mercy Rest Home: These nursing home type facilities are only available for 18 aged women or nuns. There are 30 persons currently on the waiting list.

* McAuley Wing of the Convent: This wing provides a hostel for aged women, comprising 23 beds. It currently has 40 people on its waiting list.

* 'Yallambee' Aged Person's Home: This home is operated by a Local Committee known as the Gunnedah Homes for the Aged Association, and provides 10 single dwelling units for women and 14 hostel rooms for men.

* Other Senior Citizen Activities: Various other groups are active in town, including a bingo group and a Benevolent Society. A Senior Citizen Week is held by Council each year and various day trips for the aged are available from bus companies.

* Home Help Service: This provides limited emergency help, but is believed to be at full capacity.

* Domiciliary Nurse: Provided by the hospital, this service also works to capacity.

* St. Vincent de Paul Society: This society operates in town to provide an opportunity shop, crisis food and clothing provisions, a branch of Alcoholics Anonymous, and emergency overnight accommodation. Of greatest significance, this overnight accommodation provides for 6 people, perhaps up to 8. In an ordinary month, occupancy ranges from 30 (capacity 180) to 179 bed nights occupied, the heaviest peak being in the summer

months although winter also experiences some high usage. This service also caters for abused women, but can only provide material needs. The Society has recently purchased a house in Carroll to expand its operations to this village. It is believed its operations are presently severely strained by lack of funding however.

Transport Services

No public transport service presently operates in Gunnedah, other than the limited range of school bus services. None of these directly access the town.

It is believed that a bus service existed 6-8 years prior to the development of the View Street area. It apparently became uneconomic to run.

It would appear that such a service may now be economic, given the spread of development to the other side of Lincoln Street.

Educational Facilities

Existing educational facilities in the areas and their capacities are shown in the following table.

Table 3.24: Adequacy of Existing Educational Facilities

School	Approximate Capacity	Current Enrolment	Surplus/ Deficiency
Gunnedah Public (Primary and Infants)	700	520 *	-180
Gunnedah South Public (Primary and Infants)	550	551 *	-
Gunnedah High School	1,000	813 *	-200
St. Xaviers (Primary and Infants)	450	437	-10
St. Mary's High School	420	396 (75 boarding)	-25

* 1982 Source, Department of Education

It is consequently apparent that substantial spare capacity exists in the State system, if not the Private School system. This situation is in fact likely to further improve according to estimates of public school enrolments prepared by the Department of Education.

Table 3.25: Public School Enrolment Estimates

School	Year 1980	1981	1982	1983	1984
Gunnedah High	875	840	813	820	820
Gunnedah Public	550	541	520	498	476
Gunnedah South	580	566	551	534	521

Source: Department of Education

The Department of Education has in fact stated that: "The accommodation position in all public schools is more than sufficient to cater for enrolment predictions until 1984." Building work which is being carried out consequently relates only to the improvement and conversion of facilities, especially at Gunnedah South Public School which was severely damaged by fire some 5 years ago. The building programme for this school includes a new administration unit, staff facilities and library. Conversion work on existing facilities is also contemplated.

Negotiations are currently underway to acquire additional land for playgrounds for Gunnedah Public School.

In other regards it would appear that the public school facilities in Gunnedah are adequate for the demands imposed on them. In addition, the High School has substantial room for expansion if required. The possibility of expansion of Catholic School facilities appears more limited. St. Xaviers is currently adding another 2 classrooms. However it will still need to use 1 demountable room to meet existing needs. St. Mary's College has in fact expanded as far as physically possible.

An alternative denominational school has recently been opened by the Baptist Church in former church premises which accommodates 20 children. This school, the Christian Community Centre, hopes to double this enrolment.

A special school for disabled children also exists in Gunnedah. Present facilities limit enrolment to 16 pupils. The Department of Education has advised that demand is such that a further classroom would be very useful.

Technical College facilities and capacities have been provided by the Department of Technical and Further Education relating to Gunnedah Technical College. Table 3.26 lists enrolments (preliminary figures for 1982 are not available as yet but are expected shortly).

Table 3.26: Technical College Enrolments

Year	Course Level				Total
	Certificate	Trade	Post-Trade	Special	
1970	20	28	-	548	596
1971	25	35	-	498	558
1972	9	33	-	430	472
1973	13	23	-	519	555
1974	4	37	16	610	667
1975	-	40	-	592	632
1976	20	58	-	804	882
1977	25	79	-	658	762
1978	23	88	-	813	924
1979	30	45	-	895	970
1980	25	28	16	1,170	1,239
1981	61	38	30	1,009	1,138

The capacity of a college is determined by the area of the site. The Department has taken as its guideline, a maximum number of students to the hectare as 1,000. As the Gunnedah Technical College is a site of 8.6762 hectares, the ultimate maximum capacity of the college is 8,676 students (i.e. 1,000 students per hectare). However this capacity figure does not indicate whether or not the present facility is coping with the number of students enrolled, according to the Department.

Due to the currrent financial constraints placed upon this Department, no major expansion of the Gunnedah Technical College can be undertaken at this stage. It appears that deficiencies exist in facilities for welding. Internal re-organisation is expected to greatly improve the accommodation situation until such times as funds for new works are available, however.

Minor maintenance and repairs such as the upgrading of the power supply and ventilation are scheduled and will further improve facilities.

The existing site of the College is relatively large for its enrolments. Consequently the Department has no plans to obtain additional land and in fact recently dedicated a small 0.7 hectare parcel for the use of the Police Citizen Boys Club.

The range of activities offered by the College has varied over time. Some have been discontinued. Briefly, records show that the Accountancy Certificate, Automotive Engineering Trade, Carpentry and Joinery Trade (discontinued 1972), Fitting and Machining Trade (discontinued 1971) and some special courses including Fashion, Homecraft Woodwork, Home Science, Farm Mechanics, Workshop Practice, Secretarial Studies and Art/Ceramics have been running since the 1960's.

Link courses in Fashion and Welding; Pre-apprenticeship courses in Carpentry and Joinery, and Automotive Engineering/Welding; Outreach courses, Remedial English and Adult Literacy have recently been initiated.

Due to a variety of reasons, i.e. lack of suitable facilities, teachers or student numbers, the following courses, although being approved, could not run:

* Bricklaying for home gardeners;
* Home Gardening;
* Leatherwork;
* Children's Art;
* Floral Art;
* Cocktail and Mixed Drinks.

Some community groups make use of the college facilities. The local Pastoral, Agricultural and Horticultural Association use college grounds for their Pony Club activities; the Arts Society use the Theatrette one night per month for film nights; a representative from the Small Business Agency conducts interviews in a classroom and occasionally guest speakers from other groups use the college facilities.

The Technical College also conducts correspondence courses and courses in other centres. While these associated centres are directed from the Tamworth District headquarters, they are apparently administered by Gunnedah Technical College. These include such centres as Barraba, Bingara, Boggabri, Collarenebri, Manilla, Quirindi, Tenterfield, Uralla, Wee Waa and Werris Creek.

It would appear from the above that educational needs at all levels are relatively well met in Gunnedah. In addition substantial spare capacity exists, at least in the public system, for expansion if required.

Special educational needs appear less adequately met. In particular it appears as though there may be some demand for expansion of the school for disabled persons, and some need to expand the capacity of Catholic school facilities. The fulfilling of these types of needs, however, tends to be subject to the initiation of private groups, even if government assisted, rather than the direct responsibility of public authorities.

Recreation Facilities

The recreation facilities of Gunnedah are relatively extensive and plans are currently underway to further supplement these facilities. In all, Gunnedah township has 174 hectares of open space for the purposes of recreation. 56.6 per cent or 98 hectares of this is devoted to active recreation facilities. 16.7 per cent or 29 hectares is passive open space. These facilities are supplemented by commercial facilities, some of which have been mentioned under other (e.g. leisure/cultural) categories. The 'Fitness Factory', in particular, appears a popular commercial recreation facility. There are also recreation facilities which are part of the various schools. Of significance, the High School playing fields are extensively used by outside groups.

Table 3.27: Recreation Facilities in Gunnedah

Active Recreation Facilities

Location	Facility	Approximate Area (ha)
Riverside recreation area	2 ovals (with cricket pitches)	5.00
Wolseley Park	1 oval (with cricket pitch)/8 tennis courts/ adventure playground	3.00
Chandos Street	4 tennis courts	0.28
Bowling Club, Marquis St.	2 bowling greens	0.32
Brunyara Club	2 tennis courts	0.42
Greyhound Park	Greyhound racing	2.71
Finch Street	8 playing fields	4.47
Kitchener Sports Ground	2 tennis courts/ 2 netball courts, 1 oval	4.00
Municipal Swimming Centre	3 Swimming pools	2.14
Women's Bowling Club	1 bowling green	0.76
RSL Bowling Club	2 bowling greens	0.53
Showground	1 oval	2.85
John Longmuir Playing Fields	8 netball courts, 5 playing fields	3.36
Cnr Hunter and Anzac Sts	2 tennis courts/playground	0.34
Gunnedah Golf Course	18 hole course	37.95
Stock Road	Rifle Range	8.63
McAndrew Park Avenue	2 playing fields	2.82
Base of Porcupine Hill Reserve	Motor Cycle Track	17.94
TOTAL		98.42

Passive Recreation Facilities

Location	Facility	Approximate Area (ha)
Riverside Park (cnr O'Keefe Avenue and Maitland Street	Picnic Area	1.40
Wolseley Park	Picnic/seating facilities	1.00
Anzac Hill	Landscaped, developed park	0.90
Meldrum St./Scobie St.	Parkland	2.36
Rear of Colin Court	Playground	0.27
Beulah Street	Playground	0.33
Gallen Avenue	Playground	0.91
Porcupine Hill	Nature reserve/lookout	21.38
McAndrew Street	Playground	0.53
High Street	Playground	0.66
George and Johnson Sts	Playground	0.26

Undeveloped Recreation Areas (or undergoing development)

Location	Approx. Area (ha)
Pensioners Hill	15.16
Riverside areas (other than the aforementioned)	3.69
Wandobah Road Reserve	27.50
TOTAL	46.35
TOTAL RECREATION AREA	174.79

The adequacy of general recreation facilities can be assessed by comparison of the existing open space provision per head of population to normally accepted standards for the same. As can be seen from Table 3.30 the township of Gunnedah is more than adequately provided for in terms of total active and passive recreation land when considered either in relation to the town's population or the population of the whole Shire. These figures exclude the currently undeveloped or unused recreational land. When the Wandobah Road reserve, for instance, is developed and added to the area for active recreation the provision of active recreation land per head of population will rise to 9.75 hectares per 1,000, compared with the accepted standard of 1.21 hectares per 1,000, and the overall provision will be 11.8 hectares per 1,000. This is, in fact, not an unusual finding in a country town, and in actual fact, the over-provision will become less apparent as the town grows past threshold levels for the provision of various facilities.

It is also worth briefly considering the adequacy of the allocation of these resources amongst various types of recreation facilities, and consequently the likely adequacy of the provision of various types of recreation facilities. This can be roughly evaluated from the standards contained in Table 3.28, although their theoretical nature should be noted.

Despite the apparent abundant provision of all facilities it appears that minor conflicts occur between various groups for the use of dual-purpose facilities. It is believed that a new ground is sought for the use of Australian Rules games, which presently share the Showground ring with the Rugby Club, Pony Club, Trotting Club and Showground Society. The land parcel under consideration for exchange in relation with the Retirement Village proposal has been mooted as a possible home ground for the Australian Rules Club.

The Rugby Club has recently purchased Portion 129 to cater for their future needs. The needs of the Rugby League Club are presently under consideration by Council in terms of the possibility of inclusion of a licensed club and playing fields in the Wandobah Road reserve. It is believed that the baseball/softball club also requires a permanent home ground. The Pistol Club has recently gained approval to use an isolated land parcel to the south of the Mullaley Road. However the Sporting Shooters Association is still operating from a range relatively close to now built-up areas.

Significant recreational and other community use is presently made of the Showground. A list of these functions and relation to existing structures is contained in Appendix 4.

Table 3.28: Sporting Facility Provision

	Theoretical Average Catchment Population	Desired level of Provision		Actual Provision
		Town	Shire	
Bowling Greens[1]	15-30,000	-	1	5
Football/ Cricket Oval[2]	2,500	3.6	5.3	14
Golf Course[1]	15-25,000	-	1	1
Gymnasium[3]	12,000	-	1	1
Hockey/Soccer field[4]	3,000	3.0	4.4	6
Netball Courts[2]	2,900	3.1	4.5	10
Squash Courts[2]	2,500	3.6	5.3	10
Swimming Pools[4]				
25 metre	12,000	-	1	1
50 metre	50,000	-	-	1
Tennis Courts[2]	2,500	3.6	5.3	18

Sources:

1. Latona, Masterman et al. (ibid).
2. Blacktown City Council (ibid).
3. Planning Workshop Pty Ltd/PA Management Consultants Pty Ltd Leisure - A New Perspective, 1974.
4. Planning Workshop Pty Ltd/PA Management Consultants Pty Ltd/Camden Shire Council Narellan/Elderslie Infrastructure Assessment, 1981.

Tourist Facilities

Tourist facilities in Gunnedah are not highly developed. The principal tourist facility existing in the Study Area is the Tourist Information Centre operated by the North West Tourist Association. This facility operated for many years in various locations in Conadilly and Abbott Streets, with the current centre being in a shop front in the Ex-Servicemen's Club building facing Abbott Street.

Council, in collaboration with the North West Tourist Association and the Association of Apex Clubs, is currently having a new Centre erected in Anzac Park Gunnedah. This project has qualified for a subsidy from the Tourist Industry Development Fund. It is anticipated the building will be opened about September 1982, and an official opening by the New South Wales Minister for Leisure, Sport and Tourism is planned for October 1982.

The Department of Tourism holds the belief that with the provision of this facility and associated toilets and passive recreation areas, the requirements of tourists will be adequately catered for in Gunnedah. The Department has stated that it cannot perceive Gunnedah having the need for increased tourist related facilities in the foreseeable future. The town is largely a stopover point for travellers to or from the North Coast of NSW, or alternatively, to the North Western areas of the State, rather than a tourist destination point.

(i) Tourist Accommodation

The recent increase in motel facilities is considered to have enabled Gunnedah to satisfactorily cater for tour groups travelling by coach, and this is seen as a distinct improvement, particularly as the North West Tourist Association has developed a special expertise in the promotion of farming industry related special interest tours.

To the best of our determinations, the township of Gunnedah consequently has available the following tourist accommodation:

Table 3.29: Tourist Accommodation, Gunnedah

Type of Accommodation	Number of Establishments	No. of Rooms
Motels	4	102
Hotels (offering accommodation of tourist standard)	2	47
Caravan Parks (tourist)	1	60
Guest Houses (Bed and Breakfast establishments)	2 (rural properties)	3

(ii) Tourist Management Structure

According to the Department of Tourism, Gunnedah is the headquarters town of the North West Tourist Association, which at present embraces eleven Local Government areas from Nundle to Moree. This Association is officially recognised and subsidised by the Department and has direct representation on the Region Tourism Promotion Committee. This Committee was established under the provisions of the Tourist Industry Development Act, 1976 and is the means by which dollar-for-dollar subsidies are provided towards the cost of approved regional tourist promotions.

Commencing from 1st July 1982 the Department advises that the North West Tourist Association representation will be increased from one to two delegates. From the same date, the Association will become part of the new North West Country marketable area, instead of the former New England region. The Department sees this as a step forward in marketing terms, and it will be the task of the new Area Promotion Committee to achieve widespread awareness and interest in the new area. The Department will support the respective marketable areas with substantial media promotion at six monthly intervals and in accordance with a five year marketing strategy developed after consultation with all segments of the tourist industry.

3.2.9 Existing Community Facility Needs

Several areas of community need are identified from the preceding discussion, and from the comparison of existing standards with desired standards in Table 3.30.

Additional Occasional Child Care Facilities

It is apparent that the Mary Rankin Centre fulfils a particularly important need in the community by providing occasional and sessional child care although it does not provide any long day care. It is also apparent that this centre is currently operating at capacity, and that even at the current rate of growth of the town, both further occasional and long day child care facilities are required to be established.

The current centre, in its central location, is confined in its ability to expand. It is consequently considered that another Association will be required to be formed and a second occasional centre established, as well as facilities for long or family day care.

Establishment of a long or family day care scheme

At present there is no formal family day care system or long day care system working in Gunnedah. However Council is aware that there are several increasingly large home child minding groups which are currently operating in the town.

This informal service reflects a growing need in Gunnedah, which should be formalised by the introduction of such a scheme as soon as practicable.

Table 3.30: Community Facility Provision in Gunnedah

Facility	Theoretical Average Catchment Population	Gunnedah Population (1981) Town	Shire	Generalised Standard	Desired Level of Provision Town	Shire	Actual Provision
Aged Persons Accommodation							
Self-care units				1 unit/225 pop.[1]	39.6	58.5	35
Nursing home		8,909	13,173	59 beds/1,000[2] pop. over 65	48.1	70.2	18 beds (women only) (+21 beds - hospital)
Hostel				14 beds per 100 self care units[8]	5.5	8.2	23 beds (women only) 14 beds (men only)
Child Care							
Long Day	1 unit*:7,000				1.3	1.9	1 general facility
Kindergarten	1:4,500	8,909	13,173		2.0	2.9	(1 unit)
Pre-School	1:6,000				1.5	2.2	9-4.30 pm 1x1 unit 1x2 unit
Public Schools							
Primary	1:4-5,000			1 per 1,400 homes[4]	2.0		2
High School				1 per 4,000 homes	1.0		1
Health Services							
General Practice	1:2-5,000[5]				1.8-4.5	2.6-6.6	9
Baby Health Care	1:4-6,000	8,909	13,173		1.5-2.2	2.2-3.3	1
Community Health Care	1:12,000				-	1	1
Hospital	1:15-20,000				-	-	1
Open Space (hectares)							Town Shire
General				2.83/1,000[6]	25.2	37.3	128.44 128.44
Active		8,909	13,173	1.21/1,000	10.8	15.9	98.42 98.42
Passive				1.62/1000	14.4	21.3	30.02 30.02
Multi-Use							
Neighbourhood Centre (inc. child-care)	1:4,400-6,000[7]	8,909	13,173		1.5-2.0	2.2-3.0	- -

* 1 unit = 20 places, 11-12 children aged 0-4 years per place

Sources:

1. Latona Masterman and Associates (1981), Community Facilities and Services in Land Commission Estates.
2. Ibid (National Capital Development Corporation).
3. Blacktown City Council (1981) Community Facilities Study.
4. NSW Department of Education, Directorate of Planning Services, Procedures for Allocating and Siting Schools (1980).
5. Latona Masterman, op. cit. (AWDC).
6. Department of Environment and Planning.
7. Blacktown City Council, op. cit.
8. Geoffrey Twibill & Associates.

Additional Adolescent Activities

A most valuable survey of youth needs in Gunnedah was conducted by Council's Social Worker in May 1982. This study identified the activities/facilities in Gunnedah considered most worthwhile by the youth of the area; the deficiencies in facilities; and the kinds of facilities which are required to satisfy youth needs in Gunnedah.

By far the most worthwhile existing activities identified in order were:

(i) Commercial

* The Roller Skating Rink.
* The 'Fitness Factory' (gym and squash).
* The Town Hall Picture Theatre.

(ii) Recreational

* The Municipal Swimming Pool.
* The BMX Track and Club.
* Football.
* The Pony Club.
* Playing fields/parks.
* Tennis Courts.

(iii) Leisure

* The Police Boys Club.
* Discos.
* Scouts/Guides/Cubs/Brownies/Venturers.
* Junior Drama.

Church Fellowships were also popular. No educational facilities rated highly.

The survey also asked respondents what type of activities they thought **should** be available to them in Gunnedah. The most popularly requested facilities were the following, the establishment of which mainly depend on commercial interest:

* Amusement park/sideshows.
* Waterslide/aquajet.

* Drive-In.

* Pinball Parlour/Space Invaders.

* Skateboard Bowl/Track.

* Tenpin Bowling.

* Discos.

* Motor Bike Track/Club.

The comments of participants indicated a considerable degree of restlessness among the youth of Gunnedah. Many of them appeared to expect no more of a country town although most made constructive suggestions for improvements.

The Department of Youth and Community Services noted that the needs of adolescents in country centres in areas of employment, housing and leisure, were of particular concern to them as these needs were sometimes unmet. The Department has a direct role in services for disadvantaged youth, including young offenders. It is of concern that services for such young people are often only available in Metropolitan areas, and the Department urges the development of the following services:

* adequate assessment centres providing psychiatric and psychological counselling;

* part residential facilities for those adolescents who are having difficulties in living at home, and who require specialist treatment.

* Full residential care facilities for those children who cannot live at home and who are requiring a more intense residential setting.

* Services for those adolescents who come into conflict with the law and who are sent to a training institution and who at the present time are forced to go to Sydney for such training.

These needs, especially emergency shelter and counselling also emerged as central concerns in the Youth Survey. Council's Social Worker particularly saw the need for a drop-in centre for 16-20 year olds, a location for which had been investigated but discarded because of its remoteness. The new Police Boys Club is to some extent being looked on as possibly filling this role. It does also appear that a second major commercial amusement such as a drive-in, waterside or tenpin bowling alley, would be viewed as desirable, although of course the establishment of any such facility would be subject to economic feasibility.

Improved Provision for Cultural Activities

While the range of cultural activities occurring in the town appears wide for the existing population threshold, it appears that a particular need exists in the form of provision of a suitable venue to carry out many of these activities.

The Town Hall is unsuitable for dramatic purposes and the like by virtue of its stage, lack of dressing room facilities and limited capacity. The inadequacies of the Smithhurst Theatre have already been mentioned, and likewise the Shire Band Hall. The situation in regard to dramatic performances is consequently quite serious, in fact so much so that the Arts Council no longer visits Gunnedah at least partly in response to this factor.

The lack of a suitable large-scale seating capacity venue is also noticable for other activities. The building of the Community Centre has provided adequately for groups of up to 80 persons. Substantial use is also made of the High School Assembly Hall for meetings and performances, and the Gunnedah South School for meetings. However, there is still a lack of a venue for larger audiences or groups, especially those needing a stage.

The new Police Boys Club has been mooted as a possible solution to these problems. However, it is envisaged that there could be considerable conflict between potential users for popular evenings. It would consequently appear appropriate for an alternative venue, particularly for dramatic performances and recitals, to be investigated. It is suggested that given the summer climate of Gunnedah, this could be an outdoor venue. Alternatively, further consideration could be given to the role of the Showground as a Community Centre.

Provision of Aged Person's Accommodation

While there is plenty of opportunity for social meeting and activities for aged persons in Gunnedah, the existing provision of housing for aged persons has been noted to be extremely limited, not adequate even for the town let alone the Shire population, and long waiting lists exist for available accommodation. The Housing Commission Units and 'Yallambee' form the only Aged Persons 'Village' available; nursing care is available only by default through the hospital, and limited hostel care is available only through the Convent. According to figures provided, the Housing Commission has 11 elderly single persons and 5 elderly couples on the waiting list for its aged persons units, apparently resulting in a waiting period of up to 3-4 years. The Commission is presently constructing 5 aged units on an infill site at the corner of Conadilly and Osric Streets, Gunnedah, and has another 3 units proposed as a second stage of a project in Little Beulah Street. However, this will fill only a segment of the existing demand.

Three major proposals have been made in Gunnedah to provide aged person's accommodation of varying kinds.

An aged persons' home has been proposed on a site on the corner of Pearson Street and Kamilaroi Road, incorporating accommodation for 40 persons in aged persons units, in conjunction with a private nursing home containing 40 beds.

A retirement village has been proposed which involves an exchange between a piece of Crown Land at the base of the Porcupine Hill Reserve on the corner of Apex Road and Stock Road, and a piece of land adjacent to the river. It is believed that this exchange is about to take place and it can therefore be expected that this proposal, for a nursing home, serviced hostel type units and self-care, self-contained accommodation will proceed.

A third proposal for a Frail Aged Hostel, intermediate in orientation between self-care and hospital care has been proposed to be built on the hospital site and closely linked with it. This proposal incorporates accommodation for some 40-50 beds.

Based on the normally accepted standards shown in Table 3.30, it would appear that there is a current need for at least some 24 self-care units and 52 nursing home beds in Gunnedah at the present time. It would also appear desirable for some publicly available hostel-type beds to be provided in association with other kinds of aged person accommodation which may be developed. It would consequently appear that an integrated retirement village such as that proposed in Gunnedah at the moment would be desirable, as long as the diversity of types of care was made available. Alternatively a combination of the Frail Aged Units with the Private Nursing Home proposal would appear appropriate to satisfy existing needs.

The standards given in terms of aged persons accommodation should more than any other facilities, however, probably be treated as minimal. This is particularly considered to apply to the provision of self-contained units as the present provision is all relatively low cost accommodation and there could certainly be expected to be a substantial market for high quality self-contained units in Gunnedah.

Provision of Emergency Accommodation

A desperate need for emergency accommodation has been seen to exist in Gunnedah. At present the only formal source of this type of accommodation is the St. Vincent de Paul Society. Temporary accommodation needs are presently filled by the Showground caravan park, and the caravan park in Warrabungle Street which is occupied by 14 permanent vans. In times of extreme need, and overflow of the Showground Caravan Park, Council has permitted temporary use of the Showground for these purposes.

The Housing Commission has no short term accommodation available. It has built a total of 417 dwellings in total in Gunnedah for low income earners. As of 1981, the waiting period for Housing Commission accommodation was:

Period	Type of Accommodation
20 months	2 bedrooms
17 months	3 bedrooms
12 months	4 bedrooms

At the present time there are 64 approved applications on the waiting list.

It might be noted that the Housing Commission as well as carrying out the Government's public housing programme, also erects dwellings on behalf of a number of other government authorities, such as the Public Housing Authority, the Teacher Housing Authority and the Department of Aboriginal Affairs.

Its own programme of construction has varied in recent years. Twice as many dwellings were built in 1980-1981 as in 1979-1980. If the rate of construction until March 1982 continues throughout the year it could be expected that a further increase in the total number of dwellings constructed would occur, from 25 to 30. Despite this activity, however, it is clear that not all low income nor any emergency needs will be able to be satisfied by the Housing Commission's 1982 programme.

It should also be noted that there is no office of the Department of Social Security in Gunnedah. A departmental officer visits Gunnedah for 3 hours per week, which according to community welfare staff, is not a particularly adequate or satisfactory arrangement.

It would appear that significant further provision of both low income and emergency housing is required in Gunnedah to satisfy existing needs and to relieve the rather unsatisfactory use of permanent mobile homes presently existing in the town. The Department of Youth and Community Services confirms this attitude, noting that there is a definite lack of ". . . decent low cost housing for rent or purchase"; that ". . . the caravan parks include some permanent sites and it is not known whether those residents are in caravans by choice or from lack of alternatives", and that even ". . . families on social security benefits who are in private housing often pay excessively high proportions of their rent, leaving them without enough money for other basic needs such as food and clothing".

The Department of Youth and Community Services considers that some relief for people in these situations can also be gained by safeguarding the access of low income housing to transport.

Need for an Internal Transport System

There is presently no public transport provision in Gunnedah. In the works of the Department of Youth and Community Services, then, ". . . people without access to private transport are disadvantaged if the services they require (shopping, medical, educational, recreational) are further than walking distance from their homes".

In 1980, according to the Department of Social Security there were 1,093 age or invalid pensioners and 427 others on social security benefits in the Gunnedah District. The location of services and residential areas consequently has a profound effect on the access of disadvantaged people to services. As noted by the Department of Youth and Community Services, ". . . the responsibility for transport services is not clearly acknowledged by any existing agency". Council, is however, well aware of the problem.

Need for Development of Facilities in South Gunnedah

The situation is compounded by the very one-directional growth which has taken place in Gunnedah. **All** commercial and retail facilities with the exception of corner shops are located north of the railway line. Seventy-two per cent of the residences in Gunnedah are now located south of the railway line. The newest development and consequently the housing areas likely to contain the highest numbers of families with young children and the lowest proportion of second cars, is the furthest south, and stretches as far as $2\frac{1}{2}$ kilometres away from the Central Business District as the crow flies. Concrete pavements only presently extend as far as George Street.

It appears untenable that not only is there no transport system to service the southern parts of Gunnedah, but there are no commercial, retail, or community facilities located at South Gunnedah.

It is believed that six shops were proposed in a centre in Lincoln Street which has been approved but has not proceeded to date.

A centre such as this is sorely needed in South Gunnedah. Further, given the orientation of the population toward this area and the applicable standards adopted for the provision of community facilities (see Table 3.30) this centre needs to provide at least some facilities which can be used for occasional child care, possibly a pre-school kindergarten, a baby health centre and generally, the multi-use facilities of a neighbourhood centre which can be used by groups such as playgroup, and the like.

In other words, it is seen as essential that the new child-oriented facilities shown to be needed in Gunnedah, should be situated in close proximity to the majority of users.

It is further considered that the extension of community facilities to South Gunnedah should include recreational facilities. With the exception of the Porcupine Hill area and its special purpose (rifle range and motor bike track) facilities and the Golf Course, South Gunnedah is relatively poorly endowed with either passive or active recreational facilities other than at the playground level.

Allocation of Recreation Facilities

In general, Gunnedah was seen to be well endowed with recreational facilities. It would appear that local demands dictate the need for additional playing fields/ovals to alleviate conflicts between users at peak times. However, Council appears to have already taken these needs into consideration in the design of the Wandobah Road reserve, which provides for a further 12 tennis courts, childrens playgrounds, fitness trail, 8 playing fields (or 4 ovals, depending on layout), plus a site for possible rugby league development.

The addition of these active facilities should more than adequately cater for Gunnedah's sporting needs in general items. However it can be suggested that given expressed demands some incorporation of specific purpose baseball/softball fields may be warranted.

The development of this area in this manner also opens the possibility for some linking of existing playing fields. In effect this land and land to its south along the Wandobah Road can be used to form the basis of an important green corridor which links the southern part of Gunnedah with the north, where most of the major recreational facilities are located. It was noted earlier that South Gunnedah currently suffers from a lack of such facilities other than for playground level and specific recreation needs. Given that the overall level of provision is currently very high, a reallocation of access to these resources can in effect be achieved by the better linking of the two.

It is suggested that a very effective method of achieving this can be by the installation of bikeways in the town. While this Study cannot be the forum for debate of the need for bikeways, it should be stated that it has observed that bicycle usage in the town is high, not only amongst school children, without there being any specific provision for it. Gunnedah appears to have excellent natural potential for the provision of bikeways at relatively low cost. There appears substantial scope to link the south-western corner of Gunnedah along the western side of the Wandobah Road to the Wandobah Road Reserve. Through the reserve, such a track might double with the fitness track, which need be no wider than 5 metres. this may consequently be more appropriately located on the road side of the creek. To the north of the reserve, this track may then be able to be channelled under the Mullaley Road, and certainly under the railway line and Trunk Road 72 via the existing retention basin down to the riverside recreation areas.

A second route of great potential exists in the form of Ashford's Watercourse, which, being well kept for drainage purposes, would form an excellent bikeway route with the addition of some gravel or bitumen path resistant to washaway. This could be linked by road from Hunter Street to the town centre.

The use of drainage reserves for the dual purposes of drainage and recreation (especially for bikeways) is well acknowledged and an efficient use of land.

On the other hand, Gunnedah is well endowed with a great number of wide and quiet streets which lend themselves to the incorporation of bikeways, either on-road or winding down wide centre planted medians. Stock Road is one such road. There is also no reason why provision for on-road bikeways should not be included on main, collector or arterial roads as a requirement for any new subdivision.

The area of recreation which presently appears little developed in Gunnedah despite the areas of land available to it, is that of passive pursuits. As was oft quoted in Gunnedah, the town ". . . turns its back on the river", ignoring it as a potential recreation facility. The opening of a small new riverside picnic area has partly helped this problem. However, large areas of Crown Reserve exist riverside which could be turned into an extremely attractive parkland. This area would seem better suited to passive recreation that active, at least partly because of its flood liability. However, there is no reason that some facilities such as an extension of the Wandobah Reserve bikeway/fitness track coulc not be extended riverside. This kind of development could turn this area from a wastelend to a local and tourist attraction.

Wolseley Park presently acts virtually as the only stopping-off point for the recreation of tourists. The development of a new Tourist Information Centre at Anzac Hill will increase the role of this park in this regard. However a riverside development would also provide another such attraction and facility. Meanwhile, Wolseley Park will contrive to play a significant role for 'stopping-off' and, as such, it is considered that the passive parts of this park could be extended and made more attractive. It is believed that Wolseley Park once existed as a spectacular garden. Gunnedah now has no botanic garden or park. The reinstatement of this kind of function in Wolseley Park would be both a local and a tourist attraction. Given that the Wandobah Reserve will increase the number of playing fields substantially, it is considered that the oval on Wolseley Park will be less important as an active recreation facility, and increased passive use of the park in its central location could be more appropriate.

A further opportunity exists to improve passive recreation facilities generally, by the addition of a water feature south of the railway line. The Blackjack Creek is noted to pass through the Wandobah Reserve and down the western side of the Wandobah Road. Present plans have only considered its virtual channelling through the proposed recreation area. There appears scope, without the loss of any proposed active facilities to extend this creek to form a major water feature in the reserve, integrating active facilities in a most attractive lakeside setting and providing a pleasant feature in a hot climate-country town.

Finally, it would appear that two existing facilities which are relatively noisy and were located in their present positions to be removed from residential development, should now be relocated further away from the urban area. These are the rifle range and motor-bike circuit. Suitable locations for these would appear to exist on the western side of town, buffeted by industrial areas.

3.3 The Man-Made Environment

3.3.1 Existing Urban Structure

The existing urban structure of Gunnedah township is controlled by its historical evolution; local factors such as the surrounding topography, local drainage patterns, and transport infrastructure; and by planning controls. These factors have combined to produce the form and in many respects the character of the town as it exists today.

Historical Influences

The earliest settlement of the town was by a settler to the Liverpool Plains, John Johnston, who occupied a run comprising the site of Gunnedah and adjoining country on the east and south during the late eighteen thirties.[1] The name Gunnedah, meaning Place of White Stone, had been attributed to the area many years before the town was surveyed. Being near to a junction of the Mooki River and the Namoi

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1. Official Souvenir, Back to Gunnedah Week, Gunnedah Municipal Council, 1935 (reprinted).

River, the spot where Johnston built his homestead became a camping ground for the bullock drays and horsemen passing down the Namoi River road and for the northern Gwydir and MacIntyre River roads. From this camping place a small township gradually sprang up.

On the basis of a petition forwarded by the proprietors of land and stock residing near the camp, a plan was drawn up by the Government surveyor showing designs for the towns of North and South Gunnedah. A fortunate delay in submitting this plan caused abandonment of the plans for North Gunnedah and modification for the plan for South Gunnedah when a visit to the locality was occasioned during a heavy flood.

Basic to the resultant plan and design of Gunnedah was the principle adopted by the Surveyor, that:

> ". . . in preparing the design . . . you will perceive that I have departed from the usual arrangement of the streets, at least so far as lone straight lines are concerned, my object being to preserve the present line of road and to place the building allotments on the highest ground. The land north of the road (i.e. the Maitland road, now Maitland Street) is neither so well adopted for building purposes nor so suitable for a roadway or street. Gunnedah possesses many natural advantages, such as permanent water, a good ford, and rich alluvial lands admirably adapted for farms and agricultural purposes. It is situated on a principal line of road, and is easily accessible from various quarters. I believe no more eligible site can be selected with the same advantages in the neighbourhood, and, as many applications have been made to me of late to purchase, I have no doubt the land will sell very well."
>
> (ibid, 1935, p.11)

Many of the problems which will be seen in following sections to presently face the town are derived from these very principles on which the original survey of the town was designed.

It is apparent from examination of the town's growth that settlement spread from the southern river bank, in fact from Maitland Street, away from the river. It appears from historical documents that the move further from the river was expedited by periodic major flooding. Buildings such as the old Court House in Maitland Street, for instance, were so shaken by the 1964 flood that they were rendered virtually unfit for use. Again in 1870:

> ". . . for nearly six weeks the flood waters of the Namoi were never off the principal street, and it is only quite recently that the people of the town had another street - Conadilly Street - opened up for traffic on the higher ground."
>
> (op. cit., 1935, p.13)

The Court House and other public buildings were eventually re-erected in this street, which, as predicted in 1935 did, in the course of time, become the main street. The decision to relocate the main street thus, in fact, appeared to create considerable discontent amongst landowners in Maitland Street.

Local Factors

The most significant of local factors impinging on the shape of Gunnedah today, is consequently the threat of flood from the river that was once the reason for its existence.

Even the relocation of the main thoroughfare south to Conadilly Street has not completely averted this threat. The western part of the Conadilly Street commercial district still lies in a classified 1 in 100, and in places, 1 in 50 year flood zone, as defined by the Water Resources Commission of NSW. Development of the blocks between Conadilly Street and Maitland Street, in particular north of Bloomfield Street, has consequently been inhibited by the threat of flood. Land in this vicinity is retained somewhat as wasteland. Some has been developed for recreation purposes, some is used for limited agricultural purposes, and elsewhere some dwellings advisedly raised on stilts. In all, however, this part of the town suffers from relatively scattered development and the quality of this development reflects the adversity of natural features toward settlement of the area.

Newer development has spread to the south of the railway line which bisects the town east/west, as far as the lower slopes of Porcupine Hill. Different local physical factors, most significantly slope and topography, have acted to partially control the spread of the town in this direction. To the south-west, some concern over soil stability may also have acted as a limiting factor.

The local development of transport infrastructure routes has also shaped the form of the city. In some respects it has caused an elongation of development in various directions as the built-up area has sprawled out along main access roads. In true country town fashion, the Central Business District has grown up on either side of a major highway passing through town. The location of the railway line has also been an important structural influence. Rail has played a significant role in Gunnedah's development as a rural gathering and distribution point. Services and industries associated with these activities have clustered around the railway line, spreading back northwards to meet with the commercial development of Conadilly Street. The existence of some older segments of the residential housing stock in these areas has led to a mixing of land uses in this zone, and often the intrusion of commercial uses on residential.

Impact of Planning Controls

The segregation of land uses is more distinct in newer areas of the town, generally to the south of the railway line, by virtue of the introduction of various planning controls and principles over time.

Subdivision design in newer areas also tends to vary from the more traditional grid pattern to the north of the railway line and at least as far south as Stock Road. In recent subdivisions for instance, road layouts follow the more undulating topography of the higher parts of town, and culs-de-sac tend to replace through-roads as the major type of residential street.

A conscious segregation of land use can be seen to have occurred in the provision of land for an industrial estate at the western end of the town, occupying the space between the Oxley Highway and the railway line. This land was put aside by Council in 1978 as a policy decision.

The planning policies adopted by Council have also acted to shape the older areas of the town in some ways. The adoption of government policies relating to the restriction of development in flood prone lands has inhibited development of most kinds in the Maitland Street area, and encouraged the use of this area for the kinds of land uses less affected by flood, e.g. caravan parks, recreational uses, agricultural activities of some kinds. It has also meant the building of dwellings with floor levels above known flood levels.

Council policy in relation to residential flat building has also added a new dimension to Gunnedah. This policy has affected the height of development in fairly strictly defined areas. It has also introduced desirable standards of development, including such features as landscaping, the provision of car parking etc., hitherto uncontrolled.

Conclusion

The impact of Council policy has been to attempt to raise the level of amenity of the township of Gunnedah.

This has been achieved by the imposition of order on a growing township as it relates to control of the historical trends and physical constraints faced by the town.

3.3.2 Land Use

The land use of the town was surveyed by Planning Workshop Pty Ltd in early April 1982. The results of the survey are as of this date.

At that time, the breakdown of total land use into major categories was as shown in Table 3.31. This table enables comparison of the amount of land zoned for each of these urban uses so that an indication of the demand for additional land can be gained.

The major land use of the Study Area is for single dwelling residential purposes (44.1 per cent of the total Study Area); other uses are industrial (7.4 per cent), retailing/commercial (2.0 per cent), open space (32.3 per cent), special uses (13.2 per cent) and residential flats and town houses (0.9 per cent). Other uses, which largely exist on the periphery of the built-up area, are agriculture, rural residential and vacant land.

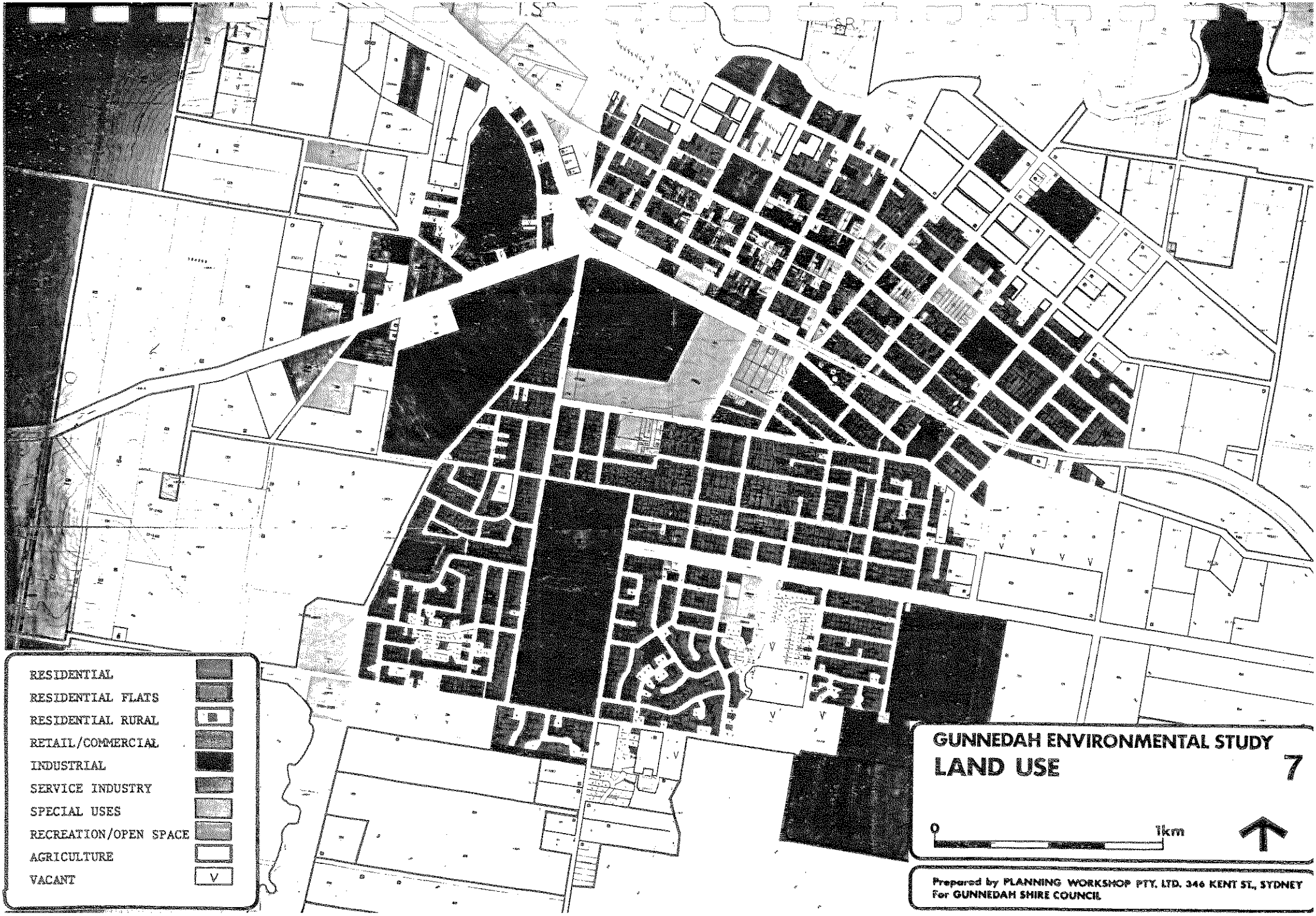
RESIDENTIAL
RESIDENTIAL FLATS
RESIDENTIAL RURAL
RETAIL/COMMERCIAL
INDUSTRIAL
SERVICE INDUSTRY
SPECIAL USES
RECREATION/OPEN SPACE
AGRICULTURE
VACANT
V
GUNNEDAH ENVIRONMENTAL STUDY
LAND USE
7
0
1km
Prepared by PLANNING WORKSHOP PTY. LTD. 346 KENT ST., SYDNEY
For GUNNEDAH SHIRE COUNCIL

Table 3.31: Land Uses and Zones - Gunnedah Urban Area

	Area (ha)	
Area Used		
Residential		
Single dwelling	238.9	
Medium Density	5.12	
Total		244.02
Commercial		11.0
Industrial		
General Industry	22.4	
Service Industries	17.9	
Total		40.3
Special Uses		71.64
Open Space/Recreation		174.8
TOTAL		541.76
Area Zoned		
Residential		
2(a)	266.4	
2(b)	16.9	
2(c)	16.1	
2(d)	29.8	
2(e)	9.9	
Commercial		
3(a)	12.0	
Industrial		
4(a)	76.3	
4(b)	14.0	
Special Uses	32.6	
Open Space/Recreation		
6(a)	102.1	
6(b)	54.8	
6(c)	105.5	
TOTAL	736.4	

Source: Land Use Survey, April 1982

Each of these various components of the existing urban structure will now be discussed in detail in the following section.

Rural Residential Development

There are a number of holdings on the periphery of the existing built-up area of Gunnedah of a type that could be defined as rural residential units. In the immediate vicinity of the town these are indicated on the land use survey.

As well as this unplanned and sporadic distribution of small acre holdings, Council has made specific provision of a rural 1(c) zone in Local Environmental Plan No. 1 gazetted in November 1981. Under this plan a person shall not subdivide land within zone 1(c) in which the average area of allotments is less than 3.6 hectares, and no allotment shall be created therein less than 2 hectares.

The total area of land zoned for this purpose is approximately 1,150 hectares and its location is shown on Map 9. The maximum capacity of this land therefore, if fully developed is between 319 and 575 allotments.

In 1976 the provisions of the Gunnedah and Liverpool Plains Planning Scheme was altered to allow rural residential subdivision on land to the south of the north-western railway line. This involved an area of approximately 22.6 hectares which has subsequently been divided into 7 lots, 5 of which are at the minimum lot size of 2.5 hectares.

With respect to the land zoned rural 1(c) to the south of the town, a number of subdivisions have been approved and a number of approvals in principle have been given. These have been concentrated mainly in the southern end of the Study Area within the Parish of Blackjack. In total the number of rural residential lots from these approvals and approvals in principle is 88 lots. While the size varies, the total amount of land subdivided was approximately 387.5 hectares, or one third of the total rural residential zoning, resulting in an average lot size of 4.4 hectares.

Residential Use

The residential face of Gunnedah has changed considerably over time. These changes are reflected in gradual changes in dwelling type, age and condition across the town.

Data gathered during the land use survey pertaining to the age and condition of dwellings can be used as an indicator of these changes. Scales used to rate such criteria were broadly:

Age	Condition
Old (Pre-war)	Poor
Medium (Post War)	Fair
New (Post approx. 1960)	Good

Dwellings in 'good' condition were those that were structurally sound, well maintained, with no obvious repairs or renovations needed. Those in 'fair' condition were considered to require some minor repairs or renovations such as painting, while those in 'poor' condition were considered to require major structural repairs or renovations. Despite the necessary subjectivity of these scales they are considered useful in broadly evaluating residential development.

PORTION 322, 2 LOTS
PARISH OF GUNNEDAH

PT PORTION 317, 2 LOTS
PARISH OF GUNNEDAH

PORTIONS 315 & 317, 6 LOTS
PARISH OF GUNNEDAH

PORTION 313, 11 LOTS
PARISH OF GUNNEDAH

PT PORTION 308, 4 LOTS
PARISH OF GUNNEDAH

PORTION 29, 12 LOTS
PARISH OF BLACKJACK

PORTION 30, 8 LOTS
PARISH OF BLACKJACK

PORTION 78, 3 LOTS
PARISH OF BLACKJACK

PORTION 76, 9 LOTS
PARISH OF BLACKJACK

PORTION 75, 23 LOTS
PARISH OF BLACKJACK

SUBDIVIDED
APPROVED BUT NOT SUBDIVIDED
1(c) ZONE BOUNDARY
STUDY AREA BOUNDARY

GUNNEDAH ENVIRONMENTAL STUDY
RURAL SUBDIVISIONS 8

0 2km

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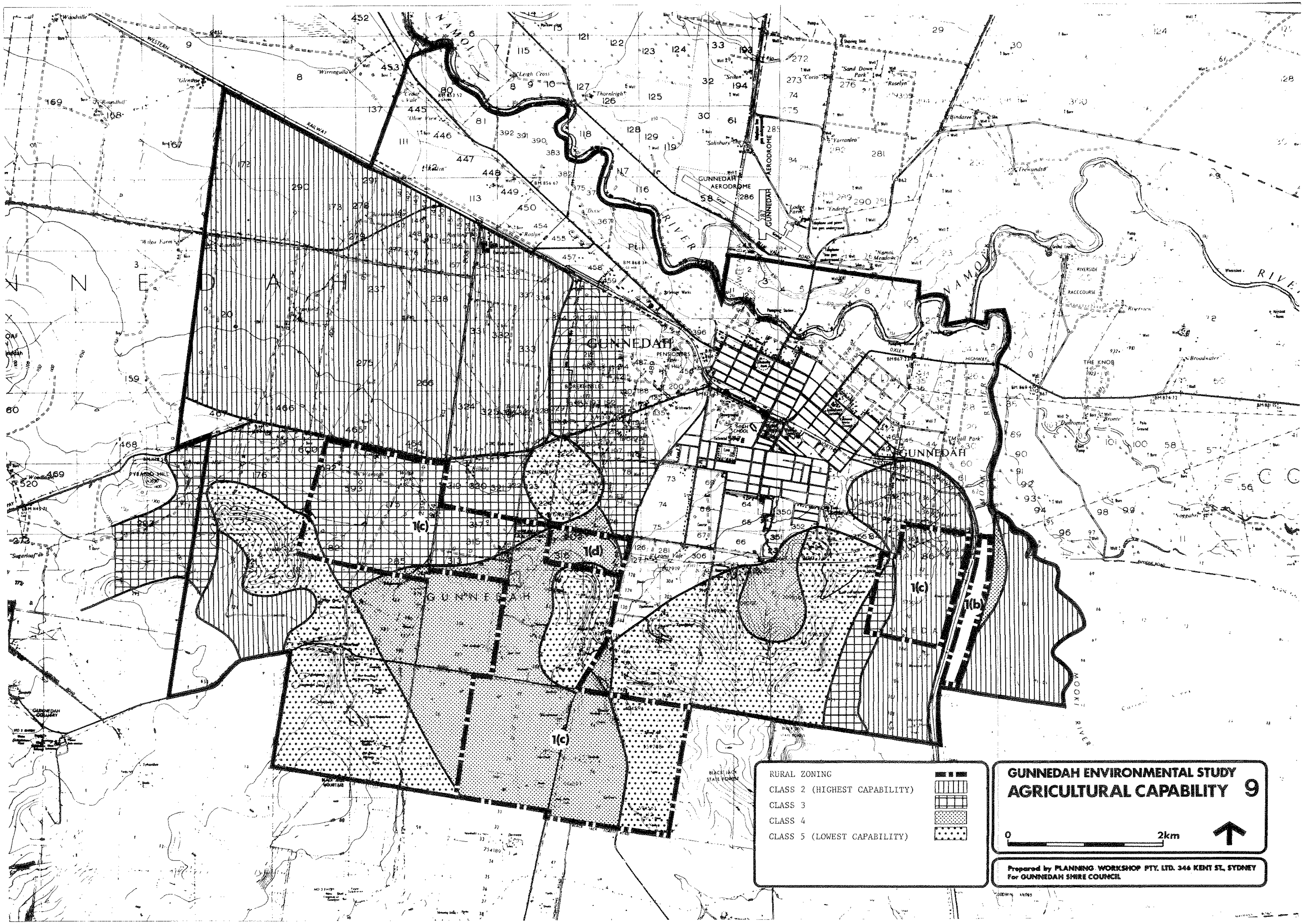
For GUNNEDAH SHIRE COUNCIL


GUNNEDAH ENVIRONMENTAL STUDY
AGRICULTURAL CAPABILITY 9
RURAL ZONING
CLASS 2 (HIGHEST CAPABILITY)
CLASS 3
CLASS 4
CLASS 5 (LOWEST CAPABILITY)
0 2km
Prepared by PLANNING WORKSHOP PTY. LTD. 346 KENT ST., SYDNEY
For GUNNEDAH SHIRE COUNCIL
GUNNEDAH
GUNNEDAH AERODROME
NAMOI RIVER
MOOKI RIVER
1(c)
1(d)
1(b)

The application of these criteria to the Study Area is summarised in Table 3.32, following.

Table 3.32: Age and Condition of Dwellings Summary

Age Class	% of Dwellings	Condition	% of Dwellings
Old	24.2	Poor	16.2
Medium	38.9	Fair	54.0
New	36.9	Good	29.8

Source: Land Use Survey

These criteria vary between various types of residential development.

(i) Single Dwelling Residential Development

The single dwelling residential fabric can be divided into 3 fairly homogeneous units which reflect variation in these factors:

Older, poorer quality housing: The oldest residential areas generally coincide with the poorest quality, although naturally there are isolated exceptions where the condition of an old house could even have been rated as excellent, having been restored or well looked after over time.

In general, however, this kind of residential development forms a large part of the housing between Conadilly Street and the river. Age of development ranges from historical vintage to 1945. Building materials used reflect the period of development. Historical buildings were typically stone; the remainder were mostly weatherboard/iron. The influence of time and often several floods has taken its toll on such materials - hence the designation of many of such buildings as being in 'poor' condition.

Housing of similar age and condition is also found in the blocks surrounding the Central Business District between Conadilly Street and the railway line. Here poor condition of buildings can often be attributed to general deterioration of the environment by the encroachment of commercial and service uses. In general this region suffers from a very mixed land use.

Some older residences of historical merit are however found toward the eastern edges of this belt - in particular, in the vicinity of the Abbott Street/Barber Street corner.

Medium Aged Housing: Further to the south-east and west of these older residential areas, residential development passes into a 'medium' aged category following the trends of the town's expansion.

The condition of these medium aged buildings varies, often according to the materials of the structure, which differentially stand the test of time. In general then, brick dwellings could be expected to be in good condition; fibro or weatherboard varied between fair to poor. There were, of course, many exceptions to this rule.

The major direction of expansion for the town between 1945 and the early 1960's was toward the south. Between the railway line and approximately Stock Road, with the exception of later infill development, most houses could be categorised as medium age. Fibro or weatherboard predominates as the main building material. Condition can be described in general as fair to good.

The discreteness of this area in terms of the intrusion of other types of land use is improved over areas to the north of the railway line.

A significant proportion of housing in this belt has been provided by the Housing Commission.

Newer, good quality development: The newest areas of development in the town extend further to the south again than Stock Road. The influence of post 1960 planning principles can be seen to enter into the design of these residential areas. The street layout changes from rectilinear to curvilinear. Culs-de-sac are the dominant form of residential street. New residential estates currently under construction on these principles can be seen to be intruding into former surrounding grazing lands.

In general the type of new residential development being erected in Gunnedah is of an extremely high standard. Material is almost without exception brick/tile; many dwellings are 2 storey; most are large in size; and many have property improvements such as swimming pools and landscaping. Many have also been built to take advantage of the elevated topography which has hitherto not been available in Gunnedah and which appears to be considered highly desirable by townsfolk.

(ii) Residential Flat Buildings

Residential flats, town houses and villas have only constituted a significant part of the Gunnedah urban fabric in the last ten years.

In adopting a Residential Flat Code, Council identified particular areas considered suitable for medium density development or redevelopment. These were categorised into areas suitable for duplexes, 3 or 4-plus flat development.

Generally the areas considered most suitable for more intensive flat development (4-plus flats) are in older, fairly poor areas north of the railway but immediately west of the Central Business District, together with a large block adjoining the cemetery between Hunter and George Streets. Again dwellings in this area are fairly old.

Areas identified as suitable for buildings of 3 flats are in fairly transitional areas with old-medium aged housing, of mixed fair to poor condition. Areas identified as suitable for duplexes include the newest and highest quality residential areas of the town.

Development which has taken place varies considerably. A good deal of it is in the form of fairly traditional design two storey walk-up blocks. However possibly due to the difficulty of amalgamating sites for large scale medium density developments, a substantial portion of it has taken the form of villa-type single storey infill development which is designed to fit the shape of often long and narrow blocks. Little town house complex-type development has taken place.

Overall, while designs appear somewhat unimaginative, the quality of medium density development seems reasonably high with 55 per cent of these developments being classified as in 'good' condition. This proportion is higher than for the dwelling stock overall.

Retail/Commercial Uses

The retail and commercial zone of Gunnedah covers an area of approximately 11 hectares, and provides convenience and a limited range of comparison goods for the town and large surrounding hinterland. It can be divided into a 'core' and a 'frame' area: the 'core' containing the intensive retail activities such as food, clothing and department stores, and some office space; and the 'frame' containing the more extensive commercial activities such as showrooms, warehouses and dealers, which are more of a service, than a strictly retailing, nature. The 'frame' uses are discussed in the following section.

While Gunnedah as a commercial centre is very central to this region, the commercial zone itself is acentric within the township. As a result of its historical development, the Central Business District is located to the south of the railway line, whereas some 72 per cent of the population of the town now resides to the north. Retail/commercial uses other than in this major centre are totally limited to scattered corner stores.

The form of the present commercial district also reflects its historical development along a main traffic artery. The majority of core retail floor space in the centre is contained along Conadilly Street. This stretches between Tempest Street and nearly Henry Street, a distance of some 5 blocks, or nearly a kilometre. Limited development spreads up each side street away from Conadilly Street on either side, especially behind the two main Central Business District blocks, Chandos to Marquis Streets and Marquis to Elgin Streets.

With the exception of one relatively modern 'arcade', this development is contained entirely within traditional street-facing shop fronts. While several of these premises have been recently renovated (particularly the premises of the building societies and banks) and the centre as a whole has an air of bustle and prosperity, many of the shops are old-fashioned in their fittings, window displays and facades. An indication of the age and condition of retail/commercial premises is given by the following data, collected during the Floor Space Survey. Rating categories used are the same as those for residential properties.

As a general observation, then, a very significant proportion of retail space is fairly old in terms of age although its condition is largely fair to good. With the exception of some fairly poor commercial space, a large proportion of commercial/office space in the Central Business District is

quite new and in very good condition. The recently opened NSW Government Office Block in Abbott Street is a prime example of this new development.

Table 3.33: Age and condition - CBD Retail and Commercial Buildings

	Retail Premises No.	%	Commercial Premises No.	%
Age				
Old	43	48.3	26	36.6
Medium	26	29.2	16	22.5
New	20	22.5	29	40.8
Condition				
Good	49	55.1	40	56.3
Fair	34	38.2	28	39.4
Poor	6	6.7	3	4.2

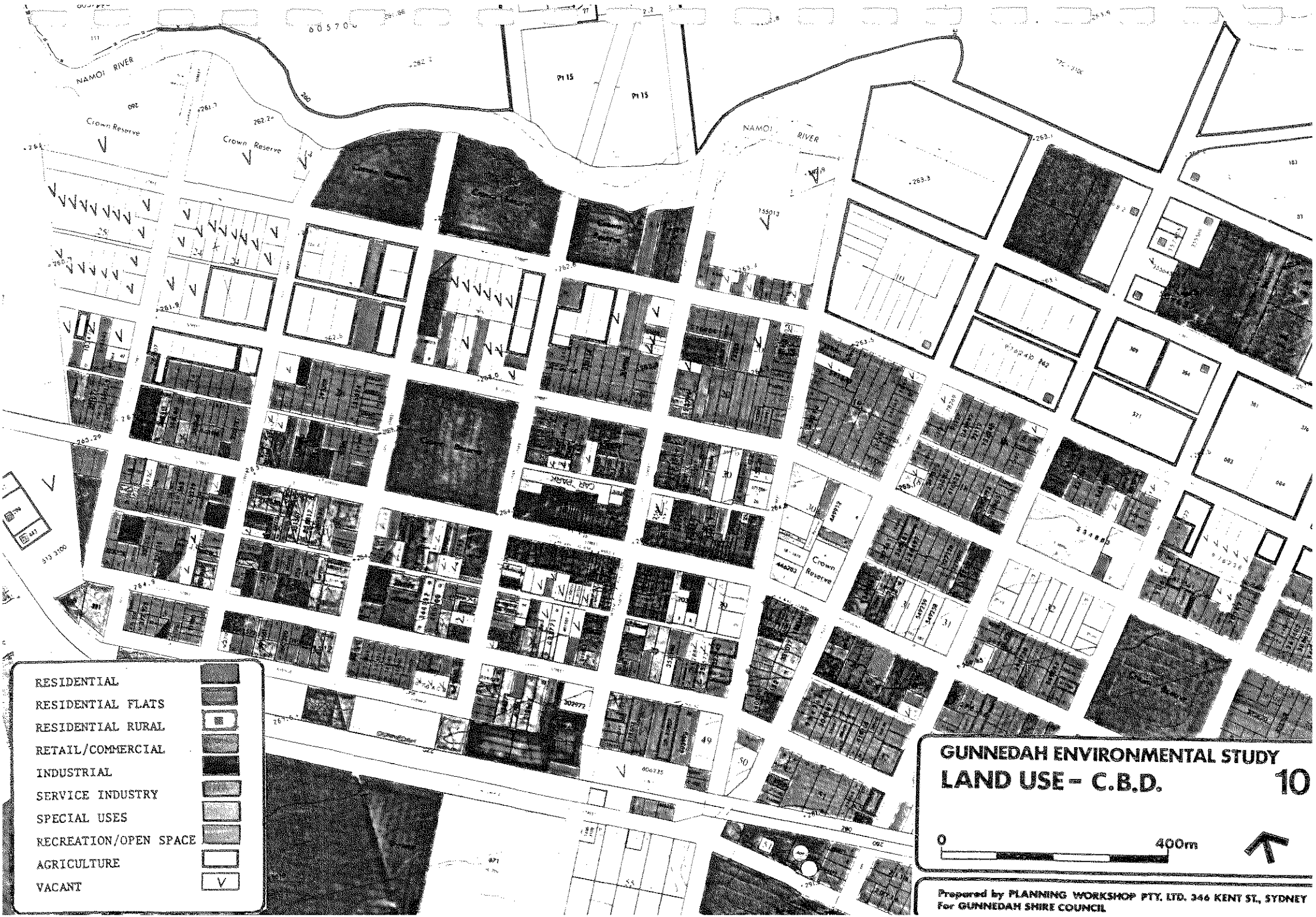
The old style nature of much of the retail space is particularly evident in the 'refreshment rooms' distributed along the main street. Gunnedah would appear to suffer from the lack of attractive cafes or a restaurant, which would seem most warranted in lieu of the all day once a week or less frequent excursions made to town by distant rural dwellers.

The one attempt to provide a modern arcade is unfortunately marred by an external appearance which does not reflect the attractive interior beyond. This could be relatively easily improved by the widening of its entrance and installing of glass opening doors, for instance.

The size and form of the Central Business District at present is such that it can most conveniently be served by angle on-street parking, supplemented by some Council provided parking behind the shops between Chandos Street and Marquis Street. An indication that parking availability and location is not completely adequate for growing needs, however, is given by the fact that substantial informal parking occurs on the vacant block to the rear of the ANZ bank in Marquis Street, and the Council car park between Little Conadilly Street and Bloomfield Street is very underutilised. Parking provision will be considered in greater detail in Section 4.8.

The types of retail and commercial uses provided in the Central Business District were established from a detailed Floor Space Survey.

The Central Business District contains approximately 27,500 square metres of retail space and 14,000 square metres of commercial floor space. This is contained in 94 retail establishments and 75 commercial businesses. Uses are categorised below basically in accordance with the Australian Bureau of Statistics classification system. 'Personal services' include such uses as hairdressers, dry cleaners etc; 'professional services' include solicitors, accountants and the like; and 'other offices' include banks, building societies, Government departments etc.


NAMOI RIVER
Crown Reserve
Crown Reserve
NAMOI RIVER
CAR PARK
Crown Reserve
RESIDENTIAL
RESIDENTIAL FLATS
RESIDENTIAL RURAL
RETAIL/COMMERCIAL
INDUSTRIAL
SERVICE INDUSTRY
SPECIAL USES
RECREATION/OPEN SPACE
AGRICULTURE
VACANT
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GUNNEDAH ENVIRONMENTAL STUDY
LAND USE - C.B.D.
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Prepared by PLANNING WORKSHOP PTY. LTD. 346 KENT ST., SYDNEY
For GUNNEDAH SHIRE COUNCIL

Table 3.34: CBD Retail/Commercial Floor Space Survey Findings

Type of Establishment	Number of Establishments	Floor Space (m^2)
Retail		
Department and General Stores	4	8,601.0
Clothing, Fabric & Furniture	13	2,042.5
Household Appliance & Hardware	11	3,834.5
Motor Vehicle Dealers, Petrol & Tyre Retailers, Heavy Machinery	18	3,924.0
Food Stores/Liquor Outlets	15	2,746.5
Other Retailers	30	5,499.0
Vacant	3	902.0
TOTAL RETAIL FLOOR SPACE	94	27,549.5
Commercial		
Personal Services	11	1,642.00
Professional Services	36	4,762.50
Offices	28	7,535.75
Vacant	0	-
Total Commercial	75	13,940.25
TOTAL RETAIL AND COMMERCIAL	169	41,489.75

The proportion of vacant space in the Central Business District is extremely low, both in retail (3.3 per cent) and commercial office space (no vacant space identified). This also testifies to the trading prosperity of the township, and indicates the pressures for expansion that currently exist.

Service Industries

Outside the area defined as the Central Business District, significant commercial development has occurred which reflects the role of the town as a rural service centre.

The service sector of Gunnedah is located primarily between Conadilly Street and the railway line, and is bounded on the west and east by Warrabungle Street and Abbott Street respectively. Scattered service industries also occur in the block immediately to the north of Conadilly Street, especially west of Tempest Street.

It is apparent that these uses consequently surround the Central Business District and in some ways act as a transitional land use between the retail/commercial uses of the core and residential areas.

In total, there are some 100 such uses. Approximately 70 per cent of these are located in this service 'frame' area - the other 30 per cent are mostly in the zoned industrial area to the west of the intersection of the railway line and the Mullaley Road. From a visual assessment, their condition is frequently poor or at best fair, despite the fact that most of such industries are only of new or medium age.

Industries

The majority of manufacturing industries are located in the above area, surrounding Pensioner's Hill. This area, containing in the vicinity of 26 industries, has been specifically set aside as an industrial estate by Council in an attempt to foster the introduction of industry to the town. Approximately as many sites again are vacant at the present time. Half as many industries as exist in this specific industrial area again are located outside this area, however. These are mostly in the 'frame' area identified above.

Surprisingly, there appears to be little or no significant variation in the condition of industries either within or outside the industrially zoned area.

There is, however, a significant variation in age of buildings. It can be suggested from this that much of the new industrial development that has occurred has been of a fairly low standard. This will be further considered in a later section.

Special Uses

Approximately 32.6 hectares of land within the town in zoned for Special uses. In actuality, special uses occupy some 71.64 hectares of land in and around the town. These uses include:

* Education Facilities:
  - Gunnedah Technical College (Hunter Street);
  - Gunnedah High School (South Street);
  - Gunnedah Primary School (Bloomfield Street);
  - Gunnedah Infants School (Elgin Street);
  - St. Xavier's Convent (Primary School - Henry Street);
  - Gunnedah South Primary School (Stock Road);
  - Catholic High School (Bloomfield Street);
  - Site (cnr. Lincoln and Wandobah Road).

* Service Depots/Reserves:
  - Shire Depot (off Mullaley Road);
  - Water Supply Reserves (Apex Road, reserve off Links Road, O'Keefe Avenue, Talibah Street, South Road, Stock Road);
  - Sanitary Depot (behind Pensioners Hill);
  - Sewage Treatment Works (Trunk Road 72).

* Saleyards/Abattoirs:
  - 2 saleyard reserves, Trunk Road 72;
  - Abattoirs (Quia Road).

* Cemeteries:
  - Hunter Street;
  - 'Memorial Park'.

* Hospitals/Convalescent Homes:
  - Gunnedah District Hospital.

* Public Uses:
  - 2 Shire offices;
  - Post Office;
  - Police Boys Club site;
  - Police Station/Court House;
  - Town Hall;
  - Soil Conservation Service Site.

* Parking areas:
  - at rear of Town Hall;
  - Little Barber Street;
  - Little Conadilly Street.

* Churches:
  - Church of England (Elgin Street);
  - Presbyterian (Barber Street).
  - Catholic Church (Conadilly Street);
  - Uniting (Abbott Street);
  - Convent (Bloomfield Street);
  - Baptist Church (Reservoir Street);
  - Salvation Army (Barber Street);
  - Lutheran Church (Stock Road);
  - Seventh Day Adventist (Barber Street);
  - Jehovah's Witnesses (Little Conadilly Street).

* Other:
  - Masonic Hall;
  - Water Buffalo lodge.

Recreation Facilities/Open Space

The Study Area contains 262 hectares of land zoned for open space or recreational purposes. Of this, 175 hectares is currently utilised for recreational purposes. The total provision of recreational and open space is nearly 20 hectares per 1,000 persons. Compared with commonly adopted standards, this means that there is a very good provision of open space per head of population for the town.

However keeping in mind that the town's recreational resources serve a much wider area, the provision is not quite as abundant as appears. Certainly in the remainder of the Study Area developed recreational resources are extremely sparse, and the Study Area population most certainly depends on the facilities provided within the town. Deficiencies identified in particular types of facilities have been discussed in Section 3.2.2.

In terms of land utilisation, however, the main areas of open space are in the low-lying, flood liable land along the southern bank of the river. While these could potentially form a green 'corridor' between Elgin Street and the western end of the urban area past Warrabungle Street, much of this land appears as 'wasteland' other than a small section recently developed as an oval between Chandos Street and Tempest Street by a joint State and Local Government initiative, and a small riverside park developed at the corner of Maitland Street and Chandos Street.

Other significant recreation areas of land devoted to recreation include the golf course, the Showground and the main urban parks - Wolseley Park, the Kitchener Sports Ground and Anzac Hill.

At the southern boundary of the existing town a large reserve around Porcupine Hill contains a town lookout.

Travelling Stock Reserves

A special category of Open Space exists in the form of Travelling Stock Reserves. These are provided for within the current Planning Scheme by an Open Space 6(c) zone.

Travelling Stock Reserves are administered in the Gunnedah area by the Tamworth Pastures Protection Board. This Board has provided certain information relating to travelling stock routes and reserves in the Study Area.

Map 11 indicates the location of existing stock routes and recerves. The Tamworth Pastures Protection Board has also proposed the declaration of certain other lands, as shown on the Map, by Gunnedah Shire Council.

3.3.3 Urban Infrastructure

Transport Infrastructure

The regional transport linkages of the township of Gunnedah have been described in an earlier section. In this section the external transport infrastructure of Gunnedah will be considered only in as far as it influences and effects the structure and growth of the town and Study Area. This section will also identify the internal transport infrastructural system which serves the town.

Rail Linkages: The main north-western rail line running through Gunnedah is probably one of the major structural elements of the town. The line curves either side of the township to bisect the town at a nearly east/west orientation.

The railway line in some respects acts as a barrier to expansion of the town. However in others it also appears to act to separate land utilisation into the purely residential (plus some support) uses, and the mixed residential/commercial/industrial. In this respect it appears to have served to enforce the sanctity of the major residential districts of the town.

In terms of its function as a barrier, the railway line is able to be crossed within the urban area at only 4 points. Three of these (Carroll Street, Marquis Street and New Street) are level crossing controlled by lights. The fourth, Abbott Street, is an overhead bridge.

The effect of this barrier depends on the volume of rail traffic. There are presently 6-12 movements per day, depending on the seasonality of wheat marketing. Various reports have stated that at peak periods on a typical week day this movement could be comprised of up to:

GUNNEDAH SHIRE COUNCIL ABATTOIR

SALEYARDS

RAIL TRUCKING YARDS

PIG SALEYARDS

GUNNEDAH AERODROME

GUNNEDAH

NAMOI RIVER

MOOKI RIVER

TRAVELLING STOCK RESERVES

TRAVELLING STOCK ROUTES

STUDY AREA BOUNDARY

GUNNEDAH ENVIRONMENTAL STUDY

TRAVELLING STOCK RESERVES & ROUTES 11

0 2km

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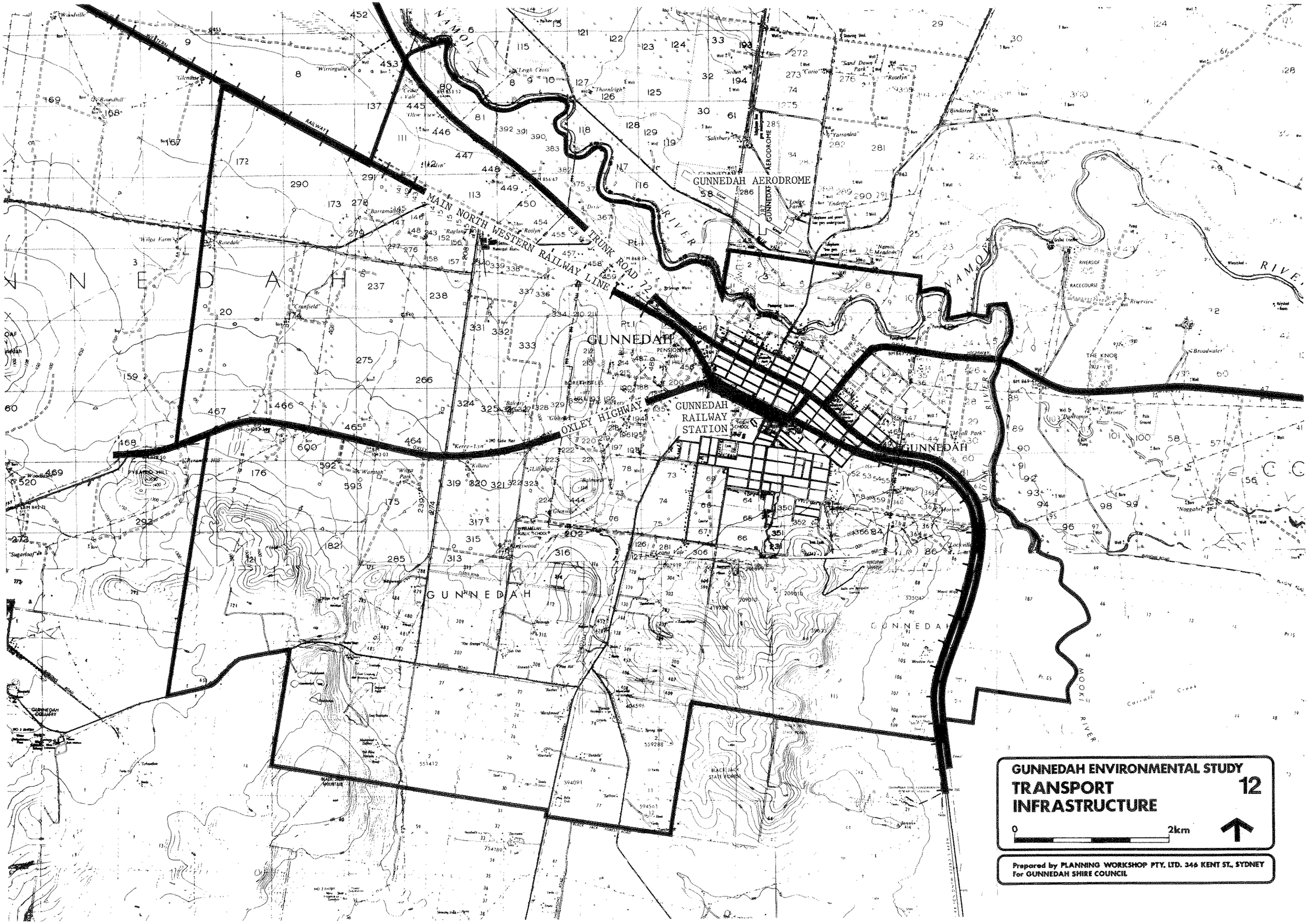
For GUNNEDAH SHIRE COUNCIL


GUNNEDAH
GUNNEDAH AERODROME
MAIN NORTH WESTERN RAILWAY LINE
TRUNK ROAD 72
OXLEY HIGHWAY
GUNNEDAH RAILWAY STATION
NAMOI RIVER
MOOKI RIVER
RACECOURSE
THE KNOB
BLACKJACK STATE FOREST
GUNNEDAH COLLIERY
GUNNEDAH ENVIRONMENTAL STUDY
TRANSPORT INFRASTRUCTURE
12
0
2km
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* 2 passenger trains;
* 6 wheat trains;
* 1 freight and meat train;
* 3 coal trains.

These movements would be less on weekend days.

Consideration of the potential increase in this traffic as a result of coal development is made in Section 5.2.

Road System: In combination with the axis of the rail line, the shape of Gunnedah has also been structured by the main road system which passes through it.

Gunnedah lies at the conflux of two main roads - Trunk Road 72 which links the New England Highway at Willow Tree with Narrabri and State Highway 11 which connects Coonabarabran (in fact Warren) with Port Macquarie via Tamworth.

Trunk Road 72 passes east/west through the town along Conadilly Street. State Highway 11 (or the Oxley Highway) enters town from Tamworth by a circuitous route (Henry Street, Conadilly Street, Abbott Street and across the railway line to South Street) and leaves to the south-west via the Mullaley Road.

Within these four axes, a largely grid street pattern has developed over time aligned basically with the river and the railway line. On the northern side of the railway line, streets consequently run basically west/north-west to east/south-east and north/north-east to south/south-west. To the south of the railway with the exception of the immediately adjacent blocks, the alignment was corrected to a straight north/south to east/west pattern. Further to the south in newer areas, the street alignment shows the influence of modern planning with the road pattern following the contours of the hillside rather than the directions of the compass.

The Wandobah Road, which leaves the township at the point of convergence of the Mullaley Road and the railway line, is also a main structural element. The importance of this road lies in its length, and consequent ability to service far outlying rural areas. Its effect on structure can be seen by the containment of existing residential development to date, to the east of the Wandobah Road.

Another rural service road of some significance exists in the form of O'Keefe Avenue (a continuation of Chandos Street), which is the only made road giving the township access to the northern side of the river. It also accesses the town airport.

Further details relating to the capacity and use of this road system are provided in Section 4.9, which deals with the adequacy of the existing traffic and parking system.

Air Linkages: The township of Gunnedah is served by one day/night airstrip, located off O'Keefe Avenue to the north of the river. This location is believed to be on flood liable land. This factor is known to have created emergency situations on only 2 occasions however, and on these occasions, a disused piece of roadway located near Curlewis has been successfully substituted.

The existing airstrip is capable of supporting planes to the size of Fokker Friendships. A local, light commercial commuter system operates daily between Gunnedah-Sydney/Sydney-Gunnedah. At other times, services are available by bus connection with Tamworth. This service operates daily. There are no scheduled commercial services to other centres.

Servicing Infrastructure

Water Supply System: The existing water supply system draws water from sub-artesian bores located north of Gunnedah. This sub-artesian water is then pumped into the water reticulation system. This system is basically divided into two 'independent' networks. The two networks, A and B, are located on the northern and southern side of the main railway line respectively.

The system has been constructed from a wide variety of pipe types and diameters. The system contains a number of reservoirs of various capacities. These reservoirs are all located on hills to the south of the township. One of the reservoirs is connected to the reticulation Network A, while the remaining four are connected to Network B.

The capacities of the various components in the existing system are presented in Table 3.35.

Table 3.35: Water Supply System - Components

Component	Number	Capacity
Reservoirs	5	17.51 ML
Bores	8	17.35 ML/day

The existing water supply system has insufficient capacity to cater for the current population of the township. The residual pressures that are predicted for peak instantaneous demands indicate that the north-eastern edge of the township experiences water pressures lower than the Public Works Department minimum criteria of 12 metres.

An outline of the basic structure of the existing water supply system is presented on Map 13.

SEWAGE TREATMENT WORKS

WELL

BORE

BORE

BORE

P.S.

WELL

RESERVOIR

RESERVOIR

RESERVOIR

EXISTING SEWERAGE SYSTEM

EXISTING WATER SUPPLY SYSTEM

GUNNEDAH ENVIRONMENTAL STUDY

EXISTING SERVICING INFRASTRUCTURE

13

0 800m

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For GUNNEDAH SHIRE COUNCIL

Sewerage System: The Gunnedah Sewerage System was originally constructed in 1942, and comprises the following components:

* Gravity Reticulation.

* Pumping Station.

* Rising Main.

* Sewage Treatment Works.

The gravity mains were initially constructed using vitrified clay and concrete pipes. The Council has extended the original system to cater for development on the southern edge of the township. The system is essentially sound, except for some of the larger concrete sewers, which have deteriorated because of chemical attack on the concrete.

The capacity of the existing system is adequate for peak dry weather flows, although it is inadequate for peak wet weather flows. The system exhibits surcharging from a number of the manholes during wet weather along the main sewers.

Two distinct catchments exist for the sewerage system:

* Northern Catchment, which drains to the Pumping Station.

* Southern Catchment which drains directly to the Sewage Treatment Works.

The sewage treatment works comprises two parallel trickling filter plants. The initial trickling filter plant was constructed in 1942, and has a capacity for 5,500 Equivalent Persons. The treatment works was augmented in 1968 with the construction of a second trickling filter plant with a capacity of 5,500 Equivalent Persons.

The capacity of the treatment works is limited by the capacity of the pumps in the primary stages of the treatment works. This restriction to the capacity will prevent shock loading of the trickling filters which can have serious consequences on the operation; it also limits the capacity of the current plant.

An outline of the basic structure of this existing sewerage system is presented on Map 13.

Drainage System: The drainage system that has been developed for the township is based on six catchments:

* Ashford's Water Course Catchment.

* Osric Street Catchment.

* Blackjack Creek Catchment.

* Stock Road Catchment.

* Killara Catchment.

* Meadow Park Catchment.

The locations of the catchments affecting the present urban area are presented on Map 14. A detailed analysis of Ashford's Water Course and the Osric Street Catchment has been presented in a number of reports and designs to Council over the preceding decade. A brief description of the six catchments is presented below:

* Ashford's Water Course Catchment

Ashford's Water Course Catchment, comprising nearly 330 hectares, rises in the hills to the south of the township. In the upper reaches, the catchment is bounded by well defined ridges to the east, west and south. The country has a moderate cover of trees and grass with moderate slopes (up to 15 per cent).

Two creeks emerge from the upper reaches of the catchment. They converge on the gentle slopes between Lincoln Street and Stock Road to form Ashford's Water Course. The catchment in the lower reaches is bounded to the east by a ridgeline, while the western boundary is a relatively flat area common with Blackjack Creek Catchment.

The creek then flows through the township in a series of channels, pipes and box culverts. The earth banks along sections of the creek have been breached in recent years by heavy flooding, with resultant inundation of some areas of the town.

Eventually, all flows join Blackjack Creek at the western edge of the town from where the run-off proceeds to the Namoi River. This catchment has been examined in detail previously and the capacity of the various structures determined, particularly in the lower reaches through the township.

The lower reaches of the catchment are inadequate for floods with a recurrence interval greater than about five years. A number of new structures have been designed but not fully installed in the lower reaches to alleviate some of the flooding problems.

* Osric Street Catchment

Osric Street Catchment, comprising 240 hectares, rises in the hills surrounding Porcupine Lookout. As in the Ashford's Water Course Catchment, the upper reaches are bounded by well defined ridges to the east, west and south. The terrain is similar to Ashford's Water Course Catchment.

The catchment flattens out towards the township to a uniform sloping area which is bounded by Ashford's Water Course Catchment and the Stock Road Catchment. The catchment contains a number of minor waterways in the upper reaches.

The Albion Street drain, which drains the western half of the catchment, has its origin as a 375 millimetre diameter concrete main at Stock Road. It eventually discharges a short distance upstream of a culvert which then flows under the main railway.

The eastern watercourse drains to the east of Pearson Street and then to the Osric Street culvert underneath the railway line. This watercourse has flooded areas of the town in the past because of the inadequate capacity of the culvert.

A report on the drainage system undertaken a number of years ago recommended a number of modifications to these systems to increase their capacity. A number of these modifications have been constructed although not all have been undertaken.

South of the railway culvert the catchment maintains a gentle slope through residential areas as far as Maitland Street. The area below Maitland Street is a floodplain. A detailed map of the town, which outlines the flood prone areas of the township, has been prepared by the Water Resources Commission.

* Blackjack Creek Catchment

Blackjack Creek Catchment rises in Blackjack State Forest and the area around Blackjack Mountain well to the south of Gunnedah. The catchment is considerably larger than Ashford's Water Course Catchment and Osric Street Catchment. The area is bounded to the east by a ridgeline stretching from Ashford's Water Course Catchment to the Soil Research Station, to the south by Blackjack State Forest and to the west by the ridgeline extending from Blackjack Mountain.

The part of the catchment that is of particular interest is that area directly west of Ashford's Water Course and the low mountains to the west of Gunnedah.

The upper reaches of the catchment contain a number of farming properties and a State Forest. The slopes range from gentle to steep (up to 25 per cent). A number of hills and mountains are contained within the catchment. It is proposed that a number of water supply reservoirs be located on some of these hills. The lower reaches of the catchment are relatively flat, containing parts of the existing township and a lawn cemetery.

A number of waterways traverse the catchment, these being of only minor interest to this Study except for the three that form Blackjack Creek. This creek is well defined from Pine Hill Station to the Lawn Cemetery. However, downstream of the Lawn Cemetery, the creek is no longer contained within a well defined narrow channel. The Council intends to create a defined waterway for the Blackjack Creek as it crosses the Crown Reserve at some future date. The creek then crosses the Oxley Highway and main railway line before joining the Namoi River.

* Stock Road Catchment

Stock Road Catchment, comprising a few hundred hectares, has its origin on Porcupine Hill to the south-east of the township.

In the upper reaches, the catchment is relatively narrow, with steep slopes off the hill. The catchment broadens out in a fan shape in its lower, relatively flat reaches.

The catchment is bounded to the west by the Osric Street Catchment, and to the south by a broad expanse of uniformly sloping land. The railway line which forms a barrier to the east and north of the catchment has a number of culverts which drain the two small watercourses on the catchment. These watercourses then drain across the floodplain to the Mooki River upstream of the Oxley Highway. The catchment contains only scattered development.

* Killara Catchment

Killara Catchment, comprising a few square kilometres, has its origin on the ridgeline to the north of Blackjack Mountain. In the upper reaches the catchment is relatively steep, with slopes up to 25 per cent. The area is bounded to the east by Blackjack Creek Catchment, and to the west by a relatively uniform slope around Cranfield.

The lower reaches have gentle slopes, with one main watercourse rising around Killara Station. This watercourse then flows across the railway line to the Namoi River. This catchment contains only scattered farmhouses and the Gunnedah Abattoir.

* Meadow Park Catchment

Meadow Park Catchment, comprising a few hundred hectares, rises on the ridgeline south of Porcupine Hill. In the upper reaches the catchment is moderately steep, with Stock Road Catchment forming a boundary to the north and the Blackjack State Forest to the south.

The catchment drains across a uniformly sloping area to the railway and then to the Mooki River floodplain.

4. IDENTIFICATION OF PAST AND EMERGING ISSUES

4.1 Catering for Growth

4.1.1 Past Rates of Population and Dwelling Growth

Table 4.1 shows past rates of population growth for the township of Gunnedah and Table 4.2 shows equivalent growth in dwellings.

Table 4.1: Population Growth - Gunnedah

Year	Population	Population Increase	% p.a. Compound Growth
1961	6,855		
		652	1.83
1966	7,507		
		725	1.86
1971	8,232		
		457	1.09
1976	8,689		
		373	0.84
1981	9.062 *		

* Estimated resident population township of Gunnedah
Source: Australian Bureau of Statistics

As can be seen, while the population has been growing, it has been growing at a decreasing rate since 1971. In the 10 years since 1971, population has grown by an annual average of 0.97 per cent, while in the 10 years before 1971, the population grew by 1.85 per cent annually - nearly double the rate since 1971.

Table 4.2: Total Dwelling Stock - Gunnedah

Year	Occupied Dwellings	Unoccupied Dwellings	Total Dwellings	Increase	Growth Rate (%)
1961	1,659	49	1,708		
				374	4.04
1966	1980	102	2,082		
				387	3.47
1971	2,317	152	2,469		
				175	1.38
1976	2,484	160	2,644		
				345	2.48
1981	2,801	188	2,989		

As can be seen, dwellings have increased at higher rates of growth than population. This implies that occupancy rates (the number of people per total dwelling) is declining. Occupancy rates are shown in Table 4.3.

Table 4.3: Occupancy Rates - Gunnedah

Year	Occupancy Rates	Marginal Occupancy Rates
1961	4.01	
		1.74
1966	3.61	
		1.87
1971	3.33	
		2.61
1976	3.29	
		1.08
1981	3.03	

The second column in Table 4.3 shows marginal occupancy rates. This is the ratio of the increase in population to the increase in dwellings and shows the additional population for each addition to the total dwelling stock. It is useful in forward planning exercises in determining the future dwelling requirements for an expected population growth, or conversely, the expected increase in population from a given increase in total dwelling stock.

As can be seen from Table 4.3, occupancy rates have been declining consistently over time. Marginal occupancy rates have fluctuated more erratically with no distinguishable trend.

These past rates of population and dwelling growth can be used as a basis for forecasting future population trends.

4.1.2 The Future Growth Prospects for the Town

In order to determine the level of population growth that is likely to occur over the next 15-20 years, the future growth prospects in the Shire need to be addressed. Of specific interest here are changes in the economic base of the region surrounding Gunnedah that may have spin-offs in terms of population growth in the township.

As described above, the traditional agricultural service function provided by Gunnedah is expected to continue into the future. The strong regional importance of the saleyards, the abbatoir and the well established agricultural services industry are not expected to show any marked trends of expansion or decline in the immediate future. This is not to say there will not be short term cyclical fluctuations in the

fortunes of these industries. However, as far as population projections are concerned, it is expected that the existing rural related industries in the area will not change to an extent significant enough to alter past population growth trends.

Thus an assumption has been made that past levels of population growth will continue into the future to form the base level population.

To this must be added population related to major economic development projects.

As can be seen from Section 4.1.1, in the 20 years from 1961 to 1981, the population of Gunnedah grew by an annual average compound growth rate of 1.41 per cent. The intercensal growth rate over that period has declined however, suggesting that the growth rate for the next 20 years will be less than 1.41 per cent. Before 1971, the annual growth rate was 1.85 per cent and since then it was 0.97 per cent. Thus, for the purposes of estimating base rate population levels in the future, it is assumed that the 1971 to 1981 population growth rate will remain the same from 1981 to 2001. Thus, in the absense of any external economic events, and based on a continuation of past trends, the population projection for the township of Gunnedah would be as follows.

Table 4.4: Base Case Population Projection

1971	1981	1986	1991	1996	2001
8,282	9,062	9,510	9,980	10,473	10,991

The major regional economic activity likely to indicate a rate of population growth that varies from the trend is the proposed coal mining activity located mainly to the north of Gunnedah.

Coal Resources in the Gunnedah Region[1]

The township of Gunnedah lies near the centre of the major coal resource known as the Gunnedah Basin. As with most of the coal in NSW, this coal is found in basin-like structures, closest to the surface at the edges of the basin. The coal is found in seams located within beds of sedimentary rock.

1. The source of information in this section is the 'New South Wales Coal Strategy Report, 1981' a report for the NSW Government by the Coal Resources Development Committee.

Although there are a number of significant proposals in the area, the Gunnedah Basin coal deposits are relatively unexplored. While inferred reserves (based on sparse sampling) total 102,444 million tonnes or 20 per cent of the State's inferred reserves, measured and indicated resources only total 972 million tonnes or 4.3 per cent of the State's measured and indicated resources. This low level measured and indicated reserves relative to the amount of coal reserves indicated by less extensive survey has prompted the Department of Mineral Resources to carry out further investigation as top priority. Authorisation area 216, taken out by the Department in order to prospect for coal in the basin, covers a substantial part of the entire basin.

There are a number of authorisation areas, exploration areas and coal lease areas in the basin. An authorisation area such as the one issued to the Department of Mineral Resources covering the entire basin is an authority to prospect, granted on application to the Department. These usually cover large areas and give companies permission to explore for recoverable coal reserves. Exploration permits are similar in nature to authorisations but are usually granted on a tender basis rather than by application. As a result of prospecting within an authorisation or exploration area, a company can then apply for a coal lease, which gives the company authority to embark upon a process leading to the mining of coal deposits. Coal lease areas are much smaller in size and refer to areas for which permission to mine will be sought.

Major Coal Projects

Important mining projects proposed within these authorisation and lease areas include:

* Gunnedah Colliery Holdings operated by Gollin Wallsend Coal Company Limited, which currently operates a mine just south of Gunnedah and holds a number of prospecting authorisations on land surrounding the existing mine. There is a proposal for an open cut mining operation to produce 300,000 tonnes of coal per annum from part of one of these authorisation areas - Authorisation 138.

* Vickery Joint Venture relating to Authorisation 151 and 157. This project is a joint venture between the Coal Cliff Collieries Pty Ltd as major partner and Vickery Coal Pty Ltd (formerly Sunshine Gold). The Coal Cliff Collieries Pty Ltd is wholly owned by Kembla Coal and Coke Pty Ltd.

* Boggabri Joint Venture relating to coal lease area C2. This project is a joint venture between Amax Iron Ore Corporation (Coal) Division and BHP.

Kembla Coal and Coke Pty Ltd is also investigating a second mine in the area at Maules Creek - exploration area E4. However, at this point in time, the proposed Maules Creek mine is at pre-feasibility stage and no decision has yet been made as to extent or timing of the development. For the purposes of this Study therefore, likely employment generation and population implications of the Maules Creek development have not been considered.

Gunnedah Colliery Holdings

The Gunnedah Colliery Holdings proposal is for an open cut operation to remove saleable coal at the rate of 248,000 tonnes per annum. At this rate, the expected life of the mine is 19 years. After coal is removed by open-cut, the company may consider underground mining to recover deeper seams. At persent, coal is recovered from underground mines at the rate of 498,000 tonnes per annum (saleable coal). Thus, the proposed development will increase output to nearly 750,000 tonnes per annum by 50 per cent. Compared with the proposed developments in the Boggabri area, this proposal is relatively small.

In terms of employment generation, this proposed development will be integrated with the existing operation. Although the open-cut mine proposal will create a need for 39 jobs, rationalisation of the existing operation will result in an overall increase in the workforce of 5 per cent on the current level of 220, i.e. an additional 10 jobs. It is envisaged that this operation will commence in early 1983 if necessary approvals are given. It is felt that the additional 10 jobs can be found within the existing resident workforce of Gunnedah, Curlewis or Carroll, with a consequent insignificant effect on population growth.

Vickery Joint Venture

This proposed open cut mining operation is located approximately 33 kilometres from Gunnedah - a travel time of about 20 minutes[1] - in the vicinity of the Vickery State Forest. It is proposed to recover coal by open cut method at the average rate of 3 million tonnes per annum when in full production. Smaller tonnages will be recovered in the earlier years of the project during the gearing up phase. The actual amount of saleable coal recovered will depend of course on the availability of infrastructure and economic conditions in the international coal market.

Workforce projections associated with the proposal are as follows:

Construction:

Year 1	330
Year 2	290
Year 3	25
Year 4	20

Skill types at construction peak:

Labourers	161
Tradespeople	159
Other	10
Total	330

1. Source: Vickery Joint Venture Draft Environmental Impact Statement (June 1982) prepared by Dames and Moore.

Operational workforce:

Senior management	40
Management and administrative support	22
Tradespeople	155
Unskilled workers	325
Total operational	542

The full-time operational workforce will commence work in Year 3 and will build up gradually to full employment by Year 8. At the present time, construction is scheduled to begin in 1984 with the operational workforce building up over a 5 year period from 1986 to 1991. However, given the current economic climate, this timing is subject to variation. At this stage no firm decision has been made by the joint venture companies on the timing of the project. For purposes of this investigation, it is assumed that although the commencement of mining may be subject to change, the rate and scale of development will be fixed.

Boggabri Joint Venture

The open-cut mine development proposed by the AMAX/BHP group is located further to the north from the Vickery project at a distance of 55 kilometres from Gunnedah. This is a larger proposal than the Vickery project, involving an estimated average output of 4.5 million tonnes per annum. After all possible coal is extracted by open-cut methods, underground mining will be considered giving a total mine life of about 100 years. The project will be undertaken in two stages:

* the first stage will be to build up to an output of 2.5 million tonnes per annum in 5 years; and

* the second stage to 4.5 million tonnes in a further five years.

The construction workforce at peak will be 320 and the operation workforce is estimated to be 630 at full production. The estimated occupational breakdown of this workforce is as follows:

Professional	35
Tradesman	170
Skilled Operators	185
Clerical/Stores	47
Labourers	68
Apprentices	20
Other Operators	105
Total	630

The timing of construction and operation of workforce growth is shown below.

Table 4.5: Workforce Growth

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Construction	30	150	320	120	50	180	90	0
Operation	30	110	320	400	480	500	550	630

Source: Data provided by AMAX Iron Ore Corporation

Originally scheduled to commence in 1983, it seems likely that this project will be delayed due to the current downturn in the economic outlook, particularly the coal market. For the purpose of this exercise, Year 1 in the above table is taken as 1984. The implication is therefore that both major projects in the area will get underway at about the same time. The uncertainty relating to the timing of those major proposals could mean they will be tested by varying the timing of the proposed developments and assessing the implications for population growth.

Potential Coal Projects

As mentioned above, there are large amounts of as yet unexplored coal reserves in the Gunnedah basin. The Department of Mineral Resources has embarked upon exploration programmes which could result in additional population growth in the area. As pointed out in the New South Wales Coal Strategy 1981, prepared for the NSW Government, the inferred resources of the basin are large and in fact are nearly half the potential reserves in the whole of the Hunter Valley. Thus there is the capacity in the future for a large scale increase in coal mining in the Gunnedah area. In the longer term, the exploitation of these reserves are certain. Such development however takes time and because no definite plans exist at the moment, it is not possible to incorporate such proposals into the Environmental Study population projections. Council should be aware however, that longer term coal developments are likely in the region which will have a significant impact on the town of Gunnedah and surrounding rural villages. Known proposals in the area include:

* Kembla Coal and Coke Maules Creek Proposal: Discussed briefly above, no commitment has been made on this proposal as yet. Indications suggest that it is likely to be of a size and scale similar to the Vickery Joint Venture Project.

* Electricity Commission of NSW: The Commission has long range plans to develop a power station and associated coal mine, utilising the coal resources of the Gunnedah basin. At this stage, the Commission has approached the Department of Mineral Resources for authorisation to prospect for coal in the basin and their application is being considered. Early attention has been given to solving water shortage problems that would be associated

with thermal power generation in the area, and the Snowy Mountains Engineering Corporation is investigating the feasibility of a pump, storage and hydroelectric scheme to pump water into the basin from the Apsley River. While work within the Commission is continuing, it is not possible at this stage to identify the location of the power station, its scale, timing, or the employment generation effects. It is not likely however that construction would commence within 15 years.

Council should continue to participate fully on regional planning committees and establish lines of communication with relevant public and private agencies to ensure that it is fully informed at all times of proposals relating to coal development in the area.

4.1.3 Implications of Coal Mining on Population Growth and Dwelling Requirements in Gunnedah

In association with proposed mining projects in the area, a number of projections have been made of population growth in towns and shires likely to be affected, the two major works being the Environmental Impact Statements associated with the Vickery Joint Venture Project and the AMAX/BHP project. More recently the Grafton Regional Office of the Department of Environment and Planning is undertaking a more comprehensive exercise, looking at the combined effects of proposed mining projects rather than an assessment of individual projects, as was the situation with the Environmental Impact Statements. As yet, this government study has not been completed. Thus there are no official government population projections for the Shires likely to be affected by coal industry developments.

In order to assess the implications for Gunnedah, a number of assumptions have to be made. These assumptions will now be discussed.

(i) Multiplier Effects

Multiplier effects of an increase in mining jobs in the area refer to the additional jobs created in the community as a result of the mining jobs. Although somewhat oversimplified, there are basically two types of multiplier effects. Type 1 Multipliers refer to the indirect jobs created in industries serving the mines such as car sales yards, machinery repair shops engineering works etc., and Type 2 Multipliers refer to induced jobs in industries serving the population, such as wholesaling and retailing and commerce. There is a serious lack of any rigourous data or investigation to enable the accurate identification of the extent of these multiplier effects, particularly in the Gunnedah region. However, it is reasonable to assume the following:

* The Type 1 Multiplier effects are likely to be low in the region. A review of the industrial structure of the towns in the area, particularly Gunnedah, and discussions with the mines, suggests that equipment and servicing will be imported into the region. While there may be some spin-off for Tamworth, the effects on towns such as Gunnedah is likely to be small. Any increase in indirect jobs could also be partially taken up by spare capacity in existing workshops. For this reason a Type 1 Multiplier of 1.1 has been assumed.

* Type 2 Multipliers however, will be more significant, particularly in Gunnedah which has a much larger retail and commercial base than surrounding smaller villages. Although some major shopping trips will be made into Tamworth, there will be substantial spin-off in Gunnedah. For this reason a Type 2 Multiplier of 1.7 has been assumed - that is an indirect multiplier of 1.1 and an induced multiplier of 1.6.

* In accordance with conventional practice this multiplier of 1.7 will be applied to the total expected basic workforce at the two mines of 1,172.

Thus the total employment effect of the two mines will be:

Basic workforce	1,172
Multiplier effect workforce	820
Total employment effect	1,992

(ii) Non-Local Workforce

The total employment effect of the two proposed mining developments in the area is estimated to be nearly 2,000. Some of these jobs will require skills not likely to be found in the local workforce, necessitating a degree of inmigration to the region.

The occupational breakdown of the workforce associated with the two proposals discussed above showed that in the vicinity of 40 per cent of the total workforce has a skill that could not be easily learnt. this complies with studies undertaken in the Hunter Valley. The implication is, therefore, that at least 480 workers will move into the area - these being in the more skilled job categories. There is the potential for the remaining 700 direct jobs and the 820 multiplier jobs to be met by the labour force reservce in the region. Such jobs will be filled from three sources:

* unemployed workforce;

* people holding jobs in other industries that will change jobs to work in the mines;

* hidden unemployed - those people under or unemployed that have not registered as unemployed.

In terms of estimating incoming workers, it is the first and last category that is important. People leaving jobs to work at the mines will create a vacancy that would have to be filled thus not reducing the need for additional workers. However, such structural changes in the local economy may cause disruption to local industry as it adapts to compete with the high paying mines.

The ability of these 1,520 jobs to be met locally is dependent upon the size and skills of the unemployed workforce and the size of hidden unemployment. Underemployment and hidden unemployment can best be indicated by looking at labour force participation rates. These are shown in Table 4.6.

Table 4.6: Labour Force Participation Rates 1976

Area	Males %	Females %
Gunnedah	82.2	40.9
Narrabri	82.1	40.4
Manilla	81.0	40.0
Barraba	82.2	35.7
NSW	79.0	43.1

Male labour force participation rates are generally higher than is average for NSW suggesting that the likelihood of hidden unemployment is less than one would expect in the State as a whole. These figures however, may conceal a significant amount of underemployment by part-time rural workers etc.

Female workforce participation is lower than the State average, as expected in rural communities. This situation is not expected to improve with coal mining in the area; these projects providing work opportunities predominantly for males. While there may be additional opportunities in service industries, this is not expected to reduce female unemployment or improve participation rates.

The Environmental Impact Statements currently being prepared for the 2 major proposed mines after analysing the local unemployment situation conclude that the local workforce would be able to supply 63 per cent of total operational jobs (60 per cent in the case of one proposal and 67 per cent for the other). This reflects 714 jobs. These independent studies however, do not look at the combined effects of the two proposals.

After discussions with local officers of the Commonwealth Employment Service, the Grafton office of the Department of Environment and Planning has appraised the availability of unemployed workers in the labour market area that the mines could potentially draw on. The first comment that can be made is that this labour market area is quite large. On the reasonable assumption that people would be prepared to travel 45 to 60 minutes to work, the proposed mines could draw on labour pools from towns and rural areas such as Gunnedah, Narrabri, Barraba, Manilla and perhaps even Tamworth. Unemployment in this local labour market area as at February 1982 is estimated to be:

Table 4.7: Unemployment

	Male	Female
Adults	1,037	535
Juniors	519	716

These figures include unemployment in Tamworth, Willow Tree and Quirindi, and therefore could be a slight over-estimation of the unemployed labour pool. The Commonwealth Employment Service officers suggest that only 50 per cent of adults and 70 per cent of juniors would be willing to undertake mining work.

This gives an available pool of unemployed as follows:

Table 4.8: Available Unemployed

	Males	Females
Adults	518	268
Juniors	363	500

Even including an allowance for hidden unemployment in the region, it is apparent that there will not be enough labour surplus in the local labour market.

Furthermore, experience in Lithgow and Mudgee mining areas has shown that even with coal related developments, there was no appreciable drop in the unemployment roles and an increase in female unemployment. This is probably because of people moving into the area in anticipation of jobs. There is no reason to believe that such an occurrence would not take place in the Gunnedah region.

For the purposes of this Study, it is assumed that 75 per cent of direct jobs (i.e. 75 per cent of 1,172) and 60 per cent of multiplier jobs will be taken by migrants to the area. Thus the total number of net new jobs involving migration into the region is estimated to be approximately 1,380.

It should be emphasised that because of the lag time involved in providing zoned residential land it is more desirable to over-estimate the need for residential lots than to under-estimate.

Construction Workforce

Construction workforce pose particular problems because of the short-term nature of their stay in an area and the variation in dwelling requirements. On the assumption that both the major projects in the area commence operations in the same year, it is assumed the build-up of construction workforce will be as follows:

Table 4.9: Construction Workforce

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
360	440	345	140	50	180	90

Build up to peak construction will be between 6 to 12 months. The timing of construction workforce is affected by the 2-stage build-up proposed by AMAX/BHP.

Some of these jobs would be taken by existing unemployed or by firms already in operation in the region. Also it is likely that teams will commute daily or weekly from the large regional centre of Tamworth. It can be expected that the labour market for the construction workforce will be greater than that for the operational workforce because workers will be prepared to (and used to) travelling longer distances under contract for short-term jobs.

AMAX/BHP propose to house all migrating construction employees on-site while the Vickery Joint Venture plan gets underway, which suggests that most of their their construction workforce will be housed in temporary accommodation. For the purposes of this Study it is assumed that the construction workforce would not significantly affect the permanent population of Gunnedah. However, there will be important implications for temporary accommodation such as rental accommodation and caraven parks/mobile homes.

Population Implications

The population implications of the additional jobs in the area are related to the total number of jobs provided by the proposed developments, including multiplier jobs, and not specifically to the migrant jobs. This is because there will be a migration of people to the area who move in the expectation of a job on the basis that their chances of employment in the region might be higher than elsewhere. Thus there is a tendency to correct labour market imbalance through labour migration. A ratio can be found between the employed workforce and the total population of an area. This ratio is made up of two components:

* a total labour force component; and

* an unemployed component

In Gunnedah Shire this ratio was 41.3 per cent at the 1976 Census compared with 42.5 per cent in NSW as a whole. The rate for the Shire was representative of the area as a whole at that time.

This implies that there are approximately 2.42 persons for every job in the Gunnedah region. It is assumed that this jobs to people ratio will reflect the population growth associated with new mining jobs in the area.[1]

Using this ratio, population growth associated with mining development can be assessed.

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1. Similar approaches have been used in other studies of coal related development. See 'Upper Hunter Subregional Planning Study 1981', Department of Environment and Planning.

Table 4.10: Population Growth

	1984*	1985	1986	1987	1988	1989	1990	1991
Basic jobs+	55	175	600	780	920	990	1,070	1,172
Multiplier jobs	38	123	420	546	644	693	749	820
Total employment	93	298	1,020	1,326	1,564	1,683	1,819	1,992
Total population	225	721	2,468	3,208	3,784	4,072	4,402	4,820

Notes

* Assumed that both projects will commence in same year.
\+ Excludes construction workforce.

Distribution of Population Growth

This population growth is unlilely to occur in one location. Given the spatially large labour market area surrounding the mines, it is likely that population will be distributed to a number of towns such as:

* Boggabri;
* Gunnedah;
* Narrabri;
* Manilla;
* Baraba;
* Tamworth.

Also some additional population will locate in the smaller rural villages such as Carroll, Curlewis and in rural areas themselves.

The eventual distribution of population will depend on the following:

* the size of the towns;
* the availability of community facilities;
* the price of houses and land;
* distance from the mines;
* the availability of houses and land.

The two mining companies involved see most of the additional population living in Boggabri and Gunnedah with senior management and administrative jobs at Gunnedah and non-local skilled jobs at Boggabri. In effect, the distribution would be wider than this.

As far as size of towns is concerned, Gunnedah is obviously a more desirable location, having a large town image and a good distribution of community facilities. It is close to Tamworth for the less frequent shopping and service trips. The standard of residential development is higher than in Boggabri or even Narrabri, and can be said to provide a more pleasant living environment.

With respect to community facilities, Gunnedah is again more advantaged than other towns such as Narrabri, Manilla and Boggabri. Being a regional agricultural centre, it provides a higher order of goods and services than in any of the other towns. This, of course, is related to city size. Residents of Boggabri and, to a smaller extent, Narrabri utilise facilities in Gunnedah. This is particularly obvious in areas such as retailing. Boggabri has a limited number of shops, with most residents travelling to Gunnedah or Tamworth to do all but convenience shopping. Boggabri at the present time does not have a high school which would be another significant factor in location choice for families with school children. Although there are plans to provide a high school at Boggabri, no decision has been made on this at this point.

At present the price of houses and land in Gunnedah are relatively higher than other towns such as Boggabri, Narrabri and Manilla. At the same time however, there are generally more attractive blocks and the houses more substantial. There are a number of reasons why the price of land or houses will not be a significant influence on locational choice. Firstly, experienced mine workers have high disposable incomes and if they are migrating to the area from other coal fields they are likely to be able to easily afford a house and land at Gunnedah. Secondly the provision of additional land at Boggabri will require further subdivision of land. The Environmental Study for the town identified a growth area to the north-west as being suitable for further residential development. The costs of subdividing and servicing this land will result in a rise in the price of land over the price of existing subdivided parcels. Thirdly, inflationary pressures will force up the price of land in Boggabri. Fourthly, it is felt that any resulting relative prices for land in the towns will reflect the residential desirability of the towns. As far as Boggabri is concerned, the influx of 500 additional dwellings in the north-west side of town will more than double the existing dwelling stock and will create a definite mining town atmosphere with the existing residents in the older part of town and the miners in the expansion area to the north-west. Although the Department of Lands is investigating the residential development of Crown land adjacent to the railway this mining town ('haves' and 'have nots') image will be hard to dispell and will strongly influence the desirability of the town to new residents.

The price of land and houses in Gunnedah has traditionally been higher than surrounding towns. It is felt that the effect of coal mining development would be to reduce the relative price difference particularly as far as the larger towns are concerned. It will always be possible to find cheaper land in the smaller rural villages such as Carroll or Curlewis. Thus it is not expected that price of land will be a significant locational factor.

Gunnedah and Boggabri would be the closest towns to the proposed mines with Gunnedah approximately 15 to 20 minutes further away than Boggabri. Other towns are further away yet still within easy commuting range. Within the Hunter Valley for example, it is commonplace for workers to travel considerable distances each day.

In conclusion, the locational choice is quite complex and extremely difficult to predict. However, there are strong grounds for believing that a significant proportion of population growth will occur in Gunnedah. These include:

* the size of the town and the resulting wide range of community facilities available;

* the attractiveness and stability of the town and its ambient living environment;

* the greater ability for additional growth to be assimilated into the existing social structure;

* its location relative to the mines and to the growing regional centre of Tamworth.

On this basis, a number of assumptions have been made concerning the location of future population growth related to the proposed mines. The purpose of making these assumptions is to ensure that adequate land is zoned for future development. These assumptions are:

1. High growth rate - 75 per cent additional population growth is located in Gunnedah.

2. Medium growth rate - 50 per cent of growth will be located in Gunnedah.

3. Low growth rate - 25 per cent of growth to be located in Gunnedah.

Thus the resulting population growth rates will be as follows:

Table 4.11: Population Projections - Gunnedah

Assumption	1981	1986	1991	1996	2001
Base	9,062	9,510	9,980	10,473	10,991
Low	9,062	10,127	11,185	11,738	12,318
Medium	9,062	10,744	12,390	13,002	13,645
High	9,062	11,361	13,595	14,267	14,972

It is assumed that after the mines become fully operational, population growth will decline to the base case growth rate.

Dwelling Requirements

In order to estimate the additional number of dwellings needed to house the expected increase in population, use will be made of the marginal occupancy rates shown in Table 4.3. It is assumed that the marginal occupancy rate between 1971 and 1981 would apply to future population levels. This suggests that an additional 160 people and 100 additional dwellings will be needed. However it is expected that the marginal occupancy rate will increase as the growth rate increases, thus a rate of 1.8 is assumed for the purposes of this Study. Thus projected dwelling requirements for Gunnedah are as follows:

Table 4.12: Projected Total Dwelling Stock - Gunnedah

Assumption	1981	1986	1991	1996	2001
Base Case	2,989	3,238	3,499	3,772	4,060
Low	2,989	3,580	4,168	4,475	4,797
Medium	2,989	3,923	4,837	5,177	5,534
High	2,989	4,266	5,507	5,880	6,272

Residential Land Requirements

(i) Existing Stock of Vacant Land

The land use survey undertaken by Planning Workshop Pty Ltd included an investigation of vacant residential land. This land can be divided into a number of categories. The stock of vacant zoned residential land in Gunnedah at present is:

Vacant lots	175 lots
Zoned unsubdivided land	645 lots
Total	820 lots

A vacant lot is a vacant zoned residential building block apparently not part of an adjoining dwelling and therefore potentially developable.

Zoned unsubdivided land refers to land zoned for residential uses but as yet unsubdivided. It is assumed that such land would yield 10 residential allotments per hectare. This leaves a capacity for 820 detached dwellings or 11 years supply at current construction rates. Most of this land is located at the southern end of the town.

(ii) Future Land Needs

Table 4.13 above shows the estimated number of dwellings that would have to be built to cater for expected population growth in the town of Gunnedah. Of course not all these dwellings will need to be provided as detached houses on the urban periphery. An allowance has to be made

for medium density development within the existing urban area and redevelopment of existing low density residential land. Increased provision of dwelling units in the form of residential flat buildings will decrease the overall demand for residential land.

In 1976 the proportion of residential flat buildings to total dwelling stock in Gunnedah was approximately 10 per cent and it is estimated that this percentage has remained constant since then. However, as has been experienced in other coal related growth areas, it is expected that the number of residential flat buildings will increase along with the demand for rental accommodation and the proportion of single people and young couples amongst the immigrants. It is assumed therefore that 20 per cent of additional dwelling requirements will be in residential flat buildings. Furthermore it is assumed that 75 per cent of these would be constructed within the existing urban area either on vacant lots or as redevelopment of older low density dwelling stock. Twenty-five per cent would occur on land in the newer estates. In order to estimate lot requirements, it is assumed that 3 residential flat buildings could be constructed on the average residential block.

As well it is necessary to ensure that there is an adequate supply of zoned residential land to provide a sufficient land bank to ensure that supply will always be able to rise and fall to meet demand, thus stabilising price. A land bank is needed both in terms of subdivided lots and zoned unsubdivided residential land to meet the demands of investors as well as people buying land for future use such as retired persons or engaged couples. Growth within the Shire should be constantly monitored so that additional land can be released for residential development when and where it is required. It is envisaged that there should be sufficient zoned land to cater for at least 5 years normal demand in order to allow sufficient time for development, sale and construction to occur and to have a stabilising influence on price.

A further assumption is made that on average there is a capacity of 7.5 dwelling units per hectare.

In determining future land needs, the highest population projection has been used to ensure that land is identified to absorb the highest rate of growth that can reasonably be envisaged.

Based on these assumptions, land requirements as shown in Table 4.13, have been estimated.

Thus, by the year 2001 an additional 344 hectares of zoned residential land will be needed to accommodate the maximum level of expected population growth.

The timing of the provision of this land is dependent to a large extent on the timing of the two major coal proposals in the area. The land requirements above assume that both the Vickery and the Boggabri proposals will be fully operational by 1991. This implies the commencement of construction activity in 1984.

Table 4.13: Additional Land Required for Rezoning for Residential Purposes under High Growth Option

	1981-91	1991-2001	1981-2001
Additional dwellings required	2,518	765	3,283
Additional lots required	2,056	625	2,681
Land bank requirements	700	-	700
Available zoned vacant allotment equivalents	800	-	800
Total lot requirements	1,956	625	2,581
Land requirements (ha)	261	83	344

4.2 Preservation of the Existing 'Character' of the Town

The possibility of coal related growth appears to generate greatest concern in relation to the threat it is perceived to pose to the 'existing character' of the town. Indeed it appeared that any development of the town proposed was desired by the townsfolk to take place within the bounds of the 'existing character' of Gunnedah.

It is difficult to define 'existing character'. On seeking a definition from various townsfold the following concepts appeared to emerge:

* the concept of Gunnedah as a big countrified town;
* the concept of an orderly, clean place;
* a well maintained, houseproud town;
* a green town, where trees are important;
* a low-scale town, nestling into the foothills.

At least part of this character has emerged as a response to positive planning actions initiated by Council.

Council currently operates a continuing tree planting programme, providing street trees in exchange for care. The species of trees are nominated by Council to ensure compatibility with each street and location. Council also carries out planting in reserves and public places.

Council has recently been testing various types of street furniture. It has investigated the alternatives available and has now decided to standardise the use of a modern form concrete upright seat with wooden slats, as well as various exposed aggregate covered litter bins and planter boxes.

It has recently installed such boxes in central median positions at the major interstection in town, and on some surrounding pavements.

The scale of development in the town has, to some extent, been controlled by restrictive measures adopted by Council. By identifying and placing limitations on flat development on various parts of town, Council has attempted to ensure that the intensity of development remains compatible with existing development.

Council's concern with the scale of development has also been shown in relation to the establishment of a 7(d) Scenic Rural Environmental Protection Zone on land to the south-west of the corner of Lincoln Street and Links Road. This zone was established to protect the visual amenity of the town in relation to the view of the hills surrounding it, and also to preserve the existing undisturbed vegetation above the tree line.

On land within a 7(d) zone, development may be carried out only with the consent of Council for the purposes of:

> ". . . agriculture, dwelling-houses, home industries, roads, subdivision and utility installations (other than gas holders or generating works) and for purposed ancillary to the use of the land as open space."

There are also specific controls over the subdivision of land in this zone, with the basic intention of protecting the scenic value of the land.

In other regards, the general amenity of the town and compatibility of land use in the town has been protected by the operation of a planning scheme ordinance since 1966.

Within such a development control framework, Council has attempted to preserve the 'character' of Gunnedah, at least those aspects of it which Council deems desirable.

There are instances where this has not occurred and where the development control framework has been inadequate to prevent undesirable development occurring. At times conflicts have arisen between the community's desire for growth, and the physical form in which it has occurred. An example which might be pointed to is the active industrial promotion of the town, yet the development of industrial areas which are not an attractive part of the town.

It appears from the foregoing discussion that growth related to coal development is, in the long run, inevitable. The only method of ensuring that this growth does not occur in undesirable forms, is for Council to ensure the existence of an adequate and more stringent development control framework than has previously existed.

The proposed Structure Plan for the future growth of the town contained in this report and the Local Environmental Plan which will follow to give it statutory force will attempt to ensure that land uses are appropriately located. Specific recommendations of this Study, for example, relating

located. Specific recommendations of this Study, for example, relating to the preservation of historic and environmental features, and beautification of the town centre, will also ensure the retention of some desirable elements of the landscape. However, the back-up of several codes is required to regulate details of development which can occur within broadly delineated land use zones.

Council presently has no code relating to the standards and layouts to be adopted within either residential or industrial estates. It provides no firm guidelines for the development of medium density residential development other than those locations in which it is, or is not, desired. Council has no written parking code, although it does usually adopt a reasonably consistent standard relating to the provision of car parking space. Other factors such as layout and location of parking facilities, turning circles, accessways etc., should be regulated as well as the total provision, however. On the other hand, developers are provided with no clear guide of the open space contribution or community facilities contributions which they may be required to make in association with developments they are carrying out.

Both in order to promote development by a clear statement of requirements, but also to ensure the community as a whole gains from development and is protected from undesirable development, and it would appear that reasonable development standards need to be determined, incorporated in appropriate codes and adopted by Council.

4.3 Consolidation and Improvement of the Central Business District

The retail/commercial centre of Gunnedah is presently well established along both sides of Conadilly Street, stretching between Tempest Street in the west and nearly Henry Street in the east. This is a distance of 5 blocks, creating a retail centre of nearly 1 kilometre in length.

Limited development has spread along side streets away from Conadilly Street. This has occurred mostly in the two main blocks of Conadilly Street, Chandos to Marquis Streets and Marquis to Elgin Streets. The only set of traffic lights in the town operates at the corner of Conadilly Street and Marquis Streets, which consequently acts somewhat as a town centre of focus.

As noted in Section 3.3.2, pressure on the retail/commercial centre is fairly strong. The proportion of vacant premises is extremely low with only 3.3 per cent vacant retail space and no vacant commercial office space. The number of vacant shops at the time of the survey was actually only 3. Two of these were being remodelled. The third, a larger premise located on Conadilly Street but to the east of Abbott Street, had been vacant for some time and actually is being reserved for use as a temporary Post Office following demolition of the existing Post Office.

From the current vacancy rates there certainly appears a need for some expansion of the Central Business District. However, this need can be assessed on a more quantitative basis. If the commonly accepted

for convenience and comparison goods is adopted, it could be imputed that to serve just the town's needs, 13,363 square metres retail floor space would be required. To serve the whole Shire, 19,760 square metres retail floor space would be required. According to the Retail Floor Space Survey, Gunnedah has a total of 27,500 square metres of retail floor space. Extracting the categories of motor vehicle retailers, dealers etc., and vacant premises, there is presently 22,723 square metres of retail floor space trading in Gunnedah. Using either standard it would appear that Gunnedah Township is relatively oversupplied with retail floor space.

It could be suggested that Gunnedah, in fact, draws from a wider area than the boundaries of the Shire, in particular from Boggabri. Residents in Boggabri are unlikely to do their convenience shopping in Gunnedah. However even if all residents of Boggabri did all their shopping in Gunnedah, only an additional 1,500 square metres of retail floor space would be required to adequately provide for them. In reality the additional floor space required on behalf of Boggabri residents would be considerably less.

The conclusion to be made from such figures can either be that Gunnedah has too many shops to serve its needs or that the existing shops are particularly spacious in terms of floor space needs. Given the appearance of trading as relatively prosperous, and the very low number of vacant shops, the latter conclusion would appear justified.

It is reinforced by consideration of retail sales expenditure levels. The State average turnover of retail sales per square metre of floor space was $2,489 in the year 1979-80.[1] The average turnover in Gunnedah was $2,014. Per square metre of floor space, then, sales are relatively low in Gunnedah. This is, in fact, not an unusual finding in a country town where retail rents are not at as much of a premium as in a city location.

The implication of such a finding is that any allowance for expansion in existing retail floor space per capita should be made with regard to the apparently greater space norms of Gunnedah retailers compared to the usually adopted standard of 1.5 square metres per head of population. In Gunnedah the figures indicate that this allowance should be in the vicinity of 1.7 square metres per head of population.

While there are some existing vacant premises it would appear that pressures currently exist for some allowance for expansion to be made. There is currently only a slight excess of zoned commercial land - over 90 per cent of currently zoned commercial land being used for that purpose. Certainly in light of population projections made above, it would appear that a significant allowance will need to be made for future retail/commercial expansion. By 1986 the precise allowances related to the above population projections are as follows, including an allowance calculated from site coverage figures (37 per cent) for parking space:

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1. These are the latest figures available from the Census of Retail Establishments, Australian Bureau of Statistics.

Assumption	Existing	Base	Low	Medium	High
Allowance: (ha)	-	1.6	2.6	3.9	4.8

It is now necessary to discuss the ways in which this expansion might best be accommodated in order to consolidate and improve the Central Business District.

It would appear that natural physical limits to the lengthwise expansion of the centre exist in the form of Wolseley Park to the west and the existing Council Chambers/Catholic Church to the east, at least on the northern side of Conadilly Street. It is felt that these are distinct barriers and should not be exceeded if at all possible. The position is less clear on the southern side of Conadilly Street. However the 'frame' rather than 'core' type activities of the Servicemen's Club and bowling club and motel could generally be adopted as an eastern boundary. On the western end it is felt to be desirable that retail/commercial development should not be allowed to spread further than it presently exists, i.e. virtually to Tempest Street, given that this is already one block further than the identified desirable western extent on the other side of Conadilly Street. If anything, it is considered that this strip is already too long for an efficient and convenient retail centre. This can be seen by the tendency for uses to become more 'marginal' in nature towards the ends of the strip.

It is consequently considered that extension past the above points should not be premitted by Council unless by a major retailer such as Woolworths. The likelihood of such a retailer desiring to locate in Gunnedah in the near future is high in our opinion. Interest has already been expressed by various larger developers. It would appear that a one-stop type centre is probably overdue in Gunnedah, and will certainly be warranted within 20 years should the existing growth rate continue, let alone should coal related growth occur. In the latter case, if high growth rates occur, a 5,000 square metre regional centre will virtually be warranted in Gunnedah by 1986.

Whatever the rate of growth, it appears inevitable that such a centre will eventually come to Gunnedah. Given this assumption it would consequently appear desirable that Council choose and promote the most appropriate site for this kind of development, rather than permit the possibility of it occurring in a location which will less readily promote the objectives of consolidation and reinforcement of existing retailers.

Obviously the most desirable location for this is within the identified core. However it is clear that, due to the fragmentation of ownership within the central blocks, any amalgamation of a suitably sized site within this area will be difficult. If a major retailer is unable to find such a site in the core area, then Council should consider any other application on its merits. It could be expected that Council would look more favourably on land:

* preferably toward the north-east rather than west and adjoining the core;

* alternatively, into the service areas to the south and adjoining the existing core;

* out of the floodplain.

It is considered important that any new centre should not be isolated from the existing core.

In the interests of consolidating the existing retail 'core' area, expansion of a less major nature needs to be encouraged in the two main Central Business District blocks, namely between Chandos Street and Elgin Street. Expansion further north than Little Conadilly Street is possible, although there are problems associated with it. While the older, poorer residential properties situated in these blocks would be most suitable for redevelopment, they are situated in a 1 in 100 year flood zone and Council would need to require that foundations are raised above the flood level. The potential problem also exists that the conflict between main road artery and retail centre will be transferred from Conadilly Street to Bloomfield Street if this frontage is developed for retail uses. However limited retail development, at least on the southern side of Bloomfield between these two blocks, would appear warranted.

Given such problems, and also the orientation of residential development to the south of the town, retail development toward Barber Street would appear preferable. Despite the overall land use classifications on blocks in the vicinity of Little Barber Street, our field survey indicated the existence of a considerable amount of underutilised land particularly in the block between Chandos Street and Marquis Street. This land, created by the length of blocks at the rear of existing shops and premises facing Conadilly Street, is frequently used informally for parking by shop owners etc. Very little of it has structures of any substance. The main problem in its use for retail purposes is the need for consolidation of a great many small land parcels. If this consolidation could be achieved however an ideal location for intensification of the retail core could be established.

* It is well linked to the new developments (especially Coles) in the town centre.

* It could incorporate the land presently used for parking without necessarily losing existing spaces.

* It would complement rather than detract from the existing retail 'core'.

* It could be readily served with car park and loading access from Little Barber Street.

* A new arcade or small centre could be designed to maintain rear access to the properties fronting Conadilly Street.

An alternative option open to Council is to spread the retail facilities of the town between the Town Centre and newer developing parts of Gunnedah. In any case it would appear appropriate that at least part of the increase in retail floor space which will be required in Gunnedah should be provided in South Gunnedah. This could be provided either:

* in the form of a basically convenience shopping neighbourhood centre of up to 3,000 square metres incorporating a supermarket and probably 8 to 10 specialty shops; or alternatively,

* by incorporating a regional centre of around 5,000 square metres and probably 20 specialty shops.

In the latter case, the growth of the existing Gunnedah centre could be confined to the core area and concentrate on infill development. The location of the regional centre closer to the population itself would certainly result in the location of a centre more convenient to the majority of the town's residents and overcome potential problems of travel barriers which will occur in the long run with the expected increase in rail traffic. It would also be comparatively easy for Council to identify and promote a site to developers in a newly developing area.

Against these advantages Council must weigh the detraction to the Town Centre which will occur by the 'trapping' of a large proportion of the new town population and probably some existing residents in the southern part of town by the new centre. The attraction of such a centre over the town centre will also undoubtedly be increased by the integration of the types of community facilities recommended to be located in South Gunnedah, within such a centre.

A solution to this quandary available to Council is the reservation of a site in the expansion areas of Gunnedah large enough for a regional centre, but to presently promote the establishment of a centre on that site only of neighbourhood size. It is therefore possible, should growth in the future warrant it, and should a major retailer not approach Council with a suitable site in the town centre in the meantime, to expand this centre to regional size at an appropriate time.

Commercial/office space is usually located inseparably from retail floor space. In Gunnedah particularly, a significant proportion of this is situated above retail premises. The conclusions in relation to directions of expansion are consequently similar. However the development of the new State Government Office Block in Abbott Street has somewhat swung the orientation of commercial space toward the eastern end of town. The existence of the two Council Chambers in this vicinity also increases its commercial emphasis.

The existing supply of office space in Gunnedah amounts to a provision of 13,940 square metres. Per head of population this represents a standard provision of just over 1 square metre compared with the normally accepted standard of 0.8 square metres. It would consequently appear that like retailing, more expansive than usual provision for commercial office space will need to be made. It can be expected that this provision will occur conjointly with retail development. The opportunity also exists for use of the Conadilly Street Council Chambers as a consolidated commercial centre. It consequently does not appear necessary to set additional land aside for this purpose over and above a generalised allowance of 2.7 square metres per head of population for retail and commercial development.

4.4 Extent and Impact of Industrial Growth

Gunnedah is presently served by a large industrial sector, which, as noted earlier, can be divided into general and service industries. There is presently some 22.43 hectares devoted to general industrial use in Gunnedah and 17.88 hectares to service industries. This results in an overall industrial land usage of some 40.31 hectares or 3.1 hectares per 1,000 head of population for the whole Shire. This figure should be compared with the land actually zoned for industrial use, which amounts to 76.3 hectares of 4(a) zoned land and 14 hectares of 4(b) zoned land, a total of 90.3 hectares, or 6.75 hectares per 1,000 people.

This is a relatively low figure in comparison with the generally adopted standard of approximately 8.0 hectares per 1,000 people. However, it would appear that a figure of this magnitude is rarely reached in country centres. Additionally, the abattoir, tannery and various coal industries are located outside the urban area surveyed but still provide significant industrial employment to the town. Hence, neither figure appears unacceptably low. When related only to the town population (in the circumstances probably a more reliable indicator), the amount of zoned land (8.4 hectares per 1,000 population) appears slightly above average, if not the amount of industrial land in use (4.4 hectares per 1,000 population).

Given these indicators it would seem that the current provision for industrial land use is roughly adequate for existing needs, but that additional use of available land may need to be promoted. This apparently has been a concern of Council as evidenced by the formation of an Industrial Promotion Committee charged with the responsibility of bringing new industry to the town.

It would appear that these attempts have been quite successful judging by the development of new pharmaceutical (rural related) and farm machinery industries. Undoubtedly the town's central role in the holding of the 'Ag-quip' exhibition has also been a significant factor in drawing new industry into Gunnedah, and expanding this 'service industry' sector greatly.

It appears in this regard that Gunnedah plays a rural service role far in excess of that generated by its hinterland. It is believed that this role is such that the trade area of Gunnedah in terms of rural machinery sales and service and the like cuts across several higher order centres, including Tamworth.

In view of this existing role and its even greater potential, it would appear appropriate that special provision is made for it. It was noted earlier that a relatively new industrial area has been developed adjacent to the Mullaley Road, but that in general the standard of development which has occurred has not been high. There are exceptions - including some rural service industries.

This leads to the possibility that a new industrial estate might be developed of a high standard which draws together and highlights the function of Gunnedah in this regard. While considerable land exists in

the already zoned Lloyd Road area, it would appear that many of the blocks are too small or topographically unsuitable for fairly large scale machinery display. The quality of much of the existing zoned land is also not conducive to the encouragement of often international firms.

Close scrutiny needs to be given to the standards of industrial development in the Shire and consideration needs to be given to the development of at least a new special purpose industrial area as well as the reservation of additional general industrial lands to meet future needs. Estimated needs by the year 2001 will be as follows:

Assumption	Existing	Stable	Low	Medium	High
Allowance: (ha)	1.25	15	26	36.6	47

The directions of this industrial growth require discussion. Extension of the existing industrial areas to the west would appear logical, within the broad boundary of the triangle formed by the railway line, the Mullaley Road and Blackjack Road. Direct extension is however, limited by the interception of a range of hills close to the existing industrial boundary. These hills are particularly visible and should not be marred by industrial development on or adjacent to them.

It would almost seem desirable that this range of hills should act as a barrier between existing industrial development and any new high standard industrial estate. If such a rural service estate was to be developed on the western side of this range it would also have the advantage of a permanent location close to the 'Ag-quip' site.

We believe that Council has the opportunity of purchasing a large area of land in this vicinity. Council development of this land would seem an ideal opportunity to ensure the type and quality of industry that is envisaged to be established in this area. While the available amount of land may be in excess of present and near future requirements, Council purchase of this land would ensure its reservation for this purpose when required, and ensure the provision of an adequate supply of industrial land to meet all potential needs. It would also ensure that the release and development of industrial land was able to be monitored and occur when needed.

The area of land recommended for industrial development also does not include relegation for any other uses which might suitably be located on industrial land in this location. Recreation facilities, particularly of a noisy type, or of a type only used at night, would normally be considered for inclusion in such areas. Given that the motor cycle track requires relocation out of a residential precinct but that teenagers do not wish it to be so far out of town that they cannot feasibly wheel their bikes to it, it would appear that this could be a suitable use of some such land at the present time. Given youth suggestions for facilities needed in Gunnedah, Council might also give consideration to the inclusion of a drive-in theatre in such an area. Scope may even exist to dually use a drive-in with industrial parking.

In any event it would appear that the purchase and use of this land for industry would be appropriate, and that west is the appropriate direction for industrial expansion of Gunnedah that will minimise the environmental effects of industry in the town. It would appear desirable that additional industrial expansion consequently be isolated in this area as much as possible. It is not, in particular, deemed desirable to extend industrial development 'any further' in the wedge between the Boggabri Road and the railway line. This area is not well linked to the main body of industrial land; its further lineal expansion is not considered desirable in planning terms, and generally, it is considered an inferior industrial location to other available industrial land.

To ensure this environmental isolation, it is suggested that it may be appropriate to initiate the reservation of a landcaped buffer zone on either side of the Mullaley Road from the existing industrial area to the Blackjack Road or as far as industry may eventually spread.

4.5 Pressure for Rural Residential Development

In many areas of NSW, considerable development pressures have been experienced for semi-rural lifestyles. Research undertaken by the Department of Environment and Planning suggests that demand for smaller rural holdings takes two forms:

* rural residential lots up to 2 hectares for predominantly residential purposes;

* rural small holdings capable of supporting some agricultural production with a size range between 4 and 10 hectares.

Actual demand however, would tend to cover a wide spectrum of sizes. In some areas of NSW, minimum rural subdivision provisions of planning schemes prevent subdivision of rural land into small lots. This is forcing some people to accept 40 hectare lots, often in excess of their requirements. The provision of zones in specific locations permitting rural residential subdivisions would prevent the uneconomic subdivision of agricultural lands, reduce the pressure for subdivision of rural lands, and enable the economic provision of infrastructure and community services and a more environmentally acceptable level of subdivision layout and design.

Land for such development needs to be provided in response to genuine demand. It is important therefore to assess present demand and supply of this form of development.

The existing supplies of rural residential land were ascertained in Section 3.3.2. The interest expressed in subdivision of the available land that has been shown over the past 6 months or so is indicative to some extent of the demand for this style of land. Being a rather well established rural community, it can be expected that demand for rural residential lots from retiring farmers and city dwellers alike would be quite strong. As well as the level of interest in subdivision, a further indication of demand can be obtained from analysing:

* land and house sale prices;

* attitudes of local estate agents on the state of the market.

An analysis of notices of sale of properties has been made in order to identify trends in price. The number of sales for a distribution of property sizes in the Shire is shown in Table 4.14.

Table 4.14: Analysis- Sales of Properties

Year	Size (ha) 0-2		2-5		5-10		10-20		20-50	
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
1979	-	-	-	-	2	3,000	3	2,100	6	700
1980	1	N.A.	2	3,400	4	2,100	4	3,400	5	1,100
1981	3	4,000	1	N.A.	7	4,000	4	3,640	7	1,560

It should be pointed out that very few of the sales shown here would have been in the rural residential zone. Table 4.14 represents small holding sales around the township of Gunnedah. Data before 1979 were unavailable. Sales in the 1-5 hectare category were very few, probably reflecting a lack of supply. Prices have increased significantly over time in all categories, which has been substantiated by discussions with local agents. While the number of sales is small, there is a definite increase which again supports the estate agents' belief that demand is increasing.

Discussions were held with a representative sample of estate agents in town to obtain more subjective but accurate impressions of the demand for rural residential land. Agents reported that enquiries for rural residential lots were strong and at some times even equal the number of weekly enquiries for normal residential lots. Demand is mainly from Gunnedah residents, with no clearly definable socio-economic growth predominating. At March 1982, agents reported that enquiries ran at an average of 3-4 per week, although this might be influenced by the proposed subdivision activity in the rural residential zone.

In the future, therefore it can be expected that demand for rural residential lots will come from the following sectors, all of which are expected to grow:

* People retiring from the land interested in retaining a limited interest in the land but at the same time being close to town.

* Town dwellers interested in upgrading and improving their living environment.

* New residents associated with mining developments, many of whom will be wealthy enough to afford a higher quality of residential amenity.

These people will demand a range of allotment sizes and it is felt that subdivision rules for zoned rural residential land should reflect this. Experience elsewhere in NSW, particularly along the coast, has shown a strong demand for smaller lots ranging from 1 to 2 acres in size. While there may be demand for larger lots for semi-rural purposes, there seem

to be advantages in having an average lot size of approximately 8,000 square metres. Anything larger would require a great deal of effort and capital expense in maintaining the land. Furthermore larger parcels of land - 5 to 10 hectares are generally not large enough for viable farming unless on extremely productive land because it is not large enough to carry stock and provide a return to cover the necessary capital and operating costs of running such an enterprise (small tractor, stock ramps, etc.).

Thus, it is recommended that subdivision of land zoned rural residential (Rural 1(c) zones) should be permitted up to an average lot size of 8,000 square metres with a minimum lot size of 4,000 square metres. All lots over 16,000 square metres would be excluded from the averaging process.

4.6 Identification and Preservation of Historic Features

4.6.1 Introduction

Under the Heritage Act 1977, environmental heritage means:

> " . . . those buildings, works, relics or places of historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance for the State."

No comprehensive investigation of the environmental heritage of Gunnedah Shire has ever been undertaken. However, certain buildings and sites have been listed by the National Trust and the Australian Heritage Commission, as indicated in the following schedules. In addition to these items, a number of buuildings and sites have been identified as worthy of conservation (and further investigation by the National Trust) as a result of fieldwork and discussions with local historians.

The National Trust has 'recorded' a number of buildings and individual sites within the Shire. Until recently, the National Trust has utilised a two-tiered classification system under which buildings or sites were listed as either 'classified' or 'recorded'. However, it has replaced this system with a single 'classified' listing. Consequently any items previously 'recorded' are to be classified by the Trust as soon as practicable, to establish whether or not they should be upgraded to the new classification or be removed from the Register. However, to date the 'recorded' sites in the Gunnedah Study Area have not undergone such re-assessment.

4.6.2 Historic Buildings

The following abbreviations are used as a key to classification of the following schedules of buildings:

AHC	=	Listed by the Australian Heritage Commission
R	=	Registered by the National Trust
PWD	=	Public Works Department
LI	=	Local Information

*	Christ Church Anglican Church, Barber Street, corner Elgin Street	R
*	Carinya, 113 Barber Street, C.1908	R
*	Courthouse, Conadilly Street, 1879	AHC R PWD
*	Post Office, Conadilly Street (soon to be demolished)	R
*	'Trelawney', 329 Conadilly Street, including fence	R

In addition to these structures, there are a number of other historic buildings in the Study Area which form part of the heritage and charm of Gunnedah, but which, as yet, have not been listed by the National Trust or the Australian Heritage Commission. These include:

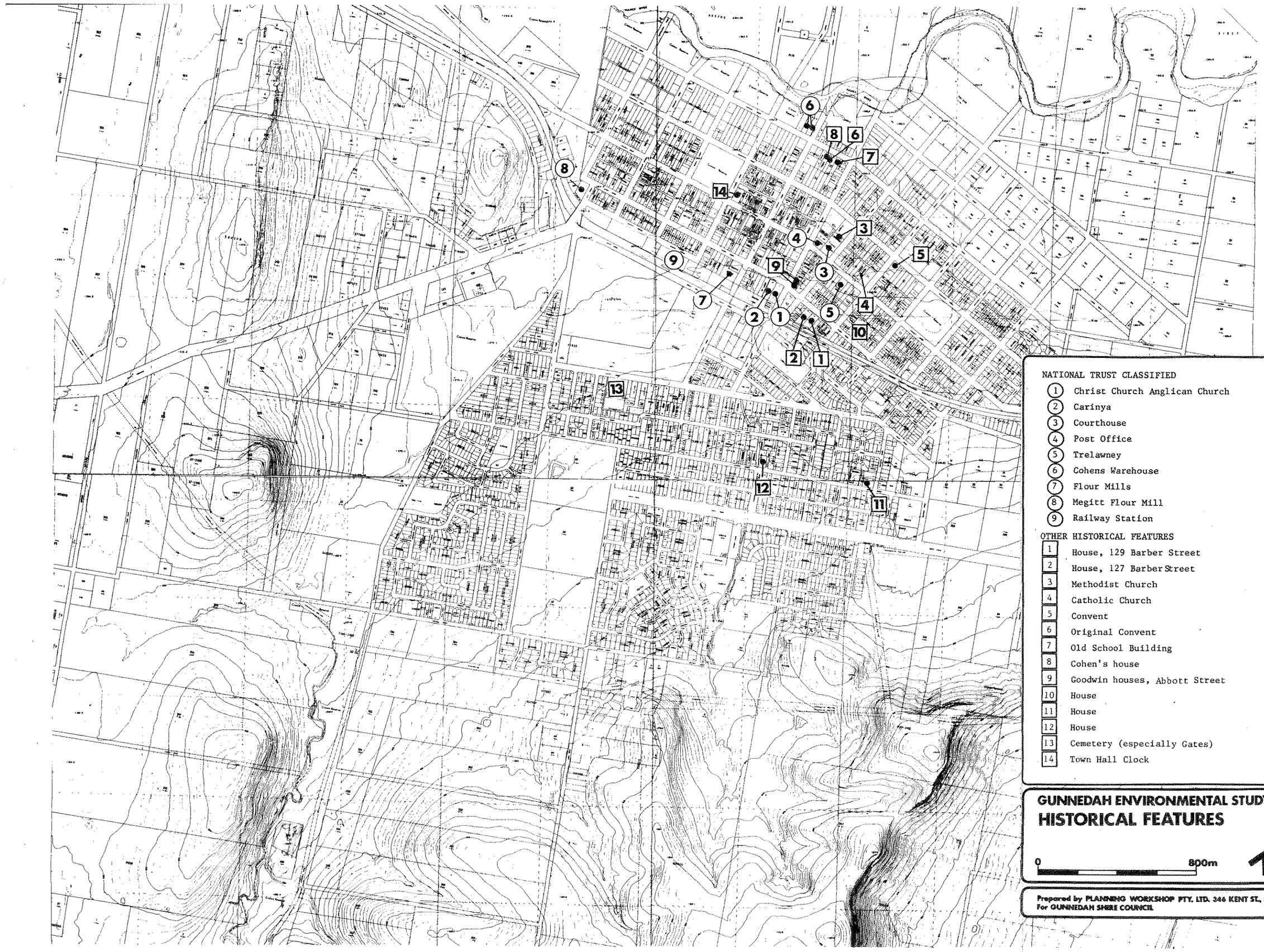
* House, 129 Barber Street, 1905.
* House, 127 Barber Street.
* Original Methodist Church, Abbott Street.
* Original Catholic Church, Conadilly Street.
* Convent building, Bloomfield Street.
* Original Convent Building, Maitland Street.
* Old School Building, Elgin Street.
* Two storey house in Maitland Street, formerly owned by George Cohen.
* Group of three brick houses, Abbott Street, between Little Barber and Barber Streets - built by Goodwin, c.1910.
* Timber house, corner of Little Barber Street and Henry Street.
* Timber house, corner of George Street and Porcupine Street.
* Stone house, corner of George Street and Bickett Street.

4.6.3 Industrial Archaeology

*	Affleck Meatworks, formerly Cohen's Warehouse, Maitland Street	R LI
*	Namoi Flour Mills, Marquis Street	R LI
*	Meggitt Ltd Flour Mill, formerly Brunton's Flour Mill, New Street	R LI
*	Railway Station, New Street	AHC R LI

4.6.4 Other Heritage Items

In addition to the above sites, it is considered that the General Cemetery in Hunter Street (including its gates) and the Town Hall Clock are significant items of local heritage.



NATIONAL TRUST CLASSIFIED

1. Christ Church Anglican Church
2. Carinya
3. Courthouse
4. Post Office
5. Trelawney
6. Cohens Warehouse
7. Flour Mills
8. Megitt Flour Mill
9. Railway Station

OTHER HISTORICAL FEATURES

1. House, 129 Barber Street
2. House, 127 Barber Street
3. Methodist Church
4. Catholic Church
5. Convent
6. Original Convent
7. Old School Building
8. Cohen's house
9. Goodwin houses, Abbott Street
10. House
11. House
12. House
13. Cemetery (especially Gates)
14. Town Hall Clock

GUNNEDAH ENVIRONMENTAL STUDY
HISTORICAL FEATURES 15

0 800m

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4.6.5 Townscapes

There are no townscapes or areas of conservation significance listed for Gunnedah Shire. Nevertheless, two groups of three buildings form remnants of early streetscapes which have since been modified on either side:

* Group of three brick houses, Abbott Street, between Little Barber and Barber Streets.

* Original Convent Maitland Street, two storey house formerly owned by George Cohen and the Affleck Meatworks.

In addition, the Courthouse and Post Office in Conadilly Street form an early streetscape remnant of significance.

Historic buildings and sites considered to be worthy of preservation can be protected by the Local Environmental Plan. The NSW Heritage Council has provided guidelines for inclusion in the Plan.

4.6.6 Conclusions

* This Study has listed 19 historic buildings, 4 industrial archaeological sites, a cemetery and the Town Hall clock, as well as three streetscapes.

* Of these, 5 historic buildings and 4 industrial archaeological sites are recorded by the National Trust, pending re-assessment. Only the Courthouse in Conadilly Street and the Railway Station are listed by the Australian Heritage Commission on the National Estate.

Further protection of the features not listed or recorded in the above fashion would appear warranted in order to conserve the heritage of the town.

4.7 Impact of Flooding

Government Policy in Relation to Flood Affected Lands

The NSW Government has recently adopted a policy of restricting or prohibiting the development of flood prone land. This policy, as expressed in the Section 117 Direction 7(i)(a) issued by the Minister of the Department of Environment and Planning on 27th August 1980, states that:

> "The following general provisions in deemed instruments embody principles of State and Regional significance and shall be maintained in draft Local Environmental Plans:
>
> (1) Provisions for the protection of, or development controls relating to:
>
> (a) flood liable land;
>
> (b) water catchment areas."

The only provision within the Local Environmental Plan No. 1 - Shire of Gunnedah relating to flood liable land and water catchment areas is:

> "8. In respect of any application for approval to erect a dwelling-house or a residential building, the Council shall take into consideration the likelihood of floodwaters entering any such building and may attach conditions to any such approval requiring the floor to be erected at a height sufficient, in its opinion, to obviate the frequent flooding of the building."

The above Directive also requires that Draft Local Environmental Plans be consistent with certain Planning and Environment Commission Circulars (see Appendix B). The former Planning and Environment Commission's Circular No. 15 'Development of Flood-Prone Lands' laid down those matters which Councils were required to consider when determining applications for development on flood prone land.

On 15th February 1982, Circular No. 31 was distributed to all City, Municipal and Shire Councils. The circular deals with development on flood prone land and extends earlier Circulars 15 and 22.

Paragraph 4 of Circular 31 states:

> "The policy as set out in the circulars is mandatory for all Government or Government assisted works, except where flood free sites are neither available nor appropriate and it is strong advice for local government and for private development. These circulars are among those included in the Minister's Direction of August 27th 1980 under Section 117(2) of the Environmental Planning and Assessment Act and are to be followed by Councils in the preparation of Local Environmental Plans."

The main elements of the Circular are as follows:

> "(a) Essentially the policy promotes the removal of urban development from **flood prone areas** where this is practicable and appropriate, and aims to clear **floodways** of unnecessary obstructions to the free flow of flood water.
>
> (b) Flood prone lands are defined as "Those areas covered by a 1 in 100 year flood" unless otherwise determined by the Water Resources Commission.
>
> (c) Floodways are defined as "Those areas covered by a 1 in 20 year flood" unless otherwise determined as above.
>
> (d) "It is essential that all development involving the erection of buildings and the carrying out of works on the subdivision of land, within flood prone areas is subject to the Council's consent."

(e) The Circular recognises that to zone land as flood prone will be likely to have the following consequences:

(i) difficulty and social disruption to the owners and occupiers of land.

(ii) Residents of flood prone land may be likely to resist any suggestions of relocating.

(iii) Owners may find they are unable to use land for the purpose for which it was purchased.

(iv) Property values may fall.

(v) Owners will have difficulty in obtaining insurance against flood damage.

(vi) Legislation does not make provision for the payment of compensation arising out of zoning restrictions except in certain circumstances.

(vii) Disbenefits in short term but beneficial in long term in alleviating social disruption, distress and financial loss.

(f) Fundamental intention of policy is the avoidance of loss of life, damage to property and potential worsening of flood conditions.

(g) No habitations, capital intensive land uses or structures likely to impede flood flow should be permitted where dangerous flooding occurs. Floors of buildings on flood prone land should be above flood level."

The provisions of the proposed Local Environmental Plan will need to incorporate those matters covered by the Department of Environment and Planning Circular No. 31, and the (former) Planning and Environment Commission Circulars 15 and 22.

In general it would appear that the policy to be adopted should be that development should be prohibited on flood prone land, as delineated by the 1 in 100 year floodplain, unless otherwise determined by the Water Resources Commission. It is our opinion, then, that Council should seek Water Resources Commission concurrence on any application in a floodzone. It would be expected that concurrence would not be given if the proposed development was located in a floodway, as determined by Water Resources Commission. If the Water Resources Commission does concur to an application then Council would have the options of approving such an application, rejecting such an application (in which case it may be determined by the Court) or approving it with conditions.

Council may wish to continue the current practice of approving such a development with a condition attached to ensure that the floor level is built up to a sufficient height to raise it above flood level. This may result in designs which are unsatisfactory to Council and may subsequently cause Council to refuse the application on that ground.

The above would be the approach recommended to be adopted by Council in handling applications in floodplains. It appears to ensure that Council has due regard to any damage that flooding might cause on development or vice versa, and transfers some responsibility for determination to a body better able to determine it.

Even so, it appears that if Council approves of development within a known floodplain area which is subsequently damaged by flood, it still may be liable to legal action for damages on the basis that it was negligent in giving the approval.

We believe that some Councils have received legal advice on a method by which they can ensure the avoidance of legal liability. We do not have access to that information, but suggest that Council should seek legal advice from the appropriate counsel who are versed in this matter.

The Government's policy for flood prone areas also includes the promotion of removal of urban development from flood prone areas where practicable and appropriate, and the clearing of floodways for NSW rivers of unnecessary obstructions to the free flow of flood water. Given the extent of the town which has been developed on flood liable land in Gunnedah, it does not appear practical to undertake substantial removal of urban development from flood prone areas. However Council should ensure that unnecessary obstructions are kept clear of floodways, and also abide by the directive that no Government, semi-Government or Government assisted or subsidised work should be located within a floodway, even where land has already been acquired not built on or where redevelopment of a site is involved. Further, where there is a floodfree alternative location for a Government or semi-Government or Government assisted proposal, this alternative should be adopted.

4.8 Simplification of Existing Planning Controls

Gunnedah is typical of most areas of NSW in that development control is administered by means of a Planning Scheme Ordinance and Map together with other more detailed controls within codes adopted by resolution of Council. In addition, the Local Government Act still is in the forefront of subdivision control and Ordinance 70 is still of critical importance in building control. Many other Acts and Ordinances also still have some bearing upon planning matters such as Schedule 7 to the Local Government Act, which prevails over planning controls at the building application stage.

The present Planning Scheme Ordinance is divided into seven sections as follows:

Part I	-	Preliminary
Part II	-	Reservation of Certain Land

Part III	-	Restrictions on Building and Use of Land
Part IV	-	Existing Buildings, Existing Works and Existing Use of Land
Part V	-	Consents
Part VI	-	Special Provisions
Part VII	-	General

A recently exhibited Draft Local Environmental Plan, which Planning Workshop Pty Ltd had a substantial hand in preparing, embraces only three sections in 24 clauses. The current Gunnedah Scheme has about 50 clauses. Admittedly the Draft Local Environmental Plan embraces the Environmental Planning and Assessment Model Provisions, 1980. Nevertheless, the planning controls are substantially simplified. The principal variations are these:

* There are no special clauses dealing with the reservation of land for public purposes. The need for special reservations is not necessary because any reservations are simply placed within an open space zone or other zone.

* The majority of special uses, such as schools and hospitals are places within the zone within which they are sites. For example a school or a hospital is a permissible use within a residential zone. The principle used therefore is for particular uses not to be shown in a special uses zone unless there is a sound reason for it.

* There is a considerable expansion of the uses which are permissible subject to conditions. This provision ensures a more simple system of managing development control but requires a number of development control codes to provide the performance standards for the simplified system.

Consequently, we suggest that Council consider a review of the following:

* Residential Flat Code;

* Subdivision Code;

* Industrial Code; and

* Parking Code.

If these codes are reviewed and consistently applied, the requirements relating to individual applications will be generally known beforehand. It must be said, however, that the application of a code does not remove the responsibility from Council of ensuring that the requirements of the Environmental Planning and Assessment Act, 1979, are satisfied.

We propose that the above simplifying steps should be incorporated into the new Gunnedah Local Environmental Plan.

4.9 Adequacy of Existing Traffic and Parking Situation

4.9.1 Introduction

Background

Gunnedah is served by a town centre which is traversed by Conadilly Street. This street forms part of the classified main road (Trunk Road 72). The existing conflicts, within the centre, between traffic travelling through the town, particularly heavy vehicles, and parked vehicles has prompted Council to investigate alternatives to redirect this traffic away from the town centre. It was also felt that in conjunction with the development of a Local Environmental Plan, a broad assessment would need to be made of the road system within the township to identify any existing or potential land use/transport conflicts and to make recommendations for a road system that adequately serves the needs of industry, residents and through traffic.

Scope of Traffic and Parking Section

This section of the Study covers the following areas of investigations:

* Data collection and surveys.
* Evaluation of the existing traffic and travel patterns.
* Capacity analysis of existing road system.
* Identification and evaluation of alternative routes for through traffic, particularly heavy vehicles.
* Broad assessment of existing parking provisions within the town centre.

Study Area

The Study Area for the purpose of the traffic and travel pattern evaluation is generally bounded by the Namoi River to the north, the saleyards to the west, South Street and the railway line to the south and Boundary Road to the east as illustrated in Map 16.

A broad assessment of the parking situation was carried out within the town centre in the area shown in Map 16.

4.9.2 Data Collection and Field Surveys

Inventory of Existing Street System

* Street System

The Study Area, illustrated in Map 16, is served by two classified main roads, namely Trunk Road 72 along Conadilly Street and State Highway No. 11 along Henry Street, Abbott Street and South Street.

TRAFFIC STUDY AREA BOUNDARY

PARKING STUDY AREA BOUNDARY

CORDON STATIONS FOR NUMBER PLATE SURVEY AND CLASSIFICATION COUNTS 1-6

CLASSIFICATION COUNTS ONLY 7-8

GUNNEDAH ENVIRONMENTAL STUDY

STUDY AREAS

16

0 500m

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Conadilly Street has a six-lane undivided carriageway within the Study Area, narrowing to two lanes east of Carroll Street and west of Warrabungle Street.

Henry Street has a six-lane undivided carriageway fully kerbed and guttered, between Barber and Maitland Streets, reducing to a two-lane carriageway north of Maitland Street. South Street, is not kerbed and guttered, and has a two-lane paved carriageway with shoulders on both sides.

Bloomfield Street, presently sign-posted as a Heavy Vehicle alternative route, has a six-lane undivided carriageway for most of its length reducing to only two paved lanes between Tempest and Warrabungle Streets. Maitland Street has a two-lane paved carriageway. The number of traffic lanes along these routes and all other streets within the Study Area are illustrated in Map 17.

The majority of streets within the Study Area have six-lane undivided carriageways. However trees planted in kerbside lanes of certain streets have effectively reduced the carriageway to four travel lanes only.

* Traffic Control

'Give Way' signs have been erected at all side streets of both classified routes, i.e. State Highway No. 11 and Trunk Road 72. 'Give Way' signs have also been installed at other selected locations where traffic control was considered necessary.

One set of traffic signals controls the intersection of Conadilly Street with Marquis Street. The locations of these traffic control devices are illustrated in Map 17.

Five pedestrian crossings are also available in Bloomfield Street (east of Henry Street), in Henry Street (south of Bloomfield Street), in Conadilly Street (west of Elgin Street) in Elgin Street (north of Conadilly Street) and in Conadilly Street (east of Chandos Street).

Annual Average Daily Traffic (AADT) Volumes

Annual average daily traffic (AADT) volumes published by the Department of Main Roads for the years 1972, 1976 and 1980 have been collected for the Study Area. These volumes, together with annual average growth rates for the periods 1972-1976, 1976-1980 and 1972-1980, are included in Table 4.15.

Traffic volumes along the major routes within the Study Area have increased at an average marginal growth rate of 0.6 per cent per annum between 1972 and 1980.

The highest increase in traffic has been experienced along Conadilly Street, east of Henry Street, where traffic volumes have increased at an annual rate of about 8 per cent between 1976 and 1980.

Table 4.15: Annual Average Daily Traffic (AADT) Volumes and Annual Growth Rate

	Year			Annual Growth Rate (%)		
	1972	1976	1980	72-76	76-80	72-80
Abbott Street (SH 11), south of Conadilly Street	4,490	4,510	4,290	0.1	-0.1	-0.6
Abbott Street (SH 11) on railway overhead bridge	6,720	8,090	6,810	5.1	-4.0	0.2
Conadilly Street (SH 11) west of Henry Street	4,940	5,620	5,190	3.4	-1.9	0.6
Conadilly Street (TR 72) east of Henry Street	2,730	2,710	3,570	-0.2	7.9	3.8
Conadilly Street (TR 72) west of Abbott Street	6,370	5,640	6,310	-2.9	3.0	-0.1
Narrabri Road (TR 72) west of Warrabungle Street	3,270	3,120	3,020	-1.1	-0.8	-1.0
Henry Street (SH 11) north of Talibah Street	1,810	2,420	2,500	8.4	0.8	4.8
Henry Street (SH 11) north of Conadilly Street	2,400	2,950	2,590	5.7	-3.1	1.0
Marquis Street at level crossing *	N/A	4,490	4,780	-	1.6	-
TOTAL*	32,730	35,060	34,280	1.8	-0.6	0.6

* Not including Marquis Street
Source: Department of Main Roads

Classification Counts

The number of vehicles for each direction of travel were counted at 8 locations. These counts were carried out on Monday 3rd May, 1982, between 8 am and 8 pm at hourly intervals. Vehicles were further classified as follows:

* Light vehicles including cars, station wagons, panel vans and two axle commercial vehicles.

* Rigid commercial vehicles with three or more axles.

* Semi-trailers.

6 LANE CARRIAGEWAY
4 LANE CARRIAGEWAY
3 LANE CARRIAGEWAY
2 LANE CARRIAGEWAY
TREES IN KERBSIDE LANE
TRAFFIC SIGNALS
GIVE-WAY SIGN
PEDESTRIAN CROSSING

GUNNEDAH ENVIRONMENTAL STUDY
STREETS INVENTORY & TRAFFIC CONTROL
17

0 500m

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The results of this survey for each location are detailed in Tables A1 to A8 of Appendix A and summarised in Table 4.16.

On average, rigid commercial vehicles with three or more axles and semi-trailers accounted for 6.8 and 3.3 per cent respectively of all vehicles travelling through the eight locations.

The highest percentage of semi-trailers occurred in Curlewis Road, where they accounted for about 8 per cent of all vehicular traffic. The highest number of semi-trailers (170 vehicles) during the 12 hour period were recorded in Conadilly Street, west of Warrabungle Street.

Intersection Traffic Movement Counts

Traffic movement counts carried out by the Department of Main Roads in 1976 at three intersections were obtained. In view of the marginal increase in traffic since 1976 (refer to Table 4.1), these counts were considered suitable for further analysis.

Analysis of the results of these counts showed that each of these intersections were at their peak during the afternoon.

The counts were supplemented by a count at the intersection of Conadilly Street and Marquis Street carried out on Monday 3rd May 1982 during the period 3 pm to 5.30 pm.

Traffic volumes during the afternoon peak hour at each of these intersections are illustrated in Map 18, together with the time during which it occurs.

Number Plate Survey

A number plate survey was undertaken during the afternoon period of 1.30 pm to 5.30 pm to determine the number of vehicles entering and leaving the Study Area illustrated in Map 16, their origin, destination and the path they followed. The registration number plates of all semi-trailers and of about 20 per cent of all other vehicles (only those with plates ending in '0' and '1') were recorded at the five external cordon stations numbered 1 to 5 in Map 16.

This survey was carried out in conjunction with the classification count survey. To better determine the routes that vehicles used, number plates and total volumes were also recorded at one internal station, namely station 6 in Bloomfield Street.

The total number of plates recorded, total volume counts and their ratio at each external and internal stations are summarised in Appendix B. The total number plates recorded during the four hour period amounted to about 18 per cent of the total volumes. This is considered a satisfactory sample. The travel pattern obtained from the sample of number plates recorded was then assumed to represent the actual trip pattern for the afternoon period.

A detailed description of the origins, destinations and path of through traffic is given in Section 4.9.3.

Table 4.16: Classification Counts and Level of Service

Location	8 am to 8 pm (Two Way Volumes)				Peak Hourly Volumes (One-Way)					Number of Effective Traffic Lanes	Level of Service
	Light Vehicles	3 axles & over	Semi-Trailers	Total	Time of Peak	Light Vehicles	3 axles & over	Semi-Trailers	Total		
HENRY ST., N of Talibah St.	1,689 90.3%	93 5.0%	88 4.7%	1,870 100%	9 to 10 am	110 90.9%	6 5.0%	5 4.1%	121 100%	2	A
CONADILLY ST., W of Warrabungle St.	1,951 79.6%	331 13.5%	170 6.9%	2,452 100%	4 to 5 pm	124 82.1%	18 11.9%	9 6.0%	151 100%	2	A
NEW ST., N of South St.	3,516 91.9%	259 6.8%	49 1.3%	3,824 100%	4 to 5 pm	235 90.7%	22 8.5%	2 0.8%	259 100%	2	A
SOUTH ST., E of View St.	2,096 94.1%	95 4.3%	35 1.6%	2,226 100%	4 to 5 pm	142 97.3%	4 2.7%	- -	146 100%	2	A
CURLEWIS RD., E of Boundary Rd.	966 89.5%	22 2.1%	91 8.4%	1,079 100%	1 to 2 pm	69 94.5%	1 1.4%	3 4.1%	73 100%	2	A
BLOOMFIELD ST., E of Marquis St.	1,945 86.8%	228 10.2%	68 3.0%	2,241 100%	8 to 9 am	104 83.2%	16 12.8%	5 4.0%	125 100%	6	A
CHANDOS ST., N of Maitland St.	586 82.2%	100 14.0%	27 3.8%	713 100%	8 to 9 am	51 87.9%	6 10.4%	1 1.7%	58 100%	2	A
CONADILLY ST., W of Marquis St.	4,941 93.7%	214 4.1%	119 2.2%	5,274 100%	3 to 4 pm	301 93.2%	10 3.1%	12 3.7%	323 100%	2	A
TOTAL	17,690 89.9%	1,342 6.8%	647 3.3%	19,679 100%							

Parking Surveys

A parking inventory and utilisation surveys were carried out so that a broad assessment of existing parking conditions within the town centre could be made. A description of these surveys is included in Section 4.9.4, together with an evaluation of existing parking facilities.

4.9.3 Traffic and Travel Patterns

Capacity of Existing Street System

An evaluation of the capacity of the major traffic counts and critical intersections was carried out to identify any deficiencies in the road system.

* Carriageway Capacity and Level of Service

Level of Service is defined by NAASRA (Reference 1) as a "qualitative measure of the effects of a number of features, which include speed and travel time, traffic interruptions, freedom to manoeuvre, safety, driving comfort and convenience and operating costs". Levels of Service are designated from A to F (Reference 1) from best (free flow conditions) to worst (forced flow with stop/start operation, long queues and delays).

A Service Volume is defined (Reference 1) as "the maximum number of vehicles that can pass over a given section of roadway in one direction during one hour while operating conditions are maintained at a specified level of service".

One-way hourly volumes for interrupted traffic flow at different Levels of Service were developed (Reference 2) from the NAASRA document. Relevant information is summarised in Table 4.17.

Table 4.17: Traffic Volumes for Urban Roads at Different Levels of Service (one-way hourly volumes)

Type of Carriageway	Level of Service					
	A	B	C	D	E	F
2 lane undivided	550	600	700	750	900	Forced Flows
4 lane undivided	900	1,000	1,100	1,300	1,500	
6 lane undivided	1,450	1,550	1,800	2,050	2,400	

The number of effective traffic lanes, peak hourly one-way volumes and existing operating Level of Service along selected routes are summarised in Table 4.16.

All streets within the Study Area operate at Level of Service A with hourly volumes well below the appropriate threshold figures of 550, 900 and 1,450 vehicles per hour for 2 lane, 4 lane and 6 lane undivided carriageways respectively.

* Capacity of Critical Intersections

Based on the peak hour volumes shown in Map 18, a capacity analysis of the four intersections was carried out.

The operation of these intersections have been assessed based on their degree of saturation 'X' which is a measure of Level of Service. The degree of saturation of an intersection is defined as the largest movement degree of saturation which is the ratio of arrival flow to capacity for a movement or approach. It is given by:

$$X = Y * \frac{C}{(C-L)}$$ where

Y = Ratio of arrival flow to saturation flow for intersections
C = Cycle length (secs)
L = loss time (sum of inter-green time between each phase of a cycle; i.e. amber and all red times)

For unsignalised intersections the following levels of operation apply:

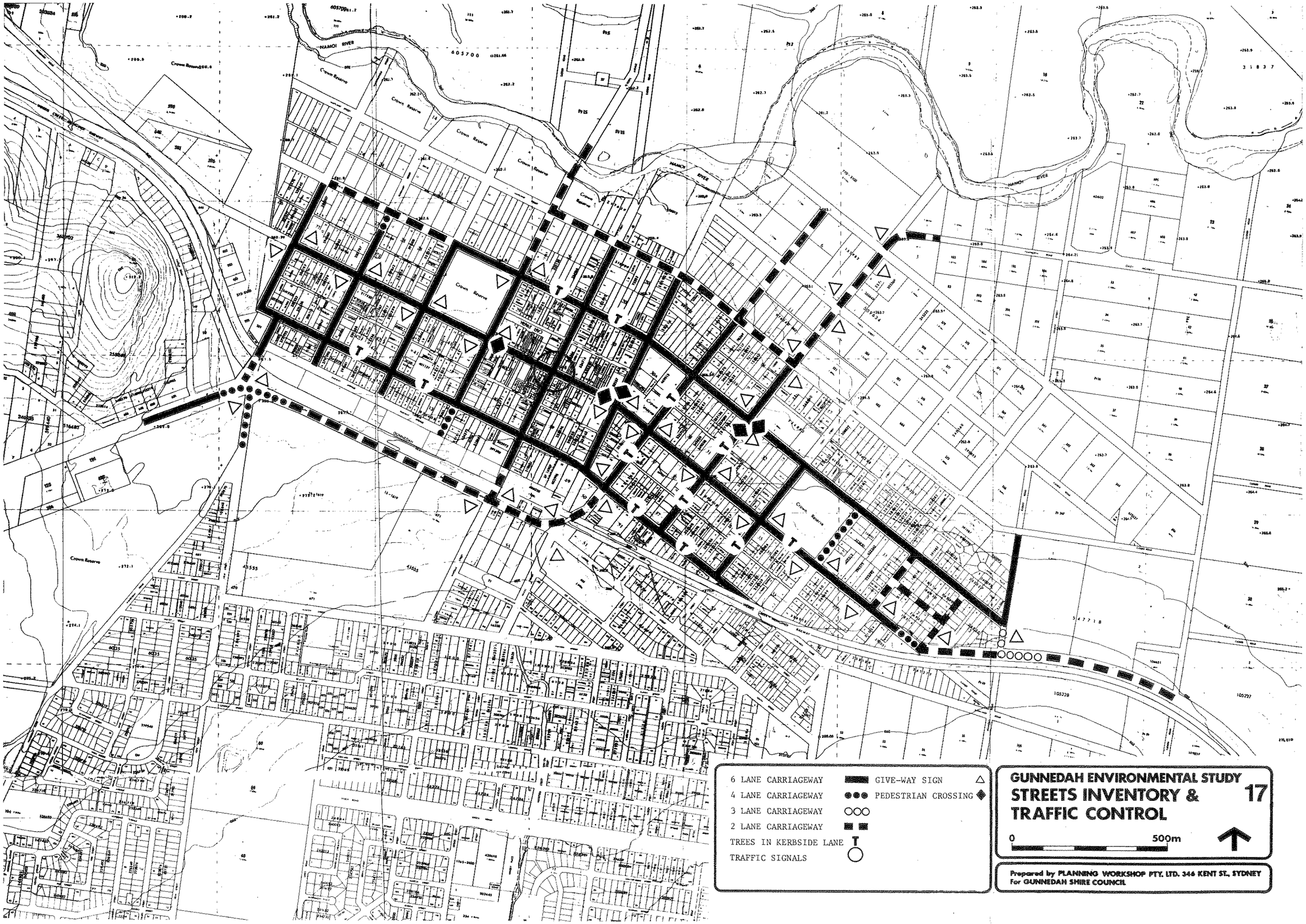
	'X' Value
Very good operation	Less than 0.60
Satisfactory	0.60 to 0.65
Traffic signals may be required	Over 0.65

For signalised intersections the following criteria for evaluation of operation are suggested:

	'X' Value
Very good operation	0.65 to 0.85
Satisfactory	0.85 to 0.90
Fair but manageable	0.90 to 0.95
Bad, extra capacity required	Over 0.95

The degree of saturation of the four intersections are included in Table 4.18.

The four intersections under consideration have very good operating characteristics.


NAMOI RIVER
Crown Reserve
GUNNEDAH
6 LANE CARRIAGEWAY
4 LANE CARRIAGEWAY
3 LANE CARRIAGEWAY
2 LANE CARRIAGEWAY
TREES IN KERBSIDE LANE
TRAFFIC SIGNALS
GIVE-WAY SIGN
PEDESTRIAN CROSSING
GUNNEDAH ENVIRONMENTAL STUDY
STREETS INVENTORY & TRAFFIC CONTROL
17
0
500m
Prepared by PLANNING WORKSHOP PTY. LTD. 346 KENT ST., SYDNEY
For GUNNEDAH SHIRE COUNCIL

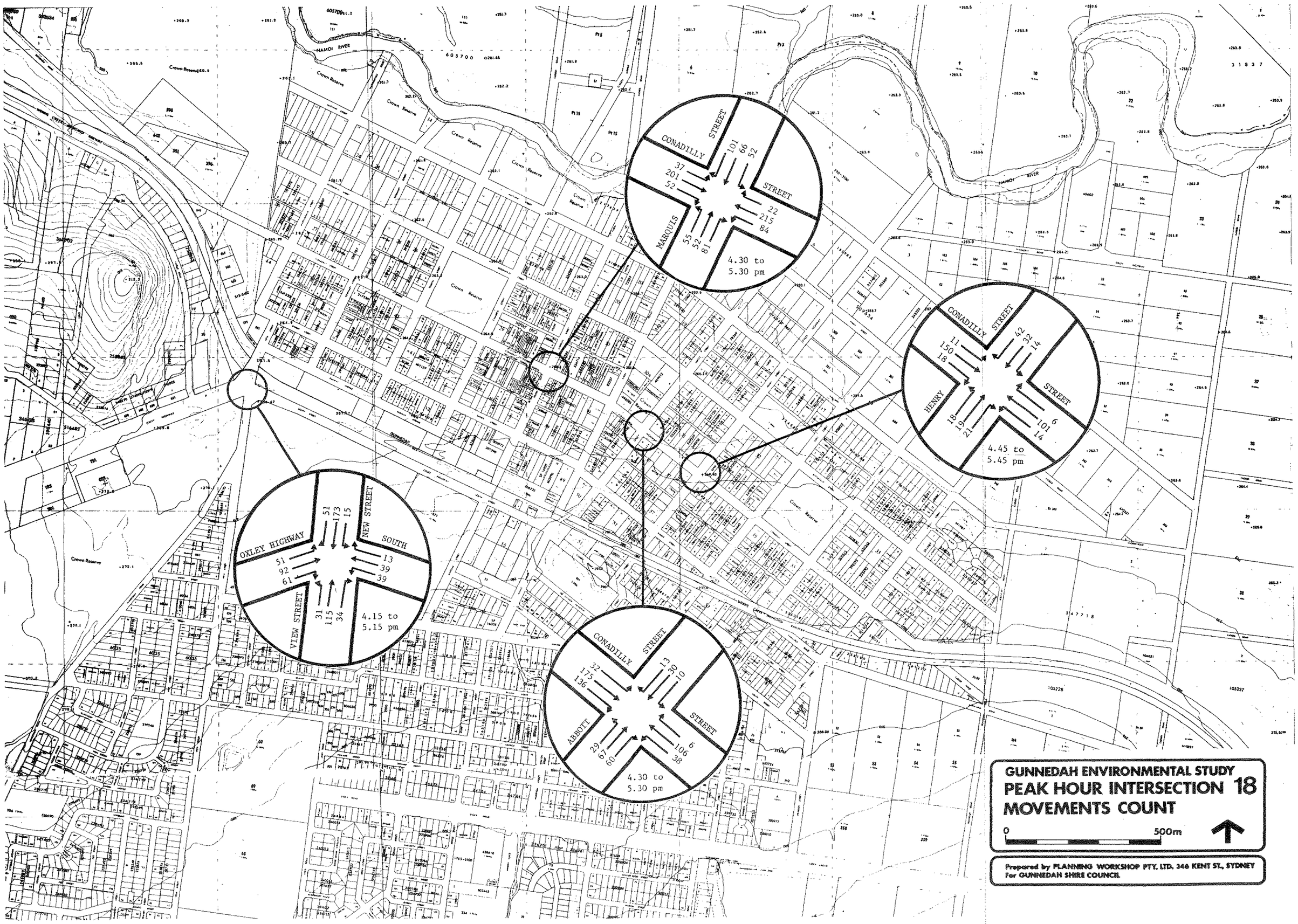

NAMOI RIVER
CONADILLY STREET
101
66
52
37
201
52
MARQUIS STREET
22
215
84
55
52
81
4.30 to
5.30 pm
CONADILLY STREET
11
150
18
42
32
14
HENRY STREET
18
19
21
101
14
6
4.45 to
5.45 pm
OXLEY HIGHWAY
NEW STREET SOUTH
51
92
61
51
173
15
13
39
39
VIEW STREET
31
115
34
4.15 to
5.15 pm
CONADILLY STREET
32
175
136
13
30
10
ABBOTT STREET
29
67
60
106
38
4.30 to
5.30 pm
GUNNEDAH ENVIRONMENTAL STUDY
PEAK HOUR INTERSECTION MOVEMENTS COUNT 18
0
500m
Prepared by PLANNING WORKSHOP PTY. LTD. 346 KENT ST., SYDNEY
For GUNNEDAH SHIRE COUNCIL

Table 4.18: Existing Operating Characteristics of Critical Intersections

Intersections	Traffic Control	'X' Value
Conadilly St./Marquis St.	Signal control	0.20 *
Conadilly St./Abbott St.	Give Way signs in Abbott St.	0.26 **
Conadilly St./Henry St.	Give Way sign in Henry St	0.17 **
Oxley Hwy./South St./ View St./New St.	Give Way in View and New Streets.	0.33 **

* Assuming cycle length of 60 secs.
** Assuming cycle length of 30 secs.

Origin/Destination Analysis of Traffic Movements

* Development of Trip Table

A calibrated trip table for the four hour afternoon period (1.30 pm to 5.30 pm) has been developed following a manual matching of the number plates. This trip table is included in detail as Appendix 5C and summarised in Table 4.19.

Table 4.19: Summarised Origin/Destination Trip Table 1.30 - 5.30 pm

Destination	External Cordon		Study Area		Total		
Origin	LR	ST	LR	ST	LR	ST	Total
External Cordon Stations	350	71	1,937	13	2,287	84	2,371
Study Area	1,936	31	-	-	1,936	31	1,967
TOTAL	2,286	102	1,937	13	4,223	115	4,338

LR Light and Rigid Heavy Vehicles
ST Semi-trailers

There are basically three types of trips, namely through trips, external trips and internal trips which are defined as follows:

* Through trips are trips between external cordon stations (Stations 1 to 5, 7) travelling, without stopping, through the Study Area (illustrated in Figure 1).

* External trips are trips having either an origin or destination within the Study Area.

* Internal trips are trips having both an origin and a destination within the Study Area.

These trips have been determined as follows:

* Through Trips: Through trips were determined from the number plate survey and calibrated to represent the traffic situation during the four hour period of survey.

* External Trips: External trips were determined as being the difference between the total traffic volumes at the external cordon station and the through traffic component at these stations.

* Internal Trips: The objective of this study has been to determine the volume and route of traffic travelling through the town centre. Internal trips have therefore not been determined as such, as this would require a major study which is not within the scope of this Environmental Study.

Analysis of Through Traffic

A total of about 4,350 vehicle through and external trips took place during the afternoon four hour period of 1.30 pm to 5.30 pm. Of these, about 10 per cent were through trips. A closer examination has, however, shown that about 62 per cent of semi-trailer trips were through trips, with the remaining 38 per cent having either an origin (27 per cent) or a destination (11 per cent) within the Study Area. By comparison, only 8 per cent of all other vehicle trips were through traffic, and 92 per cent of trips having either an origin (46 per cent) or a destination (46 per cent) within the Study Area.

Based on the calibrated trips table in Appendix 5C, an evaluation of the number of trips and routes used by through traffic within the Study Area has been made. The path of all through trips passing through the internal stations (No. 6 in Bloomfield Street) could thus be determined; the paths of most other trips could be inferred. As an example, the total number of vehicle trips between Curlewis Road (Station 5) and Conadilly Street (Station 2) is 49 trips including 16 semi-trailers. Seventeen of these vehicles (including 6 semi-trailers) have travelled along Boundary Road, Bloomfield Street (Station 6), Warrabungle Street and Conadilly Street; by inference, 33 vehicles (including 11 semi-trailers) have travelled along Conadilly Street, through the town centre.

Based on the trip table included in Appendix C, the major streets used by traffic travelling through the Study Area were determined and are listed in Table 4.20, together with the two-way, four hourly traffic volumes, estimated through traffic and percentage of through traffic.

Table 4.20: Through Traffic 1.30 to 5.30 pm

Location	Two-Way Volumes			Through Traffic			% Through Traffic		
	LR	ST	Total	LR	ST	Total	LR	ST	Total
Henry St., N of Talibah St.	613	35	648	184	29	213	30.0	82.9	32.9
Conadilly St., W of Warrabungle St.	939	74	1,013	219	53	272	23.3	71.6	26.9
New St. N of South St.	1,559	17	1,576	87	9	96	5.6	52.9	6.1
South St., E of View St.	850	9	859	62	6	68	7.3	66.7	7.9
Curlewis Rd., E of Boundary Rd.	363	42	405	99	35	134	27.3	83.3	33.1
Bloomfield St. E of Marquis St.	834	32	866	29	24	53	3.5	75.0	6.1
Chandos St., N of Maitland St.	249	10	259	49	10	59	19.7	100.0	22.8
Conadilly St., W of Marquis St.	2,000	53	2,053	121	22	143	6.1	41.5	7.0

LR Light and Rigid Heavy Vehicles
ST Semi-trailers

The following conclusions could then be made:

* About 24 per cent of all traffic travelling through the Study Area travelled between Conadilly Street (Station 2) and Curlewis Road (Station 5).

* A further 20 per cent of all through traffic travelled between Henry Street (Station 1) and Conadilly Street (Station 2).

* About 73 per cent of semi-trailers (11) travelling between Henry Street (Station 1) and Conadilly Street (Station 2) used the signposted alternative route along Bloomfield Street (Station 6). By comparison, only 42 per cent of semi-trailers (13) travelling between Curlewis Road (Station 5) and Conadilly Street (Station 2) used the alternative route.

* Over 30 per cent of traffic along Henry Street and Curlewis Road was through traffic.

* The majority of traffic in New Street and South Street (over 90 per cent) is associated with Gunnedah, particularly the town centre area.

* About 83 per cent of semi-trailers travelling in Curlewis Road travelled through the Study Area.

* 75 per cent of semi-trailers in Bloomfield Street are travelling through the Study Area. This accounts for only 32 per cent of all semi-trailers travelling through the Study Area.

* Only 7 per cent of traffic in Conadilly Street west of Marquis Street is travelling through the Study Area.

Town Centre Area Traffic

Conadilly Street (Trunk Road 72) provides the major access to the town centre. Most of the major retail and commercial activities within the town centre have a frontage onto Conadilly Street. West of Marquis Street, this street carried some 5,270 vehicles during the 12 hour period (8 am to 8 pm). Of these, about 4 per cent were commercial vehicles with 3 axles and over and 2 per cent were semi-trailers.

Of the 119 semi-trailers recorded in Conadilly Street, about 42 per cent were travelling through the Study Area.

Most of the kerbside parking spaces are at 45° angle. This reduces the carriageway of Conadilly Street to two effective traffic lanes. This has resulted in a conflict situation, particularly between the semi-trailers using this street and vehicles parking and unparking.

Congestion, delays and unsafe situations through the town centre have been observed several times during the survey. All effort should be made to remove semi-trailers and other heavy vehicles from the town centre. If they have origin/destination south of Conadilly Street, it is suggested that they use Warrabungle Street, Barber Street and Abbott Street. North of Conadilly Street, they should use Bloomfield Street.

The situation has also been observed that the entry into the town centre from the Manilla Road is at present circuitous through the back streets of North Gunnedah. Consideration needs to be given to also straightening this route as part of a major traffic restructuring.

Alternative Heavy Vehicle Route

Heavy vehicles have been encouraged to bypass the town centre and to use Bloomfield Street. Suitable signs have been placed in Curlewis Road east of Boundary Road, in Henry Street at Bloomfield Street and in Conadilly Street at Warrabungle Street.

Heavy vehicles travelling between Curlewis Road and the Narrabri road are encouraged to use Boundary Road, Bloomfield Street and Warrabungle Street. If travelling between Henry Street and the Narrabri road, they are encourgaed to use Bloomfield Street and Warrabungle Street.

About 53 per cent of semi-trailers and about 40 per cent of rigid vehicles with at least three axles which could use Bloomfield Street are using this alternative route. The remaining vehicles still choose to travel through the town centre.

Bloomfield Street is for most of its length a residential street which is also abutted by two schools. This situation has prompted the suggestion that the alternative route be relocated along Maitland Street. This would require the extension of this street to connect with Curlewis Road east of Boundary Road and with the Narrabri road, west of the saleyards.

Maitland Street is situated on flood prone land which is subject to flooding for a maximum of 20 days per year (this information was based on discussions with Council's officers). The cost associated with the extension of Maitland Street has been estimated by Council to be of the order of $1.5 million. Discussions with officers of the Department of Main Roads have indicated that Maitland Street would need to be reconstructed, as well as extended, to Department of Main Roads standard if it is to be used as a major alternative route with financial contribution from the Department of Main Roads. Estimated cost for this work would be at least $5 million. It is further understood that the Department will not have this level of funding for this project for a long time to come.

Whilst in the short and medium term, the provision of an alternative route along Maitland Street is not considered feasible, it is recommended that appropriate measures such as its inclusion in the Draft Local Environmental Plan be taken to permit in the long term (say 20 to 30 years) the construction of a bypass route to the town centre via Maitland Street.

In the meantime, the alternative heavy vehicles route along Bloomfield Street should be retained and improved and Conadilly Street should be declared a Light Traffic Route through the town centre.

An unsatisfactory situation presently exists at the intersection of Boundary Road with Curlewis Road and with Bloomfield Street. Semi-trailers travelling in a westbound direction along the alternative route have been observed travelling on the wrong side of Boundary Road to be able to negotiate the left turning manoeuvre from Boundary Street to Bloomfield Street. Consideration should be given to the provision of a

direct link between Bloomfield Street and Curlewis Road such that the western approach of Curlewis Road is perpendicular to this new link road. Priority should also be given to the alternative route by the installation of a 'Give Way' sign in Curlewis Road west of the new link road. In the meantime, two fully paved lanes should be provided for westbound traffic in Curlewis Road east of Boundary Road.

Bloomfield Street has a 6 lane undivided carriageway east of Tempest Street. Trees are planted in the kerbside lanes of its section between Chandos Street and Elgin Street. In order to provide a safer and more regulated flow of traffic, it is recommended that only the 4 centre lanes of the carriageway be used for travelling traffic. Parking along the kerbside lanes should be parallel and protected from the main flow of traffic by the provision of wider footpath at frequent intervals.

The section of Bloomfield Street between, Tempest Street and Warrabungle Street, should be reconstructed to provide a 4 lane carriageway and increase the radii of the south-eastern corner of the intersection of Bloomfield Street with Warrabungle Street to afford a better turning circle for left turning semi-trailers.

These recommended road improvements are illustrated in Map 19. Traffic along Bloomfield Street should also be given priority by the installation of 'Give Way' signs at all side streets along the alternative route. The increase in heavy vehicle traffic in Bloomfield Street could affect the safety of pedestrians crossing Bloomfield Street, particularly near the schools. It is therefore recommended that, unless the route of the Manilla Road is changed to Abbott Street, which would seem the more logical direct route, consideration might be given to installing traffic signals at the intersection of Henry and Bloomfield Streets. Pedestrian phases could be included to ensure the safety of school children and to minimise conflicts between traffic travelling in Bloomfield Street and Henry Street. If the Manilla Road is changed to Abbott Street then the removal of the Manilla Road traffic from outside the school will lessen the danger at the former intersection. This change would require the reconstruction of this route around the Greyhound Park and upgrading of the northern end of Abbott Street.

Possible Relocation of State Highway (SH 11)

It has been brought to our attention that the Department of Main Roads is considering two alternatives to minimise the effects of flooding of SH 11, east of Gunnedah, particularly near the existing one-lane timber bridge over the Mooki River. The alternatives are:

* The replacement of the existing timber bridge by a more suitable structure to provide two-way traffic.

* The relocation of the highway from a point approximately 1 kilometre east of the existing bridge to join with the Curlewis Road (TR 72), south of the existing built-up area of Gunnedah.

It should be noted however, that there are no definite proposals for either scheme at this stage.

The first alternative, whilst considerably improving the situation at the Mooki River, would not affect existing travel patterns through Gunnedah. The second alternative would, however, result in a higher number of semi-trailers and through traffic travelling through the town centre unless a better alternative such as Bloomfield Street is available.

Access Route to the Town Centre

Access to the town centre from areas west and east of Gunnedah is provided by Conadilly Street. Areas to the north of Gunnedah gain access to the town centre along Henry Street or Chandos Street. The capacity of these two routes is considered more than adequate for the traffic volumes they carry.

To gain access to the town centre from areas south of the railway line, four railway crossings are available. The first crossing is provided by a two lane overbridge near the junction of South Street, Anzac Parade and Abbott Street. The other crossings are provided at grade along New Street, Marquis Street and Carroll Street. At these locations, New Street, Carroll Street and Marquis Street have a two lane carriageway.

The overbridge along State Highway No. 11 is considered too narrow. Semi-trailers have been observed travelling on the two lanes thus blocking opposite traffic. This is a potentially dangerous situation which should be rectified as soon as possible. It is understood that plans are on hand to remove the western footway and widen the pavement.

Whilst the at grade crossings are usually closed about 5 to 6 times per day, they are considered adequate, with no extensive queues observed at any crossing during the survey.

4.9.4 Parking Situation in Town Centre

Parking Inventory

An inventory of the number and type of parking spaces within the town centre in the area illustrated in Map 16 was carried out. The summary of this survey is included in Table 4.21.

Within the parking Study Area illustrated in Map 16, there are about 1,040 on-street spaces and about 520 spaces in off-street areas. Of these, 245 spaces are on vacant land which is likely to be redeveloped.

About 60 per cent of on-street spaces are controlled by time limit restrictions (mostly 1 hour limit) during business hours.

Parking Utilisation

The total number of vehicles parked in each type of kerbside space and off-street parking area was recorded four times between 11.30 am and 5.00 pm on Monday 3rd May 1982. The results of this survey are given in Table 4.22.

Table 4.21: Parking Inventory in Town Centre

Type of Parking	Number of Spaces
On-Street Parking	
¼ hour time limit	13
1 hour time limit	581
Unlimited	429
Taxis, Doctors, Police	15
Sub-Total	1,038
Off-Street Parking	
Council Car Parks	151
Private Car Park (Coles and Mall)	123
Vacant land used for parking	245
Sub-Total	519
TOTAL	1,557

Although limited in scope, the following conclusions could be drawn from this survey:

* On-street parking spaces had a utilisation of about 50 per cent at its recorded peak.

* A higher utilisation of on-street spaces occurred in time limit restricted spaces which are closer to the centre. The highest recorded utilisation of these spaces was about 60 per cent. By comparison, the highest recorded utilisation of unlimited on-street spaces reached only 36 per cent.

* A large number of off-street spaces were vacant during the survey. Less than 30 per cent of all available off-street spaces were occupied.

* A closer examination of off-street parking spaces indicated that the highest recorded utilisation in formal off-street spaces (i.e. excluding vacant lands) was about 38 per cent.

* A very popular parking area was the vacant land behind the ANZ Bank where up to 37 vehicles have been observed at one time.

* Parking utilisation in the section of Conadilly Street, between Chandos Street and Elgin Street was the highest in the Study Area. During the survey period, it varied between 76 and 90 per cent.

Table 4.22: Utilisation of Parking Spaces

Parking Location	Number of Spaces	Starting Time of Survey 11.30am	2pm	3.30pm	4.35pm
On-Street Parking*					
Abbott Street	46R	26	18	22	11
(Bloomfield to Barber)	84U	44	48	54	34
Chandos Street	120R	40	36	45	45
(Bloomfield to Barber)	35U	6	6	4	3
Conadilly Street					
(Tempest to Chandos)	74U	22	21	20	15
(Chandos to Elgin)	187R	167	155	148	143
(Elgin to Henry)	138R	56	54	55	64
Elgin Street	2R	-	-	-	-
(Bloomfield to Barber)	143U	48	51	56	40
Little Barber Street					
(Chandos to Elgin)	15R	1	4	5	2
Little Conadilly Street					
(Chandos to Elgin)	57U	13	12	8	10
Marquis Street	29R	23	15	24	21
(Bloomfield to Conadilly)	36U	16	13	12	15
Marquis Street					
(Conadilly to Barber)	57R	45	46	37	36
Sub-Total	1,023	507	479	490	439
Off-Street Parking					
Council Car Park:					
(a) Little Conadilly Street	75	32	28	31	29
(b) Little Barber St. (Marquis to Chandos)	20	4	3	1	1
(c) Little Barber St. (Elgin to Marquis)	56	48	43	44	37
(d) McCaffrey Car Park	200	8	6	6	6
Coles Car Park	98	33	37	22	17
Mall Car Park	25	13	9	9	6
Vacant Land behind ANZ	45	37	33	36	25
Sub-Total	519	175	159	149	121
TOTAL	1,542	682	638	639	560

* Taxi, Doctors and Police spaces not included.
R = Time Restricted Spaces U =Unlimited Parking

* The results of this survey, which was carried out on a Monday, indicate that the parking situation on that day was more than adequate. Whilst a survey during peak shopping hours, say on Friday or Saturday, may indicate higher utilisation, it is considered that the existing supply of parking would more than cater for the corresponding peak demand for parking. It is however recommended that consideration should be given by Council to line mark all parking spaces in their off-street parking areas. This would increase the efficiency of these facilities.

4.9.5 Conclusions

The evaluation of the existing traffic situation in the Study Area has indicated that the capacity of the street system is very satisfactory.

The majority of intersections within the town are uncontrolled. It is suggested that a hierarchy of roads be established within Gunnedah which would assist in determining the type and location of control at all intersections.

The alternative heavy vehicle route along Bloomfield Street is used by a large percentage of semi-trailers travelling through Gunnedah. However, there is a high percentage of semi-trailers (about 58 per cent) travelling between Curlewis Road and the Narrabri road still travelling through the town centre. A conflict between semi-trailers and vehicles parking in Conadilly Street in the town centre has been observed. An alternative route for heavy vehicles to bypass the centre is therefore necessary.

Ideally, the alternative route should be along Maitland Street, away from the residential areas. However, this would not be practical for a number of years. Therefore, Bloomfield Street should be retained as the alternative heavy vehicle route. Consideration should also be given to the eventual rerouting of the Manilla Road to the north-west of Greyhound Park in order to enter the town more directly along Abbott Street.

It is concluded from the parking analysis that there is an adequate supply of parking facilities.

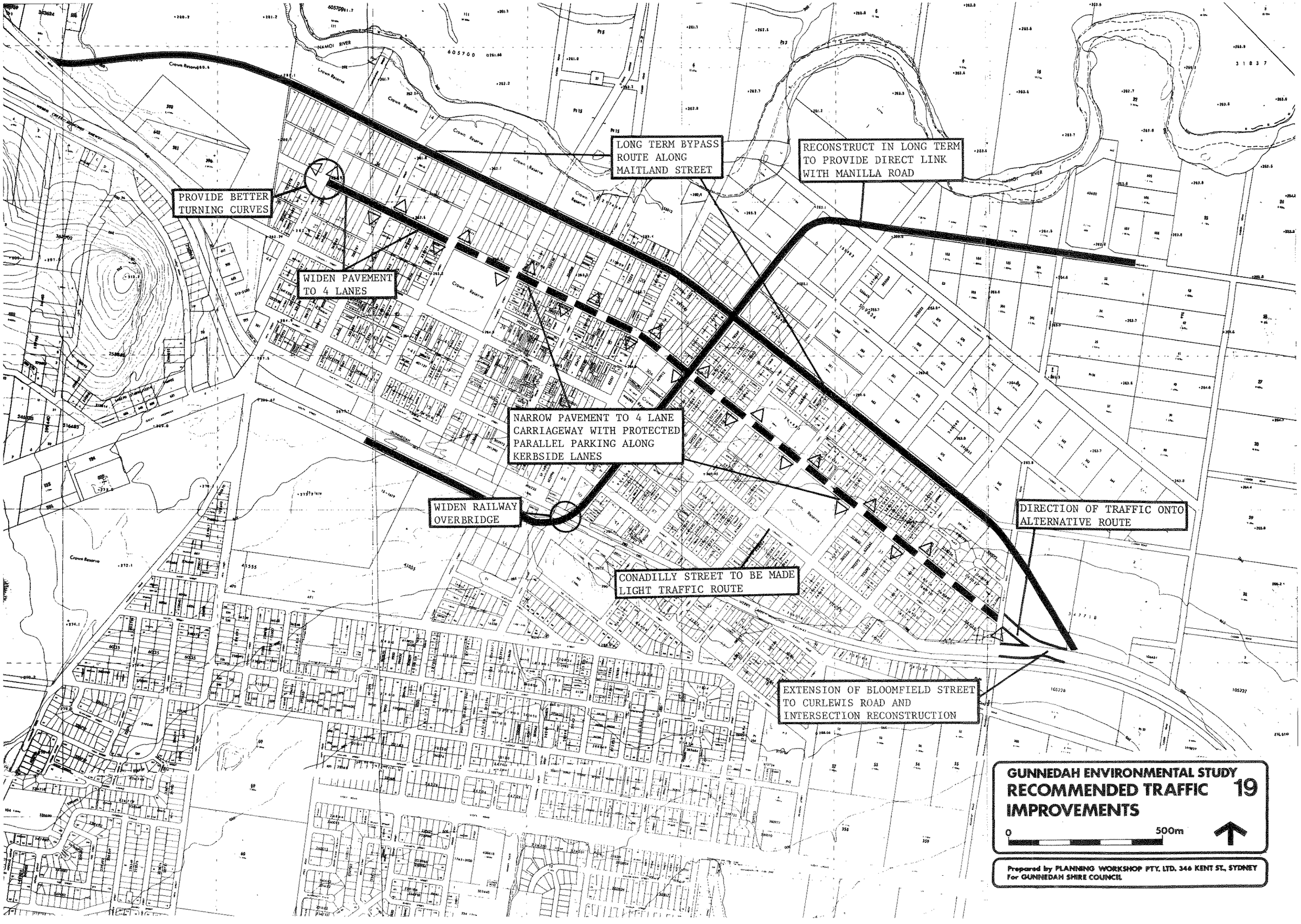
4.10 Provision of Additional Travelling Stock Reserves

The location of existing and proposed Travelling Stock Reserves and the current stock movement routes were shown on Map 11.

Examination of stock movement routes and existing Travelling Stock Reserves indicates the need for declaration of those parcels of land indicated by the Tamworth Pastures Protection Board, in particular:

* the 1(b) zoned parcel between Chandos Street and Marquis Streets adjacent to the river;

* a 1½ chain easement along the northern side of the Manilla Road east of 'Tudgey's Lane';


PROVIDE BETTER TURNING CURVES
WIDEN PAVEMENT TO 4 LANES
LONG TERM BYPASS ROUTE ALONG MAITLAND STREET
RECONSTRUCT IN LONG TERM TO PROVIDE DIRECT LINK WITH MANILLA ROAD
NARROW PAVEMENT TO 4 LANE CARRIAGEWAY WITH PROTECTED PARALLEL PARKING ALONG KERBSIDE LANES
WIDEN RAILWAY OVERBRIDGE
CONADILLY STREET TO BE MADE LIGHT TRAFFIC ROUTE
DIRECTION OF TRAFFIC ONTO ALTERNATIVE ROUTE
EXTENSION OF BLOOMFIELD STREET TO CURLEWIS ROAD AND INTERSECTION RECONSTRUCTION
NAMOI RIVER
Crown Reserve
GUNNEDAH ENVIRONMENTAL STUDY
RECOMMENDED TRAFFIC IMPROVEMENTS
19
0
500m
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For GUNNEDAH SHIRE COUNCIL

* an easement providing for permanent stock use along Finch Street between Elgin Street and Carroll Street; along Carroll Street north to the water supply depot; along Talibah Street east of Carroll Street; and along Tudgey's Lane between Talibah Street and the Manilla road.

The declaration of the parcels in the manner indicated should also be subject to investigation of the potential levels of use of such routes, however. In this regard the Tamworth Pastures Protection Board has supplied the following data.

Table 4.23: Monitored Stock Movements

Gunnedah from/to Feb/Mar 1980	Cattle	Sheep
Boggabri	2,842	27,460
Mullaley	3,960	15,100
Cohens Bridge	3,840	4,960
Curlewis	4,180	16,900
Tamworth	1,114	8,620

Source: Tamworth Pastures Protection Board

It is estimated by the Board that the largest mob of cattle in the above figures would be 1,000 head, the average being 280 to 300 head, while the largest mob of sheep would be 5,000, the average being 1,400 head.

In addition to these figures, movement of smaller mobs of both sheep and cattle in and around Gunnedah, mainly from Gunnedah Saleyards to Gunnedah Abattoir are said to take place on an average of 7 to 10 times per week.

As evidence of the turnover of the saleyards, the following figures were provided:

Table 4.24: Stock Sold Through Gunnedah Saleyards - 31st December

Year	Fat Sheep and Lambs	Store Sheep	Fat Cattle	Store Cattle
1974	240,474	2,701	62,043	12,232
1975	269,991	198	84,893	7,949
1976	219,072	7,465	92,160	10,358
1977	213,690	215	108,798	11,525
1978	239,468	2,090	116,740	9,816
1979	241,567	1,145	106,514	5,479
1980	288,476	850	91,206	5,938
1981	288,360	6,260	78,822	8,341

In addition, there are approximately 12,000 to 15,000 pigs sold annually through a private saleyard.

It would appear from these figures that use of the Travelling Stock Reserves is fairly heavy and constant. The opinion has also been forwarded that the walking of stock will increase as a method of transportation as road transport costs further increase.

On the basis of the figures provided, it would appear that dedication of the land as proposed is warranted.

4.11 Financing of Facilities

There is always a problem for Council in providing all the facilities which the community may desire. No Council or Government has unlimited funds. Therefore Council must have regard to the opportunities which exist for extending the financing of facilities.

It has been clear for many years that, under the Local Government Act, Council can require subdividers to meet the cost of the following:

* water reticulation;
* sewerage reticulation;
* roads;
* drainage;
* electricity;
* telephone;
* kerbing and guttering;
* open space.

However more recently the proportionate cost of water and sewerage amplification and trunk road construction have been added to many subdivisions.

The recent Environmental Planning and Assessment Act, 1979, embraces within it Section 94 which allow Councils the opportunity to require contributions from developers for any facility required to meet the needs of the development.

However, caution needs to be exercised here for the Section does not open up an inexhaustable supply of money. All it does is provide a Section under which a Council may require a reasonable contribution towards a facility which can be shown to result from the development.

Furthermore any contribution required by Council will result in an increased cost of land or housing, and to that degree there must be a balance between what is asked and what the community can afford to pay.

For this reason we recommend that, following this Environmental Study, Council investigate each major area of potential development including:

* commercial uses;

* industrial uses;

* residential flat buildings; and

* subdivisions.

From this investigation, Council should determine the areas of contribution required and the level of that contribution so that developers will be aware of the cost of development at the time of acquisition of raw land.

The Department of Environment and Planning has suggested in its Circular No. 23 that the following principles, where applicable, should be observed in dealing with contributions:

"(a) the services for which contributions can be required should be limited to those activities normally provided by local government authorities in whole or substantially in partnership with State agencies;

(b) local environmental plans in urban release areas should contain detailed provisions with respect to appropriate contributions including a schedule outlining the services for which contributions are required;

(c) a regulation relating to the establishment of an appropriate Trust Fund and its operation for the application of Section 94 monies, a balance sheet itemising headings of income and expenditure for contributions, including such matters as a reserve for longer term facilities;

(d) contributions should be limited towards the capital cost items;

(e) the local environmental plan should, because of the way in which demands for services will change over the development process, contain a specific time limitation on particular application of the contribution clause and include a review provision;

(f) in all cases the total current cost of the services required should be identified prior to the local environmental plan being gazetted;

(g) Councils should prepare a discussion document outlining the different revenue options to be used to provide services and the proportion of the costs of the services being borne by contributions, loans, or specific purpose grants, etc.;

(h) Councils should arrive at an overall contribution level for all services required in terms of 'per lot figures'. Such a procedure would minimise the administrative difficulties involved where a range of different contributions for different services might be sought;

(i) Councils should always provide 'in kind' contributions as alternatives to cash."

It is reasonably common for Local Environmental Plans to include a clause similar to the following:

"23. As a consequence of the carrying out of development in accordance with this plan, this plan identifies a likely increased demand for public amenities and public services as specified in the Schedule and stipulates that dedication or a contribution under section 94(i) of the Act, or both, may be required as a condition of any consent to that development.

SCHEDULE

Community facilities.

Community facility structures; child care centres; community meeting rooms and halls; community arts centre; community library; community health and welfare offices; interim community houses.

Public open space.

Embellishment, landscaping and infrastructure provision for passive, active and other public open space; routes and areas for walkways; cycleways and parking systems; lighting and amenities; active outdoor recreation facilities and structures; sports facilities; playing fields, swimming facilities; sports grounds and facilities amentiy structures; active indoor recreation structures, facilities and land requirements.

Stormwater drainage purposes.

Construction and landscaping of drainage structures, including drainage swales, retention basins, inlet/outles sytems, culverts and piping systems.

Local roads; construction and landscaping of local road works.

Public car parks and landscaped areas in business centres; construction and embellishment of public car parks and landscaped areas.

Water and sewerage reticulations."

It would appear appropriate that such a clause be included in the subject Local Environmental Plan, and that as a guide to the determining of contributions which Council should require, the standards stated in this report relating to the thresholds and average population catchments of the various types of facilities, should be adopted. Given average costs within the Shire, Council should then be able to determine the apportionment of total costs for various facilities among the population which will be dependent on them.

4.12 Involvement of Council in Land Conversion

In a fluctuating and cyclic residential market it may become important for Council to consider becoming involved in developing land. The problem at present revolves around the high cost of money and the reluctance of land developers to continue subdividing during periods of economic depression.

Where there is a rapid rate of growth, as may occur with the development of mines, economic conditions do not appear to permit the constant development of land. The cyclic conditions are such that there is an adequate supply of land created during the peaks but little produced during the troughs. Council can act to ameliorate these conditions by smoothing out the troughs.

It is recommended that Council give consideration to the purchase of sufficient undeveloped residential land to ensure that Council has some control over this fluctuating market situation. In this regard it is suggested that a control of 20 per cent of the land would adequately ensure this position.

Council should of course ensure that the same requirements and conditions are placed upon its own developments as it would require of other developers. This would require that any Section 94 contributions should be thoroughly researched and should be reasonable. As Council controls all services within new subdivisions other than electricity or telephone, there is the opportunity for Council to also control the price of residential land.

At present Council controls a substantial amount of industrial land. This provides Council with the opportunity to provide land at a reasonable price for the growth of industry within the Shire and allows Council to market industrial land to migrating industries. It is recommended that Council continue to develop and market industrial land.

It is clear from an inspection of the industrial area that a number of smaller industries have developed in a manner which is less than environmentally desirable. It may assist in overcoming this problem in future if Council developed an industrial building subdivided into small spaces for rental or for sale as strata title industrial flats.

The provision of public open space and its development is the responsibility of Council. Part of this open space requirement should be met by subdividers or developers where there is an increase in population. However, much of the space required for district active open space is already in Council hands. Council will need to consider whether it intends to require a money or land contribution from developers and, if a money contribution, should ensure that that contribution is equal to the value of undeveloped residential land in the locality.

Council's involvement in the development process may vary depending upon the rate of change. Council is the responsible authority for development in Gunnedah and must be involved from a management point of view in all development in Gunnedah. For the process to avoid the fluctuations of the economy Council should be involved in land development as well.

5. DETERMINATION OF PLANNING NEEDS AND PRINCIPLES

This section will determine the planning needs of Gunnedah for the next 20 years within the context of the existing natural, socio-economic and man-made environment in which the town is set.

The basis of this determination will be the constraints and deficiencies which emerged from Section 3 and the resolutions to problems identified in Section 4, within the planning framework identified in Section 2.

The first two parts of this section will pull together and summarise the natural and the settlement support constraints to urban development in Gunnedah. The third will restate the existing deficiencies and planning needs in Gunnedah, and outline some general principles which we feel Council should adopt in relation to the planning of the town. Taking into account the differing growth scenarios which can be established, two alternate Structure Plan Options are then outlined.

5.1 Natural Constraints

The natural constraints to change, especially expansion of the township of Gunnedah, are in essence, the following. The cumulative situation which they present is shown by Map 20.

5.1.1 Topography/Slopes

A slope analysis was undertaken for the area surrounding the township of Gunnedah. This analysis was undertaken at a scale of 1:4000 and 2 metre contour interval, on topographic maps compiled by The Central Mapping Authority. The slope classes adopted were 0-5 per cent, 5-10 per cent, 10-15 per cent, 15-20 per cent, 20-25 per cent, 25-33 per cent and greater than 33 per cent. Areas with slopes in excess of 20 per cent are shown on Map 20.

Areas of steep slopes (slopes in excess of 20 per cent) occur mainly on the residual hills and ridges to the south and west of the township. These hills are formed by relatively resistant sedimentary and volcanic rocks, which are considered to be mainly stable. The only areas of slope instability are the eastern scarps of the ridges to the west of Wandobah Road and around Porcupine Hill. These areas are subject to rock fall which results from the joint block separation of the Mesozoic sedimentary rocks. It is recommended that safety zones be developed around the top and base of each scarp line and that urban development be excluded from these zones.

5.1.2 Soils

A soil survey was undertaken in the area immediately surrounding the township of Gunnedah. Four soil types were identified; Black Earths and Cracking Clays, Clay Loams with Red Clay Subsoils, Gravelly Red Brown Earths and Lithosols. A description of these soils is given in Section 3.1.4 of this Report.

Black Earths and Cracking Clay soils occur on the floodplain of the Namoi River in the area approximately to the north of Maitland Street. These soils have a very high clay content (50-80 per cent) and are subject to extensive expansion and contraction. When dry, these soils develop closely spaced deep wide cracks and hard consistency, however when moist or wet these soils become plastic and extremely sticky.[1] This phenomena is caused by the high content of montmorillonite within the soils. Montmorollinite is an expanding lattice clay mineral which causes considerable swelling and shrinking on wetting and drying respectively. This results in volume expansion figures generally between 20 and 40 per cent.

As a result of the high clay content, the external drainage of these soils is very low once the soils become moist.

Problems associated with the expansion and contraction of the Black Earths include foundation displacement and cracking, underground pipe cracking and displacement, waterlogging and poor drainage. Within the Study Area, black earths form the least suitable soil type for urban development. If urban development is to occur, special consideration should be given to the foundation design. Because of the great depth of these soils, a 'raft slab' foundation is more preferred to the 'pier beam' foundations.

Clay Loams with Red Clay Subsoils occur in the hilly area to the south and west of the township. These soils are characterised by a brown clay loam A horizon overlying a red to reddish brown heavy clay B horizon. The A horizon is subject to severe sheet and gully erosion when cleared.

Because of the high clay content of the B horizon, these soils are subject to expansion and contraction, however the rate of movement is less than that characteristic of the black earths. Within these areas both the 'raft slab' and 'pier and beam' foundation types are suitable.

In the 'raft slab' construction it is recommended that the topsoil be removed and back-filled with gravel.

The Gravelly Red Brown Earths are probably the most suitable soils in the Study Area in terms of urban development. These soils occur in the area to the south and west of the township. They have a lower clay content than the two preceeding soil types and as such, are not as subject to the problems associated with expansion and contraction. In addition, these soils are also shallower than the other soil types.

The stability of these soils in relation to erosion potential is determined largely by topographic position and profile depth in conjunction with other factors such as vegetation cover and land use.

The Black Earths and Cracking Clay soils which occur on the floodplains are moderately erodible, however due to their topographic position it would appear that these soils are unlikely to suffer serious erosion.

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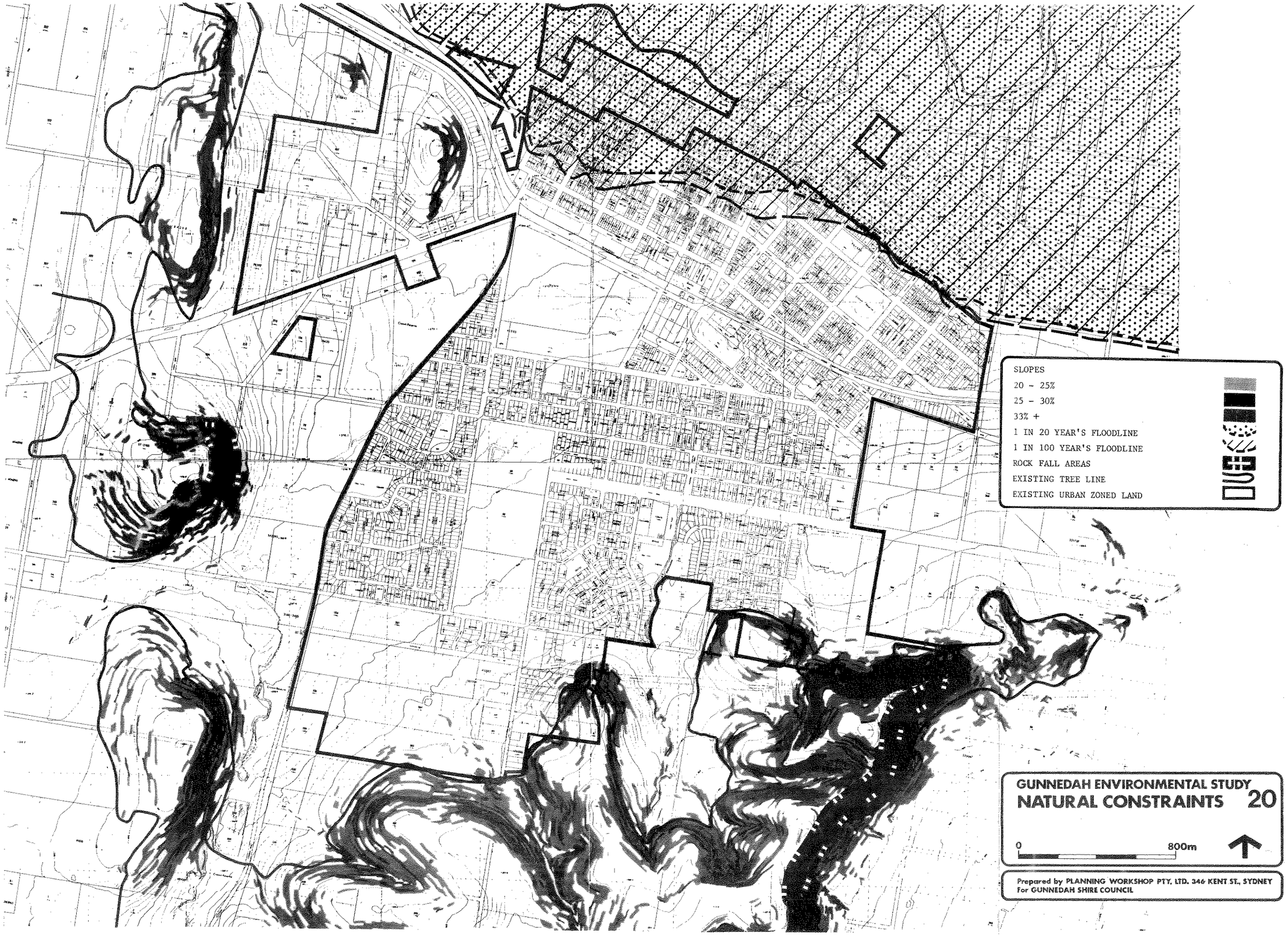
1. Soil Conservation Service (1976).


SLOPES
20 - 25%
25 - 30%
33% +
1 IN 20 YEAR'S FLOODLINE
1 IN 100 YEAR'S FLOODLINE
ROCK FALL AREAS
EXISTING TREE LINE
EXISTING URBAN ZONED LAND
DUSE
GUNNEDAH ENVIRONMENTAL STUDY
NATURAL CONSTRAINTS 20
0
800m
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For GUNNEDAH SHIRE COUNCIL

The Gravelly Red Brown Earths and Clay Loams with Red Clay Subsoils are also considered to be moderately erodible due mainly to the poorly structured A horizons and possible dispersibility of the B horizons. The gravelly nature of the red brown earths make them less susceptible to erosion than the clay soils.

The shallow Gravelly Red Brown earths and Lithosols developed on the flat to gently sloping (0-5 per cent) hillcrests and ridge, are considered stable and will present minimal problems to development. Rill erosion and sheet wash in disturbed areas has resulted in minor soil erosion problems on the ridge and hillcrests. Uncontrolled clearing and subsequent development in these areas could accelerate these minor erosion problems and may result in soil erosion of downslope areas from the increased run-off. Sedimentation of the drainage lines may also occur.

Likewise, the deeper profiles of the gravelly Red Brown Earth and the Clay Loams with Clay Loam Subsoils located in the foothill regions where slopes are less than 5-10 per cent present no instability problems. Due to their topographic position, these soils are thus suitable for urban development.

The Gravelly Red Brown Earths and Clay Loams with Clay Loam Subsoils situated on sideslope and foot slope areas with gradients greater than 10 per cent are considered to have potential instability and erosion problems as a result of their topographic position.

Provided that soil erosion measures are incorporated in the construction phase of development, moderate soil erosion potential of these soils should form no constraint to urban development. It is also recommended that cut and fill be minimised and that drainage systems be designed so that surface run-off and ground water generated by development in upslope areas does not significantly alter the moisture status of soils in the lower and mid-slope areas. It should be emphasised that the potential for soil failure (e.g. slumping) generally increases as the moisture status of the soil profile increases.

5.1.3 Vegetation

The analysis of existing vegetation in Section 3.1.5 identified one vegetative community potentially of conservation value and one not normally of conservation value in terms of individual species, but significant when considered visually and aesthetically.

The first community, the Plains Grass Community, is relatively rare but is not believed to exist within the Study Area. However, we understand that the Department of Environment and Planning is currently undertaking a study into the distribution of this grass and consequently if remnants of it are found in areas recommended for expansion, efforts should be made to preserve it within the local level.

The Open Forest Formation, while not significant in terms of species represented, provides an important scenic backdrop to the town of Gunnedah. The steeper slopes and ridges to the south and west of the township contain varying covers of this type of vegetation. They are visually prominent from most parts of the township, and act as a constraint to urban expansion only insofar as they have substantial visual, scenic and aesthetic value.

It is consequently considered that the existing sharply demarcated tree line on the southern and western ranges surrounding the town, should be adopted as a constraint to development.

5.1.4 Flooding

The existing flooding and hydrology situation affecting the town of Gunnedah are discussed in Section 3.1.7, and the policy implications of flooding on urban development discussed in Section 4.7.

The hydrology of the Namoi River system in the vicinity of Gunnedah is such that flooding is frequently experienced in the north of the town, affecting a significant proportion of existing urban structures.

In accordance with NSW Government policy in respect of flood prone lands, development should be avoided and restricted in flood prone areas (i.e. land below the 1 in 100 year flood frequency level) where alternative flood free land is available. In addition, development should be prohibited from floodways (i.e. land below the 1 in 20 year flood frequency level) and where possible, removed.

Given the advisability of adhering to such policies, flood behaviour in the vicinity of Gunnedah acts as a constraint to the intensification of urban land uses in the northern part of the town. The respective 1 in 100 and 1 in 20 year flood-lines are shown on the constraints map.

5.1.5 Prime Agricultural Land

The protection of good quality agricultural land for primarily agricultural purposes is becoming an increasingly important issue in NSW, and one that has attracted controversial discussion. In order to properly assess the importance of prime agricultural land and need for protection for agricultural uses rather than urban, the agricultural capability of the land has to be assessed.

This can be done using a procedure suggested by the Department of Environment and Planning in its Rural Land Evaluation Manual published in November, 1981. To assist the consultants and Council in the identification of prime agricultural land, Gunnedah Regional Office of the Department of Agriculture prepared an evaluation of agricultural capability. This was done in consultation with the Soil Conservation Service. The Department commented on the agricultural capability of the non-urban land surrounding the township of Gunnedah and categorised them into one of five classes based on economic social and biophysical parameters. A description of the five classes is shown in the Appendix 6.

The results of the agricultural capability assessment is represented on Map 9.

Information on the agricultural capability of rural land is important for the following reasons:

* it enables good quality agricultural land to be identified;

* it enables areas more suitable to rural residential uses to be identified;

* it provides Council with information helpful in the determination of development applications.

Within the Study Area, there is no land that can be classed as prime agricultural land. Areas of Class 2 land were identified the most important parcels being to the west of the town, to the north of the Mullaley Road and to the east of the town in the floodprone land. While the Department generally suggests that land in Class 2 should be retained in agricultural use, there are a number of factors that limit the suitability of this land for agricultural uses. The most important in the present context is the size of the parcels of land and their proximity to Gunnedah. Because the parcels are generally small, particularly to the eastern side of town and because land values are relatively high, it would be difficult to consolidate a parcel of land substantial enough to support a viable agricultural enterprise.

With respect to the area of Class 2 land to the west of the Study Area, which includes the 'Ag-Quip' site, the Department recommends that this land should generally be retained in agricultural uses where alternative areas are available for subdivision. As such, it is suggested that this land be developed only if the demand arises. This has been incorporated in the development of the preferred structure and the staging programme.

5.2 Settlement Support/Man-Made Constraints

Various constraints were identified which limited development by virtue of the existence of other competing or conflicting activities, or limitations to the infrastructural servicing framework. These were identified as follows, and are shown on Map 21:

5.2.1 Infrastructure

Water Supply

Water supply provides a major constraint to the potential areas that can be developed utilising the existing system. A water supply study was recently completed for Gunnedah Shire Council. This study provided a number of recommendations to augment the system to cater for approximately thirty years development.

A summary of the relevant recommendations is presented as follows:

* Bores

It is proposed to develop a new major set of bores along Orange Grove Road approximately 6 kilometres north of town. This area was selected from studies undertaken by the Water Resources Commission and the Australian Groundwater Consultants Pty Ltd.

Test results from the site indicate:

* that there is a deep aquifer with water quality acceptable for a town water supply;

* the probability of achieving a flow between 100 litres per second to 200 litres per second is 80 per cent.

It was recommended that a test bore be drilled to bedrock at approximately 120 metres. If this bore is satisfactory, it can be bored to a diameter of approximately 560 millimetres for use as a water supply source.

It is proposed to decommission one of the wells that supply Area A and to upgrade another of the existing bores in the same system to augment the flow.

* Reservoirs

It is proposed to construct a reservoir on Borethistles Hill. This reservoir will have a capacity of 7 megalitres and should service the future industrial and some of the residential areas.

* Pumping Stations

It is proposed to install a number of booster pumping stations to increase the water supply and residual pressures to some areas. These stations will be located at:

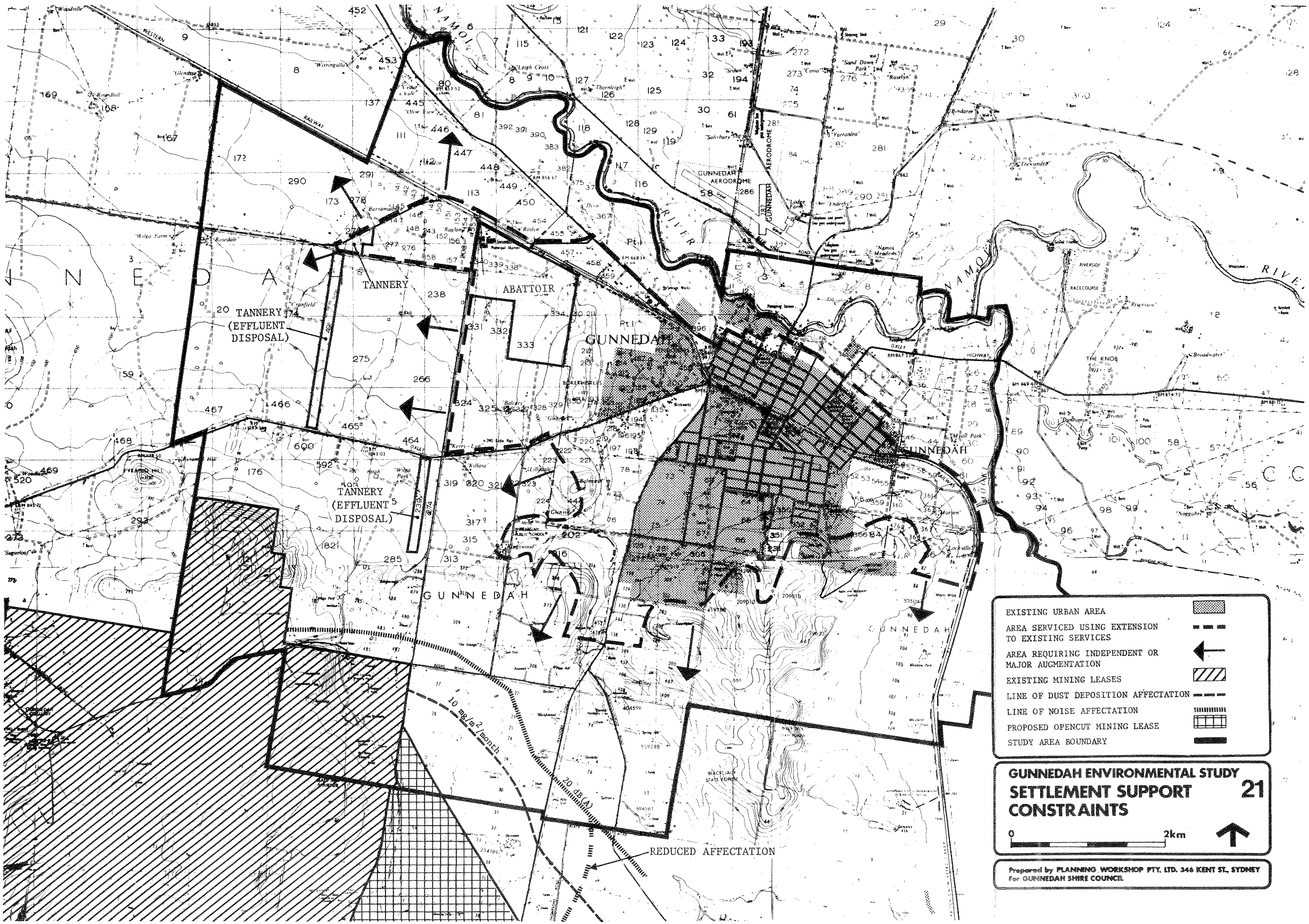
* Apex Reservoir.
* Lincoln Street Reservoir.
* The Abattoirs.
* Abattoir Reservoir.
* Reticulation

The water reticulation will be cross-connected between the two areas A and B to increase the capacity and residual pressures in Area A.

The remainder of the reticulation augmentation will be to:

* reduce the head losses in selected pipes to acceptable values;

* provide reticulation to new development, both industrial and residential;


EXISTING URBAN AREA
AREA SERVICED USING EXTENSION TO EXISTING SERVICES
AREA REQUIRING INDEPENDENT OR MAJOR AUGMENTATION
EXISTING MINING LEASES
LINE OF DUST DEPOSITION AFFECTATION
LINE OF NOISE AFFECTATION
PROPOSED OPENCUT MINING LEASE
STUDY AREA BOUNDARY
GUNNEDAH ENVIRONMENTAL STUDY
SETTLEMENT SUPPORT CONSTRAINTS
21
0
2km
Prepared by PLANNING WORKSHOP PTY. LTD. 346 KENT ST., SYDNEY For GUNNEDAH SHIRE COUNCIL
TANNERY
ABATTOIR
TANNERY (EFFLUENT DISPOSAL)
GUNNEDAH
GUNNEDAH AERODROME
NAMOI RIVER
10 mg/m2/month
20 dB(A)
REDUCED AFFECTATION

* increase the residual heads at areas of existing low pressures to meet the Public Works Department minimum criteria of twelve metres.

It should be noted that it is proposed to connect all new development whether north or south of the railway, to the reticulation in Area B because of the low capacity and pressures within the reticulation of Area A.

* Staged Augmentation

Although the former study indicated one particular staged augmentation of the system, the system development is dependent on the areas that are developed first. Development can proceed in areas and at times different to that indicated in the recent investigation.

Fifteen potential residential and three potential industrial areas have been identified for consideration in this study as areas of possible future expansion. These areas have their physical characteristics outlined in Table 5.1. They are shown on Map 22.

The water supply requirements for each of the areas is presented in Table 5.2.

Table 5.1: Development Areas - Physical Characteristics

Development Area	Area (a)	Tenements
1	21.1	232
2	54.6	601
3	19.4	213
4	45.4	499
5	15.1	166
6	88.7	976
7	98.8	1,087
8	57.8	636
9	14.9	164
10	22.4	246
11	112.0	1,232
12	153.6	1,689
13	493.0	5,423
14	1,168.0	12,848
15	157.0	1,727
16	168.0	1,848
17	208.0	2,288
18	280.0	3,080

Note: These are maximum values which will probably not be achieved in reality.

Table 5.2: Development Areas - Water Supply Requirements

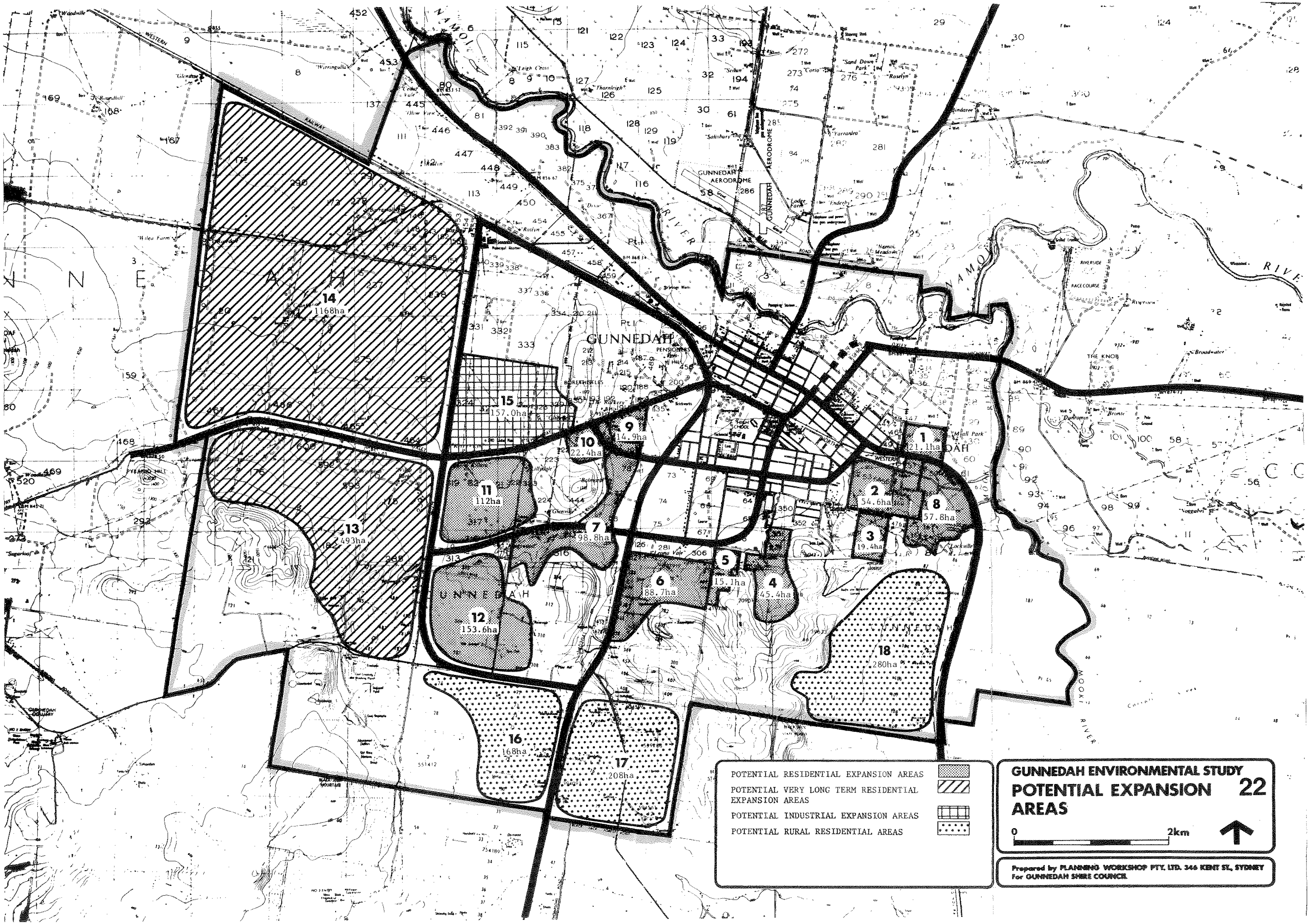
Development Area	Instantaneous Flow (L/s)	Reservoir Capacity (ML)
1	35	1.2
2	90	3.0
3	32	1.1
4	75	2.5
5	25	0.8
6	146	4.9
7	163	5.4
8	95	3.2
9	24	0.8
10	37	1.3
11	184	6.4
12	253	8.7
13	813	28.0
14	1,927	66.0
15	259	8.9
16	277	9.6
17	343	11.8
18	462	15.9

Note:
* These are maximum values which will probably not be achieved in reality.
* The tenement loadings are based on current Public Works Department criteria for small country towns.

The constraints to development for each of the areas is presented in Table 5.3.

Table 5.3: Development Constraints

Development Area	Constraints
2, 8	A significant part of each of these areas is located away from the bulk of the reservoirs and will require extensive augmentation within the existing system to provide supply.
1	This area is located north of the railway but should be connected to the reticulation and mains for Area 8. The bulk of the reservoirs and the supply mains are located on the other side of town. The system will require extensive augmentation through existing residential areas.



GUNNEDAH ENVIRONMENTAL STUDY
POTENTIAL EXPANSION AREAS
22
0
2km
Prepared by PLANNING WORKSHOP PTY. LTD. 346 KENT ST., SYDNEY
For GUNNEDAH SHIRE COUNCIL
POTENTIAL RESIDENTIAL EXPANSION AREAS
POTENTIAL VERY LONG TERM RESIDENTIAL EXPANSION AREAS
POTENTIAL INDUSTRIAL EXPANSION AREAS
POTENTIAL RURAL RESIDENTIAL AREAS
1 21.1ha
2 54.6ha
3 19.4ha
4 45.4ha
5 15.1ha
6 88.7ha
7 98.8ha
8 57.8ha
9 14.9ha
10 22.4ha
11 112ha
12 153.6ha
13 493ha
14 1168ha
15 157.0ha
16 168ha
17 208ha
18 280ha
GUNNEDAH
GUNNEDAH AERODROME
NAMOI RIVER
MOOKI RIVER
RAILWAY
WESTERN
RIVERSIDE
RACECOURSE
THE KNOB

Table 5.3: Development Constraints (cont'd)

Development Area	Constraints
3	A large section of this area is located above the reduced level that can be supplied by the existing system. This area would require the construction of a booster station or a small reservoir. The remaining low level section can be supplied using the existing system with some augmentation.
4 Low	The relatively low lying section of this potential residential area should be relatively easy to supply, with some augmentation. Some of its higher reaches will, however, experience residual pressures close to the Public Works Department minimum.
4 High	This area stretches into the upper reaches of Ashford's Water Course. It is located above the reduced level that can be supplied by the existing system and will require the construction of a high level reservoir to provide adequate residual head.
5, 6	This area was studied in some detail in the water supply report. The area will require the construction of minor reticulation and also will require the construction of a pumping station and a high level reservoir.
7	This area is located west of Wandobah Road and should be serviced by the proposed High Level Reservoir and the Borethistles Reservoir. The augmentation required should be an extension of Area 6 reticulation.
11, 12	This area is located west of the low ridgeline west of the township. The area could partially be served by a reservoir on Borethistles Hill, but a reservoir on Balmoral Hill may be required. These areas are substantial and will require a reasonable amount of augmentation to service. This area should be a natural extension to Area 7.
18	This area is long term, it will require the construction of a large reservoir on the ridgeline south of Porcupine Hill. It would be a natural extension after Area 8. The construction of this reservoir would allow the service of some of the areas around 2, 8 and 3 that are currently too high to be served.
16, 17	These areas would require a reservoir located on an adjacent ridgeline and are located a long way from the bores which supply the town. They may be developed after areas 6, 7, 11 and 12 but not before.

Table 5.3: Development Constraints (cont'd)

Development Area	Constraints
13	This area will require a reservoir located on the ridgeline to the north of Blackjack Mountain. The area is located a long distance from the town bores.
14	This is an extremely large area, but it has the advantages of being relatively close to the bores that supply the town water. A logical development of this from the north-eastern corner would be feasible.
9, 10	This is a small industrial area west of an existing industrial area on the Oxley Highway. The capacity of the existing system should be relatively easy to augment to provide adequate supply.
15	This area is located a fair distance from the existing system and will require extensive augmentation and a reasonably sized reservoir on Borethistles Hill to provide supply. This area will not be developed for a number of years.

Each of the areas has been examined in some detail using the following criteria:

* proximity to existing system;
* level of augmentation required, particularly reservoirs and trunk mains;
* problems with residual pressures;
* pumping requirements.

The areas have been priority rated according to their potential for development in the short term, or long term. A system of ratings from I to IV have been applied to the areas, a rating of I indicating potential for short term development, a rating of IV representing long term development (say twenty to fifty years).

This rating system will also be applied to the sewerage system.

It should be noted that this rating is purely for water supply or sewerage only. It does not mean that an area with a rating of IV cannot be developed before an area with a rating of I. It simply means that it would be a natural development of the system to develop the lowest rating areas first. The rating for each area is presented in Table 5.4.

Table 5.4: Potential Residential and Industrial Areas Rating

Area	Rating	Comment
2, 8	II	
1	III	
3	II, IV	High level new reservoir
4(low)	I	
4 (high)	IV	High level, new reservoir
5, 6	I	
11	II	Area 7 first
12	II	Area 7 first
18	III	
17	IV	
16	IV	
13	III	
14	I	If no other Area developed
7	I, II	
9, 10	I	
15	II, IV	

Sewerage

Sewerage provides a major constraint to some of the residential and industrial areas that can be developed utilising the existing system. A sewerage study of Gunnedah was recently completed for Gunnedah Shire Council. This study provided a number of recommendations to augment the system to cater for approximately thirty years development.

A summary of the relevant recommendations is presented as follows:

* Gravity Sewers

The main sewers that were constructed in the original system are overloaded in their lower sections. It is proposed to augment these mains with new trunk mains laid parallel to the existing mains. The mains will intercept some of the existing branch lines.

* Pumping Stations and Rising Mains

The existing pumping station has the capacity to cater for peak dry weather flows, but not peak wet weather flows. A new set of pumps and pipework should be installed in the existing wells. A new rising main will be required to increase the capacity of the mains from the pumping station to the sewage treatment works.

To service the industrial area to the west of the township, it is proposed to provide a new Pumping Station and Rising Main to the Sewage Treatment Works. The initial capacity of the pumping station is 8 litres per second.

* Sewage Treatment Works Strategy

The existing sewage treatment works has its capacity reduced by the pumping station associated with the primary treatment area. This treatment works has a capacity of 11,000 Equivalent Persons (EP) while the pumping station has a capacity of only 6,400 EP.

The current operation and performance of the works indicated that although the works was theoretically overloaded, it was currently operating satisfactorily for most of the year. It is proposed to augment the works within the next few years.

The recent study indicated that the augmentation of the sewage treatment works should be with the Extended Aeration Tank System which uses the activated sludge process.

Although this type of process has a number of advantages in operation, the recent high increases in electrical costs may make the system uneconomical. Other methods, such as trickling filters, will provide a satisfactory effluent without high operating costs.

A cost/benefit study of the process should be undertaken prior to design of the works as the treatment works can be a significant cost in the total cost of a sewerage system.

The physical characteristics of the fifteen potential residential and four potential industrial areas under consideration were presented in Table 5.1. The predicted flows for each of the development areas are shown in Table 5.5.

Table 5.5: Development Areas - Sewerage Flows

Development Area	Peak Dry Weather Flow	Peak Wet Weather Flow
1	5.1	18.6
2	13.2	48.0
3	4.7	17.0
4	11.0	40.0
5	3.6	13.3
6	21.5	78.3
7	23.9	86.9
8	14.0	51.0
9	3.6	13.0
10	5.4	19.7
11	27.0	99.0
12	37.0	135.0
13	119.0	434.0
14	282.0	1,029.0
15	38.0	138.0
16	41.0	148.0
17	50.0	183.0
18	67.0	247.0

Table 5.6: Development Constraints

Section	Constraints
2, 8	There is not the capacity in the existing mains to service this potential residential area. To provide capacity to this area one of the original mains will have to be duplicated. It is not a difficult area to sewer.
1	Only a small portion of this area can be drained by gravity to the existing sewerage system. It will require the construction of a pumping station at the north-western corner of the development. Pumping stations require regular maintenance and are an on-going cost. The construction of a pumping station should thus be deferred for as long as possible.
3	The proposed augmentation to the existing system should service this area without difficulty.
4	This area should be servicable with the proposed augmentation, but some lengths of main will have to be duplicated in the existing system.
5, 6	This area was examined in detail in the recent study. This potential residential land will require the duplication of an existing main.
7	This area should require similar augmentation to Area 6, except for the construction of sewers through or around Blackjack Creek.
11, 12	This area would be serviced using the mains constructed for the industrial Area 14. It would thus form part of an independent system with the the advantage of not duplicating mains through the existing township which can be expensive.
13	This area would be serviced as an extension to Area 8 although it would require a pumping station and rising main to service the lower areas.
17, 16	These areas would be serviced as extensions to Areas 7 and 6. This will mean very large mains laid through the existing township and to Area 7. These will be very expensive.
13	Extension of any system that would be to service areas 11, 12 and 14.

Table 5.6: Development Constraints (cont'd)

Section	Constraints
14	This area will require an independent system of reticulation, pumping station and rising main to the sewage treatment works that is not located very far away. This new system would be relatively easy to install along the open country areas compared to going through the township to other areas.
9, 10	This area will require the extension or duplication of an existing main along the Oxley Highway.
15	This area will require the construction of a rising main, pumping station and reticulation to service this industrial development. This development, while not difficult to service, should follow the other industrial areas because of its distance from the sewage treatment works.

Each of the areas has been examined to determine:

* proximity to existing system;
* level of augmentation required; particularly with regard to duplication of existing mains;
* cost to provide services.

The priority for development of each of the areas was rated using the same system as that used in the section on water supply. The rating for each area is presented in Table 5.7.

It would be preferable for development to proceed on either the eastern or western edge of the town, but not both simultaneously. The areas to east and south-west will require the duplication of an existing sewer main, thus the duplication of both mains simultaneously may not be an economic proposition. If they are both duplicated, then the diameter may be smaller than that required for the ultimate load.

The industrial and residential areas to the west of town can be developed independently of the other potential residential areas, because they will require construction of new sewerage system from the treatment works. This has a number of advantages in avoiding expensive duplication of the existing main through the township.

Table 5.7: Potential Industrial/Residential Areas Rating

Area	Rating	Comment
2, 8	I	Duplication of main
1	III	Pumping Station required
3	I	Duplication of Main
4	II	Area 6 first because of duplication
4	II	
5, 6	I	Duplication of main
7	II	
11	II	
12	II	
18	III	
17	IV	
16	IV	
13	III	
14	I	New System close to treatment works
9, 10	II	
15	II	Pumping station required

Drainage

The development and growth of the township of Gunnedah has taken place on the river plain along the Namoi River. The town is located in the lower reaches of a number of catchments. These catchments are as follows:

* Ashford's Water Course Catchment.
* Osric Street Catchment.
* Stock Road Catchment.
* Blackjack Catchment.
* Killara Catchment.
* Meadow Park Catchment.

Construction of the town across the lower sections of the Ashford's Water Course and Osric Street Catchments has created a number of flooding problems, particularly in those areas where the existing drainage system has an extremely limited capacity.

A number of recent studies and designs have been undertaken to alleviate some of these flooding problems. The urbanisation of the upper reaches of these two catchments is going to:

* decrease the time of concentration;

* increase the flood peaks and flooded areas;

if a conventional type of drainage system is constructed on these two catchments.

The problem of flooding in the lower reaches can be alleviated with the use of the following drainage structures in the potential residential areas.

* detention basins;

* floodways.

The design philosophy of detention basins and floodways is as follows.

* Detention Basins

The role of detention basins in a drainage scheme is to attenuate flood peaks by storing that part of the flow equivalent to the peak section of the inflow hydrograph to reduce post-urbanisation peak flows to pre-urbanisation level.

The following guidelines for basin design have been adopted:

* In line with the philosophy of disturbing the natural drainage system as little as possible, detention basins are to be generally located on sites of existing dams, or in existing depressions. Where possible, proposed roads are to be utilised as detention basin embankments.

* The major hydrologic consideration to be made in siting of detention basins is the effect of changing response time of a tributary on the total outflow hydrograph. A basin located on a tributary such that the peak of that tributary, is lagged to coincide with the peak of another tributary may actually increase the peak flow downstream of the confluence of the two tributaries. Therefore, basins must be located so that peak flows from the various tributaries are put out of synchronisation.

* Detention basins are able to perform multi-purpose functions if they provide for passive and active recreation facilities. They are well suited for use as playing fields, running tracks, barbecue areas or parklands. For active recreation uses, basin invert contours and basin shape should conform with the complementary uses in the final design. For passive recreation areas, earthworks should be unobtrusive and sympathetic to the environment, trees should be retained where possible and attention should be given to landscaping aspects such as field of vision. Practice in this regard is to provide batter slopes flatter than, or equal to, 1 in 6.

* A maximum depth in the basins of 1.2 metres in the 100 year flood has been adopted as a safety guideline, consistent with emerging practice. The embankment must be stable and capable of resisting scouring under flows greater than the 100 year flood.

The outlet from the basin at low flow is provided by the low flow pipe system. At higher flows, increased outlet capacity is provided by additional pipes beneath the embankment. For major floods, flow occurs over the embankment spillway. Outlet capacity from basins should be

designed so that the spillway first operates for a storm with recurrence interval of about 20 years, thus giving attenuation for a range of storms with varying recurrence intervals.

Floodways

The primary function of a floodway is to control and convey flood flows through-site. Floodways have a significant advantage over piped stormwater systems in terms of cost of construction, flood peak attenuation, multipurpose use, removal of sediment and filtration of pollutants. Guidelines and constraints adopted for floodway design are described below.

* Location: Floodways should generally be located along the natural drainage paths, thus minimising earthworks and disturbance to the environment.

* Safety: Research into the hazards involved with moving water has indicated that the two most important factors are depth and velocity. In line with this research, the criteria proposed for 100 year flows in floodways are:

  . maximum average floodway velocity - 2 metres per second (for any depth);
  . maximum depth of flow - 1 metre;
  . maximum product of depth and velocity - 1 square metre per second.

* Capacity: The above constraints apply to all flows up to the 100 year level and have been the critical criteria in selection of floodway widths.

* Open Space: Floodways have a secondary function as linear parks or as buffer zones between residential development and roads or industries. They also provide areas of passive recreation, enhancing the aesthetic appearance of a development. As a result, all trees should be retained where possible, and earthworks should be kept to a minimum. Floodway systems are proposed to be integrated into the overall planning and landscaping.

* Erosion: For erodable soils, with a kikuyu grass cover, the Soil Conservation Service recommends a maximum permissible velocity of 2 metres per second (Soil Conservation Service 1978). Experiments at the Water Research Laboratory of the University of NSW indicated that this figure is probably conservative (Bonham, 1974). The maximum average velocity that should be adopted is 2 metres per second.

* Vegetation: Besides their aesthetic value, trees can perform a hydraulic function in floodways in impeding flood flows and distributing the flow uniformly across the channel. In calculating floodway velocities, an assessment of the channel roughness or Manning's 'n' must be made. The value of 'n' is dependent on the boundary roughness of the channel and the drag provided by the

vegetation. Research undertaken by Bonham (1978) indicated that for a channel vegetated with an array of trees, drag was a far more important factor in retarding flow than boundary roughness, and that increases in discharge and depth of flow resulted in small increases in channel velocity. The velocity of flow was found to be more uniform across a floodway vegetated with an array of tall trees that across a cleared floodway.

The work cited above suggests the adoption of a value of Manning's 'n' of 0.05 for major floods. This figure requires that the vegetation density will be such as to provide a 50 per cent canopy cover. If the tree density is to be less than this in any location, a wider, shallower floodway will be required, resulting in some increase in floodway width at that location.

* Access: Floodways may be used as locations for bikeways and walkways as a result of their linear nature. For safety, transverse road and path crossings should be elevated above design water levels.

* Maintenance: Batter slopes of 1:6 in the floodways ensure easy maintenance. Regular mowing is desirable to control weeds and to maintain grass cover.

* Low Flow System: The majority of flow in the trunk drainage system is conveyed within the open floodways. Trickle flows and frequent, low flows are proposed to be contained within a piped system. Without such a system, floodway inverts would be subject to constant saturation which would inhibit maintenance and promote erosion. It is therefore desirable to limit frequency of flooding.

  The following guidelines should be used for the design of a low flow pipe system:

  - capacity should be based on a flow of 2 litres per second per hectare of contributing catchment;

  - minimum pipe size - 325 millimetres.

The construction of new residential and industrial areas can create tremendous problems with sediment-laden run-off. The current trend in the design of drainage systems is to incorporate structures that are capable of preventing the movement of sediment to the lower reaches of the catchments.

The following structures have been used in the development of residential and industrial estates elsewhere:

* Sedimentation Basins.
* Contour Banks.
* Others.

The current design philosophy of these structures is as follows:

Sedimentation Basin

The role of a sedimentation basin in a drainage system is to reduce the quantity of sediment carried by high flows. A sedimentation basin acts to trap and store sediment before the flow peaks are routed through the detention basin.

The following guidelines for basin design have been adopted:

* In line with the philosophy of disturbing the natural drainage system as little as possible, sedimentation basins are to be generally located in existing depressions.

* Sedimentation basins are installed prior to the construction of roads and sewers to control all sediment discharged.

* A maximum depth in the basins of 1.2 metres in the 100 year flood has been adopted as a safety guideline consistant with emerging practice.

* A volume of at least 120 cubic metres per hectare of development catchment is to be provided (Soil Conservation Service 1978).

* To prevent short circuiting of the sediment-laden floodwater, the sedimentation basin must have a length to breadth ratio of at least two (Soil Conservation Service 1978).

* The inlet and outlet structure from the basin will be constructed from an antivortex riser, similar to those illustrated in the Soil Conservation Manual. It is proposed to provide a trickle flow pipe underneath the basin to carry small base flows during dry periods to ensure complete drainage of the basin. This pipe will allow 'trickle' flows to bypass the basin, but will provide a 'choke' to the larger flows of the trunk drainage system, routeing these flows through the sedimentation basin. The choke will require regular maintenance.

* The sedimentation basin will be required during the construction period of the development. At the completion of this period (2 to 4 years), the basin will be regraded to form an open channel. The choke will at that stage be removed from the low flow system.

It is suggested that Council adopts these guidelines for the design of detention and sedimentation basins until an assessment can be undertaken on behalf of Council.

Potential residential and industrial areas have been examined in each of the major catchments that bound the township, as shown on Map 14 and as detailed in Section 3.3.3.

The proposed strategy to allow the development of each of the catchments with a minimum of disturbance to the environment is as follows:

* Ashford's Water Course Catchment

The urbanisation of the upper reaches of this catchment is likely to intensify the potential for flooding of the lower reaches of this catchment if a conventional piped drainage system is utilised on the catchment.

It is proposed that any further development of this catchment utilise detention basins and floodways to prevent overloading of the existing hydraulic structures.

This catchment will present a number of difficulties in the construction stages because of the relatively steep slopes in the upper reaches.

It is suggested that this catchment not be developed any further in the short term, until the capacities of the hydraulic structures in the lower reaches are increased.

* Osric Street Catchment

This catchment contains the potential residential areas around Porcupine Hill. The urbanisation of this area in the upper reaches of the catchment will create problems in much the same manner as in the Ashford's Water Course Catchment.

It is also proposed that any further development of this catchment (Carroll-Pearson Street) utilise detention basins and floodways to prevent overloading of the existing hydraulic structures.

This area should not present difficulties in the construction stages because of the relatively uniform nature of the land. This catchment may be developed in the short term, although other potential residential areas should be considered first.

* Stock Road Catchment

This is a relatively small catchment that has only a low level of existing development. This catchment drains into a number of existing culverts that flow beneath the railway line. The capacity of these culverts was not ascertained during the Study.

It is not proposed to utilise detention structures in the development of the residential land because of the land's proximity to the Mooki River and the number of culverts under the railway. If these culverts should experience hydraulic overloading and are difficult to upgrade, then some type of minor detention structure may be required.

This catchment may be urbanised in the short term without adverse affects in the existing township.

* Blackjack Creek Catchment

This catchment includes a large amount of potential residential and industrial areas.

The area of the catchment is much greater than the potential residential and industrial area that may be developed. A number of major watercourses are present within this catchment, particularly Blackjack Creek.

Council intends to reconstruct the lower reaches of Blackjack Creek, particularly across the Crown Reserve. It is recommended that this work be undertaken prior to the development of any residential land.

To avoid any possible flooding of residential and industrial areas, it is proposed to restrict all development to be outside the limits of the 100 year flows for this catchment. This development constraint must be rigidly applied to avoid damage to future structures. These potential flooding areas should be identified by Gunnedah Shire Council prior to any development of the land.

Although detention basins may be required to develop the residential and industrial land, it is not proposed to allow the construction of detention basins on the major drainage courses.

* Killara Catchment

This catchment would include a large amount of potential residential land.

The area of the catchment is not much larger that the area to be developed on the catchment. If this land is developed, then a comprehensive system of detention, sedimentation basins and floodways should be installed as the development proceeds.

The railway forms the only barrier to the development and, as such, the catchment has a high potential when compared to the existing developed catchments.

* Meadow Park Catchment

This is a relatively small catchment located south of the Stock Road Catchment, and has only a few scattered farmhouses. This catchment drains to the railway line and then to the Mooki River.

It is not proposed to utilise detention structures in the development because of the land's proximity to the Mooki River. A number of floodways may be utilised in the lower reaches rather than a piped system.

This catchment can be urbanised in the short term without adverse affects on the existing township.

Electricity

Gunnedah Shire Council approached various servicing authorities in early 1982 in anticipation of the need to expand the township of Gunnedah in the near future. The Namoi Valley County Council was one of those authorities approached. However it was unable to provide information on the ability to extend service mains as required without specific details of areas of expansion proposed, which had not been determined at that date.

The Namoi County Council has now been asked to comment on the potential areas of urban expansion identified by the Study. A reply from the Council has not yet been received and it could be expected that such investigations would take some period of time. However in our view, it is unlikely that electricity supply will act as a major constraint to development of any of the areas specified.

Telephone

Gunnedah Shire Council also sought advice from Telecom Australia at this time in relation to the extension of telephone services. Telecom verbally advised Council that it also had no real constraints to further development of Gunnedah, except of finance. In this regard expansion across the river to the north was considered likely to be extremely expensive and desirably avoided. Expansion west, while possible, would also be expensive, requiring a great deal of work on main cables. Expansion to the south was considered most desirable, existing services being most capable of amplification at lowest cost.

5.2.2 Conflicting Land Uses

Abattoir

The abattoir is located at the intersection of Blackjack Road and the main north-western railway line. It is indicated on the planning scheme map as a very small area of 'special use'. The total area of land used for abattoir purposes is, however, much larger than that presently zoned for special uses, as is shown on Map 21.

The siting of the abattoir in this location acts, consequently, as a physical constraint to development in terms of the area of land required to be retained for its space-extensive purposes. However, it also exerts a significant environmental effect on the land surrounding its own boundaries, mainly by virtue of the odours emitted from the works.

The examination of the climate of Gunnedah indicated that the dominant wind directions were from the east, south-east and north-east. If this were so, odours emitted from the abattoir, being at the north-west corner of the town, would be swept away from the town. However it is likely that winds from the south-west, west and north-west are under-represented at the local meteorological station due to the sheltering effects of hills bordering the western side of the station. The records of Boggabri and Coonabarabran in fact indicate that the strongest winds occur from the north-west, west and south-east during the year. Other winds are very light, rarely exceeding 19 kilometres per hour.

It is consequently likely that a very strong north-west wind would spread some odour toward and over the town. However, any such effect is somewhat mitigated by the range of hills between the abattoir and the town, and consequently it is not seen as a substantial problem.

The constraint should be noted, however, that a strong north-west wind would affect land between the abattoir and the range to its south-east; and light prevailing winds from the north-east and east would affect all that land immediately adjacent to the works to the west of the Blackjack Road and north of the Mullaley Road.

Tannery

The tannery is located to the far north-western corner of the Study Area roughly in the centre of the latter identified land. It also emits noxious odours, and uses two nearby land parcels for effluent disposal.

The siting of the tannery in this location creates a further constraint to the development of the land north of the Mullaley Road and west of the Blackjack Road. When light winds are prevailing, it will effect land locally to its west, south-west and north-west. When stronger winds are prevailing it will effect land for some distance to its east, south-east and north-west. The flat nature of much of the land in this direction means that few barriers to the transmission of these odours are created.

Coal Siding

The location of the Gunnedah Colliery siding at the conflux of the road and rail line between the tannery and abattoir adds a further constraint to development of this area. The same wind conditions as described above will apply. These winds could be expected to have significant environmental effects on the surrounding land as coal stockpiling is considerable and uncovered. Evidence of dust transmittal from coal transportation is also apparent along surrounding roads in the vicinity.

Coal Mining Activities

Coal mining is presently being undertaken in the south-west corner of the Study Area by the Gunnedah Colliery. The operating company, Gollin-Wallsend Coal Company Ltd, holds a further two authorisations in the area to the north-west and south-east of the existing site. It has recently applied to commence mining operations and establish supporting surface facilities on the southern authorisation site. Part of this authorisation area lies within the Study Area. As part of the application process, an Environmental Impact Statement has been prepared for the proposal, mining activities being a 'designated development', i.e. an activity likely to cause significant adverse environmental impact, under the new Environmental Planning and Assessment Act.

Assessment of the proposed mining activities on the surrounding environment, and ascertainment of the constraint which mining consequently imposes on the development of land in the Study Area, can be determined from this Environmental Impact Statement.

Current mining carried on in this area is all underground. The proposal on Authorisation 138 is for the establishment and operation of an open cut mine. Generally it could be said that an open cut mine would have a greater environmental impact than an underground mine of equivalent proportions. The proposed operation will incorporate the following features:

* Raw coal would be brought to a Receival Area at the existing Coal Preparation Plant for crushing and beneficiation.

* Rejects would be disposed of in the excavations retained open in the open cut operations for this purpose.

* Mine waters would be handled in the existing system.

Some impacts would occur specifically during construction. These could be expected to include impacts on water quality, air quality, noise levels and other minor effects. Generally these appear to be either lesser than will occur during the mining operation, or according to the Statement, of no significance.

During the life of the project, impacts which could potentially affect surrounding land are as follows:

* Change of topography: There will undoubtedly be an impact on topography in the short run while coal is being extracted. However the Environmental Impact Statement states that the proposed rehabilitation programme has been designed to repair this damage and create stable new landforms on-site which will 'merge imperceptibly' with the existing terrain, alleviating any long term impact.

* Change in surface drainage patterns: A new drainage pattern will be constructed on the site after rehabilitation which "will not change the positions or flow characteristics of the creeks on the areas outside of the property."

* Increase in noise levels: According to the Environmental Impact Statement, the operations of the mining plant and the movements of trucks will not result in significant increases in noise levels above background on properties which are not company owned or the subject of leasing arrangements with land owners. Minor increases in noise levels may occur on an area of land approved in principle for hobby farm development and at one house on the eastern side of Wandobah Road.

  The approximate extent of this affectation is shown diagramatically on Map 21. Precise determination was not possible due to the limited extent of the maps within the Environmental Impact Statement. The distance of the 20 dB(A) reading for maximum night-time noise at the furthest point from the workings has consequently been used as a surrogate indicator. The 20 dB(A) noise contour predicted from truck movements has also been extended around the remainder of the leases as a whole.

It should be noted that due to the proposal to construct a 4 metre bund wall around the open cut operation, noise levels of this order are expected to occur no longer than 3 years from commencement of operations. Depending on this commencement date, this constraint may consequently be somewhat reduced in extent by the time of expansion of urban development to this vicinity.

* Reduction in air quality: This will occur due to dust fallout on properties within the Authorisation. Again the full extent of dust deposition is not able to be determined from the information given, especially to the north of the site which would be the direction affected by the prevailing winds. However, the area in which any affectation will occur, is estimated on the accompanying map. While this deposition may be well below ambient average conditions, any additional deposition on existing levels should be considered an adverse environmental effect, if not a constraint to development and, as such, needs to be considered in determining suitable sites for new urban expansion.

* Visual impact: The Environmental Impact Statement states that no long term visual 'scars' will be evident from the operation. However, during its currency of some 19 years, there will be a localised visual impact from the Wandobah Road and properties to the east. These are demonstrated graphically on the constraints map, although its precise extent will, of course, vary as operations move.

* Increase in truck movements: The project will require approximately 40 return truck trips per day between the mine and the company's siding. While this presently "passes mainly through undeveloped areas", its impact will be significant should the surrounding areas be developed. This road presently supports 91 return truck trips per day from the existing Colliery workings. This road is used mainly by colliery traffic and in fact in the Environmental Impact Statement is referred to as "the coal haulage road". Impacts will occur in the next 20 years if residential development should proceed in the surrounding areas due not only to the passing of truck traffic, but possible dust deposition unless necessary haulage safeguards are implemented.

* Increase in rail traffic: The increase in rail traffic likely to occur as a result of the Gollin proposal is 3 additional coal trains per week. To this impact should also be added the potential impact of additional trains generated from other coal developments to the north if these should proceed. We believe from our investigations that the total expansion could result in an increase of up to 13 trains per day.

This has implications on Gunnedah in terms of dust deposition, both in rural areas and through the town, increased noise and increased inconvenience, as level crossings in the town are increasingly closed more frequently.

From a traffic point of view the latter is not seen as a substantial problem. An alternative overbridge presently exists and is likely to be upgraded, although it does have absolute limits. Queuing at crossings will never exceed unacceptable levels from a traffic management point of view. However, the inconvenience to an increasing number of southern town dwellers must be weighed.

From other points of view the effect may be more serious. It should be recognised that a very substantial increase in tonnage of coal transported along the north-west rail line occurs at the Gunnedah siding and that this passes through the town centre. The tonnage proposed to be loaded from the BHP/AMAX development, if this proceeds, may be in the order of 4 to 4½ million tonnes per annum by 1990/91. The tonnage from the Vickery develoment could be 3 to 3½ million, and from the Gunnedah Colliery ½ to 1 million. This amounts to some 7½ to 9 million tonnes of coal per annum hypothetically passing through Gunnedah by 1990 to 1991. Another ½ to 1 million tonnes may be loaded at Curlewis. However the impact of this is less significant, being south of the town. We believe that one train per day of standard size can transport approximately 700,000 tonnes of coal per year. It can consequently be hypothesised that between 11 and 13 additional coal trains daily will be required by 1990/91 to transport coal if all developments should go ahead as planned.

The environmental effects of this increase are difficult to quantify. They will include:

* noise effects, probably the most significant community impact;

* vibration;

* visual impacts (e.g. the line, trains and lights);

* air pollution (e.g. dust and dirt, fumes and odours).

The effect of air pollution can be somewhat ameliorated. Washing of coal before leaving loading points, protective spraying, loading below gunwales or covering can decrease dust fallout. The other effects are difficult to minimise and the seriousness of such a continuing impact on the town and community at this stage is difficult to quantify. When available, Council should assess these aspects of coal proposals within the appropriate environmental statements and should make appropriate submissions in relation to these effects after due consideration of the evidence presented.

The latter impact cannot be demonstrated graphically, nor in their totality can all other impacts. The Environmental Impact Statement assumes that:

> ". . . there is suitable land to the south of the town to accommodate residential development over the next 5 to 7 years. After this time, further releases to the south could be contemplated by Council. All of this land is well removed from the influence of the proposed mine." (p.80)

Our investigations show that if all proposed mining ventures proceed, and maximum resultant rates of population growth in Gunnedah occur, this may well not be the case. The Environmental Impact Statement does not consequently consider the impact of the proposal on future development of this area. It is our consideration that while this Study has been able to broadly identify the ways and areas in which environmental impact from mining may occur, the Council should ensure that the impacts from the mine are consistently monitored and future urban development permitted only where it is not in conflict with the mine.

5.3 Development of Urban Scenarios

Four urban scenarios have been developed in response to the examination of the growth prospects of the town in Section 4.1:

Scenario 1: This is the 'base' case scenario. It assumes that past levels of population growth will continue into the future, and that no major growth will occur from economic developments such as coal mining projects. Future population projections have been made based on past trends and current expectations.

The most likely source of population growth in excess of the base projections is from coal mining activity on Gunnedah's future population is difficult to determine precisely at this stage. There are many unknown variables in relation to which of the proposed developments will go ahead, when, and the effect they will have on Gunnedah. For this reason, 3 different scenarios can be developed which reflect the varying possible impacts of coal development and its multiplier effects. These are the following:

Scenario 2: The first coal-related scenario assumes that 25 per cent of growth derived from coal development will occur in Gunnedah. This is in all likelihood a low estimate of the attractive power of Gunnedah. For various community reasons, e.g. the pleasantness of residential areas, the existence of schools with spare capacity etc., the proportion of the total coal workforce attracted to Gunnedah as opposed to the large range of other possible centres within commuting distance, is likely to be considerably higher.

Scenario 3: This scenario assumes a medium growth rate - that some 50 per cent of growth derived from coal development will occur in Gunnedah. Given that the mining companies involved see most of the additional population living in either Boggabri or Gunnedah, it would seem appropriate to expect a fairly high proportion of the overall growth to occur in Gunnedah.

Scenario 4: Scenario 4 assumes that given the likely greater attractiveness of Gunnedah over Boggabri, some 75 per cent of growth associated with the coal mining developments will locate in Gunnedah. However, given the actual much wider choice of alternate locations than merely Gunnedah and Boggabri, it would appear reasonably unlikely that growth in Gunnedah would reach this level.

Scenarios 2, 3 and 4 all assume a straight extrapolation of mining growth from its inception to a time when the mines become fully operational, and population growth will revert to the base case growth rate.

In actuality, the situation may be more complicated. One development may be implemented and not others; or the rate of development may be retarded once initiated, or hastened. All of these situations can be handled within the maximum framework presented in the following table, and the alternate structure plans are developed to comply with the maximum likely demands of population growth, dwelling requirements, and raw land requirements. These are as follows:

Table 5.8: Population Growth

Scenario		Year 1981	1986	1991	1996	2001
1	Base	9,062	9,510	9,980	10,473	10,991
2	Low	9,062	10,127	11,185	11,738	12,318
3	Medium	9,062	10,744	12,390	13,002	13,645
4	**High**	**9,062**	**11,361**	**13,595**	**14,267**	**14,972**

Table 5.9: Dwelling Requirements

Scenario		Year 1981	1986	1991	1996	2001
1	Base Case	2,989	3,238	3,499	3,772	4,060
2	Low	2,989	3,580	4,168	4,475	4,797
3	Medium	2,989	3,923	4,837	5,177	5,534
4	**High**	**2,989**	**4,266**	**5,507**	**5,880**	**6,272**

Table 5.10: Additional Land Required for Rezoning for Residential Purposes Under High Growth Option

	1981-91	1991-2001	1981-2001
Additional dwellings required	2,518	765	3,283
Additional lots required	2,056	625	2,681
Land bank requirements	700	-	700
Available zoned vacant allotment equivalents	800	-	800
Total lot requirements	1,956	625	2,581
Land requirements (ha)	261	83	344

5.4 Planning Aims, Objectives and Principles Restated

A great number of planning needs and deficiencies have emerged from the preceding Study. In our investigations of the optimum methods by which such needs should be overcome and deficiencies filled, a number of aims, objectives and principles or policies have emerged as desirable.

In accordance with Section 58(c) of the Act, the following aims, objectives and policies are put forward for adoption by the Draft Local Environmental Plan. These may be amended during the period for public submissions. These aims, objectives and policies are designed to achieve the relevant objectives of the Environmental Planning and Assessment Act, 1979 as set out in Section 2.4.

5.4.1 Aims

* To provide for the development of the town of Gunnedah in physical, social and economic terms.

* To provide for the improvement of the urban environment of the town.

* To provide for the orderly and economic development, and optimum use of land and resources within the town.

* To cater for the development pressures which may be exerted on the town without adversely changing its character.

* To conserve important natural and man-made features located within the town and its environs.

* To provide for and realise the likely needs and aspirations of the existing and future population of the town.

5.4.2 Objectives

* To locate new urban development so as to maximise the use of existing infrastructure and minimise development costs.

* To provide a wide range of housing stock in appropriate locations.

* To provide adequate social and community facilities and services in locations readily accessible to users.

* To provide adequate land for industrial and commercial development with a view to broadening the economic base of the Shire and creating job opportunities.

* To provide an effective transportation network.

* To protect, effectively develop and utilise the resources of the Shire.

* To protect areas of outstanding natural beauty and buildings, and places of scientific, historic, prehistoric or architectural significance.

* To minimise air, water, noise and visual pollution through the proper location and control of industrial and commercial land use activities.

* To provide guidance to the community of the manner in which the effects of growth and change are proposed to be managed; and to the private sector in terms of future development opportunities and requirements.

* To preserve prime agricultural land, where appropriate, and protect these lands from the loss of viability caused by subdivision.

* To provide an adequate supply of zoned land in appropriate locations to accommodate demand for small rural allotments.

5.4.3 Principles/Policies

General

(i) Development should be prohibited within floodways and controlled within floodplains to obviate damage caused by frequent flooding or the possibility of Council liability for flood damage.

(ii) Uses incompatible within an urban area should be gradually relocated to more suitable positions in those areas identified as suitable for potential urban expansion.

(iii) Council should involve itself in the land conversion process, both in the provision of residential and industrial land in order to:

* regulate the supply and therefore the price of land; and

* ensure the type and standard of development it desires.

(iv) The existing planning scheme requires modernisation and simplification in accordance with modern practices.

(v) Additional open space and public areas should be created, where possible, to increase the attractiveness of the town centre.

(vi) The effect of coal development on the town needs to be monitored continually to ensure that development takes place in accordance with demand.

Basic Structural Elements

(vii) The airport should be retained in its existing location until such time as considerable expansion in its infrastructure is warranted. At this time, further consideration should be given to its relocation in a flood free situation.

(viii) A short term temporary rerouteing of the Trunk Route should be adopted to alleviate traffic congestion and danger in Conadilly Street.

(ix) A long term relocation of Trunk Road 72 should be planned and adequately allowed for in budgetary and zoning terms.

(x) A coherent east/west and north/south structure of the road pattern through Gunnedah should be planned.

(xi) An efficient road hierarchy giving force to this pattern should be established.

(xii) Traffic control measures, in particular the installation of roundabouts, need to be instigated at appropriate locations within the town.

Retail/Commercial Uses

(xiii) The retail core should be tightly defined, and any expansion outside the defined area should occur only if no alternative location within the core is able to be found by a major retailer desiring to locate in the town.

(xiv) Any expansion to the existing retail core should be judged on its merits, but should preferably occur to the north-east of the existing core and adjoining it, or otherwise into the commercial frame to the south of the core.

(xv) Retail/commercial facilities need to be located in the newly expanding parts of Gunnedah.

Rural Residential

(xvi) The demand for rural residential development needs to be accommodated in the most desirable locations, given that a definite trend exists toward this type of lifestyle compared with urban or suburban living.

(xvii) Specific areas identified for rural residential development need to be located close to existing urban areas.

(xviii) A wide variety of allotment sizes need to be provided to cater for the varying needs of households pursuing a variety of lifestyles.

(xix) High quality development standards should be applied to the design of this type of subdivision.

Residential Development

(xx) Residential development should proceed basically to the south-west of the town.

(xxi) Residential development should be constrained in the short term from expanding into areas potentially affected by coal development, whether by adverse environmental effect or physical limitation.

(xxii) The proliferation of low grade temporary accommodation as a response to housing needs arising from coal development should be strenuously avoided.

Industrial Development

(xxiii) Industrial develoment should proceed basically to the west of the town in the area bounded by the railway line, the Mullaley Road and Blackjack Road.

(xxiv) Further industrial expansion should be limited between the Boggabri Road and the railway line due to the inferior location of this land for industrial purposes compared with other available land.

(xxv) A new industrial estate of high standard should be developed to encourage and promote the town's rural service function.

(xxvi) This estate should be topographically and physically separated from existing residential areas.

(xxvii) Industrial development occurring to the west of the town should be buffered from residential development on the adjacent side of the Mullaley Road.

(xxviii) The existing industrial area incorporating the Shire Depot to the south of the Mullaley Road should be relocated to the north to ensure containment of industrial land uses to the north of the Mullaley Road.

Community Facilities

(xxix) Community facilities need to be decentralised to the newly expanding areas of Gunnedah.

(xxx) The establishment of adequate aged person facilities needs to be promoted within Gunnedah.

(xxxi) An additional cultural/dramatic venue, possibly outdoor, needs to be located in Gunnedah.

(xxxii) Additional entertainment facilities oriented particularly to adolescents need to be established in Gunnedah.

(xxxiii) Child care facilities particularly of a long day care nature, need to be extended in Gunnedah.

Recreation/Open Space Facilities

(xxxiv) A linking of recreation and community facilities by a system of bicycle/pedestrian routes should be implemented within the town.

5.5 Urban Structure Plan Options

The structure plan options for the future town of Gunnedah, which are presented in the following maps, embody the planning aims, objectives and principles identified in the previous section.

Subject to any objections which may arise, the Local Environmental Plan will bring these principles into statutory planning force and give Council the vehicle by which to manage the future growth and development of the town in the manner shown in the Preferred Structure Plan.

Three alternate concept plans are presented for consideration, with the third being the Preferred Structure Plan. In our view, this third option aggregates the most desirable elements of the other two Structure Plans. The third option is, in fact, very similar to Structure Plan 2, and represents in some respects a further development or refinement of Option 2.

Each plan is designed to adequately provide for the maximum level of growth likely to occur in Gunnedah to the year 2001. All lesser growth scenarios can be handled within the framework provided by each of the Structure Plan options.

5.5.1 Common Elements of the Options

There are certain common elements of the structure which we consider should be incorporated whichever option is adopted:

Road Hierarchy Structure

(i) The relocation of Trunk Road 72 from Conadilly Street to Bloomfield Street with a low level extension at the western end across the saleyards to meet the Boggabri Road as a short term measure.

(ii) The nomination of Maitland Street as the eventual long term Trunk Route.

(iii) The placing of a load limit on Conadilly Street to prevent heavy vehicle traffic passing through the town centre upon the relocation of the Trunk Route from Conadilly Street.

(iv) The realignment of the 'Manilla Road' to the north of Greyhound Park to allow a more direct route through town to be established along Abbott Street.

(v) The establishment of an upgraded, connecting, east/west linkage road along part of the existing route of George Street for light traffic only, and its extension across to the Mullaley Road.

(vi) The establishment of a second east/west connector road further to the south along Lincoln Street.

Retail/Commercial Area Structure

(vii) Designation of a 'core' retail area between Bloomfield and Barber Streets, limited to the west by Tempest Street and to the east by Abbott Street, except along the northern Conadilly Street boundary, which can be extended as far as Henry Street. This 'core' would contain the intensive retail activities and some office space.

(viii) Designation of a commercial 'frame' to the south and west of the retail area, stretching from Barber Street to the railway line between Rosemary Street and Abbott Street; from Little Conadilly Street to Barber Street between Rosemary Street and Tempest Street; and also in the block bounded by Henry Street, Conadilly Street, Abbott Street and Little Barber Street. The 'frame' would contain more extensive type retailers (e.g. showrooms and warehouses), businesses of a service, rather than strictly retailing, nature and other offices.

Residential Structure

(ix) The maintenance, but no expansion, of existing low density residential land use to the north of the railway line, with the exception of part of Portion 45, the suitability of which for residential use could be considered to the south of the proposed Bloomfield Street extension.

(x) The maintenance of the discrete residential areas to the south of the railway line.

Industrial Structure

(xi) The containment of industrial expansion to the western side of town, between the Mullaley Road, Blackjack Road and the railway line.

Open Space Structure

(xii) The establishment of a lineal open space corridor along the western side of the Wandobah Road.

(xiii) The protection of higher slopes and ridges above the existing tree line from the encroachment of urban development.

(xiv) The completion of a connected open space corridor along the river front from the western edge of the town to Elgin Street.

(xv) The provision for integration of bicycleway/pedestrian routes to link together the open space and other community resources of the town.

Special Uses

(xvi) The retention and rationalisation of Travelling Stock Reserves and Routes.

(xvii) The inclusion of special land uses in the surrounding land use category.

5.5.2 Variation between the Options

The major point of variation between the options is the direction in which long term expansion will occur.

Option 1 provided for the expansion of the town to the south as far as possible, partly to the east, and then for remaining growth, to the south-west and west.

The development of all remaining undeveloped land without physical or environmental constraints to development to the south and south-east of the existing zoned urban area as proposed by this option would require the augmentation of water and sewerage infrastructure.

Some areas to the west of the Wandobah Road would also need to be developed to ensure the adequacy of future land provision under this Option. This would also require augmentation of water and sewerage services.

Option 2 provided for the expansion of the town to the south only in so far as existing servicing infrastructure would permit it; and thereafter the major body of expansion to the south-west and west.

This option would involve the residential development of a significant proportion of the land to the west of the Wandobah Road and south of the Mullaley Road as far west as Blackjack Road; and the limitation of residential development in the south and south-east of the town to areas which can be serviced by existing water and sewerage infrastructure.

Option 3, the Preferred Structure Plan has adopted the directions of growth proposed in Option 2.

We consider that this growth strategy is far preferable, mainly on infrastructural grounds, for the following reasons.

Should Option 1 be adopted, enough land will be able to be provided in the expansion areas indicated to serve the needs of the town for a period of 20 years. This provision will, however, require substantial augmentation of the existing infrastructure, including the provision of a new reservoir and pumping station. Extension of existing infrastructure in this direction will be particularly expensive, especially in terms of sewerage, due to the need to extend across existing developed urban areas.

The problem with adoption of this alternative is that the land supply in this direction is finite. Even with the above augmentation, the amount of land able to be developed in the future is constrained in various ways, not the least of which is distance for servicing infrastructure to travel.

To the west, as shown by Map 22, the amount of land potentially available for urban expansion is much greater. Servicing will be cheaper in this direction and probably faster, even though a new reservoir will also be needed in this area.

The situation is, then, that even if all remaining areas to the south are developed, expansion to these western areas will eventually be required. It would consequently be our recommendation that no further augmentation of the infrastructure servicing the southern part of town should be made, but rather that capital should be invested in infrastructure in the western part of the town which will serve both short and long term needs.

The development of the Preferred Option has also occurred on other grounds - environmental, aesthetic and general planning. Incorporation of such considerations has meant, in fact, that while some areas may have servicing advantages (e.g. Area 14), they are considered less desirable for short term expansion because of their flat, uninteresting terrain, the proximity of coal mining, the abattoir, tannery etc., or simply the logical expansion of the town. In the very long term, with the encroachment of urban development and working out of mines, these areas may become more suitable for urban development. However, in the next 20 years, the areas identified in the Preferred Option are not only the most rational and aesthetically desirable areas for development, but are also the most infrastructurally advisable.

5.5.3 Preferred Option 3

The Preferred Structure Plan consequently:

* contains all the common elements of structure considered desirable;

* it adopts the most desirable direction of future expansion; and

* it also incorporates certain other elemtnes of urban structure which are considered highly desirable.

These are:

(i) The establishment of a regional retail/commercial centre on a site adjacent to the western side of the Wandobah Road. This will serve as a neighbourhood, and potentially as a regional, centre for new expansion areas to the west and some existing parts of South Gunnedah.

(ii) The provision for incorporation of community facilities within such a centre. This would allow the facilities which will be needed to serve the new population, to be located in close proximity to their residences.

(iii) The retention of rural residential land use between the existing industrial area and the abattoir on Quar Road.

(iv) The expansion of this rural residential area to include the portions of land immediately to its east which are presently zoned industrial.

(v) The restriction of extension of urban development significantly further east than Boundary Road.

(vi) The retention of flood liable land to the north in a Non-Urban zoning category to avoid intensification of development of these lands.

(vii) The categorisation of the commercial area on the southern side of Conadilly Street to the east of Abbott Street in a 'frame' classification to prevent the intrusion of intensive retailing into this area.

5.6 Recommended Staging Plan

It should not be expected that all of the areas identified for future urban expansion in the Preferred Structure Plan would immediately be available for their nominated future purpose, nor would they immediately be zoned for this purpose.

To do so would impose unacceptable burdens on owners of the land in the expansion areas identified, particularly in relation to the higher rates which might be attracted.

Rather, it is proposed that Council should adopt a Staging Plan which identifies the approximate order in which land areas should be zoned and released for urban expansion. It is anticipated that this release would then occur close to the time when it was required. This would eliminate the possibility of hardship associated with such proposals and, in fact, give land owners a fair expectation of possible future benefit.

Determination of the time at which additional land release is required will depend on the rate of take-up of vacant land. It is for this reason that Council should closely monitor the rate of usage and availability of

vacant land. This monitoring process could at present take the form of a very simple register of lots created, developments approved, buildings approved and buildings completed. Using the base vacant lot figures provided by survey in this study, a cumulative total of available vacant lots should then be readily ascertainable by Council at any time. At present, a computerised Land Bank Information System incorporating such data is in the process of development by an inter-agency committee on which the Local Government and Shires Associations are believed to be represented. It is consequently suggested that Gunnedah Shire should keep abreast of developments in this system so that at some time in the future it may be able to adopt this system to monitor its land supply situation.

The length of time taken to prepare Local Environmental Plans, to complete the rezoning procedure and undertake the lead-time for the land development process should be taken into account in determining the timing of land release. These considerations should ensure that Council has control over the possibility of land shortages developing. As discussed earlier, it is suggested that Council should work toward the provision of a land bank of at least 5 years supply of zoned land. It may be appropriate for Council to purchase and develop land itself in order to maintain this land bank.

The Preferred Structure Plan contains sufficient land for the needs of Gunnedah for at least the next 20 years. The rate at which these will require release will need to be determined by Council by the above method. This cannot be accurately determined at the present stage, due to the possible variability in growth rates. Thus, the following Staging Plan can indicate only the order in which it is deemed most desirable, at the present time, to release this land.

Map 26 shows the resultant generalised staging programme of the preferred development option.

5.6.1 Stage 1

Stage 1 encompasses land which is virtually committed for urban development in the near future. It includes the land to the immediate east of Pearson Street, and land on the opposite side of Lincoln Street to existing residential development, including the large area of land to the east of the Wandobah Road and south of Lincoln Street.

These land areas comprise approximately 161 hectares of utilisable land. At the maximum rate of growth, and including an allowance for a continuing land bank of 700 lots, they will provide land for 1 year; at the minimum (existing) rate, they will sustain growth for the next 9 years.

Stage 1 is generally able to be serviced without major augmentation of the existing infrastructure.

5.6.2 Stage 2

Stage 2 comprises land generally further from existing urban areas, but land also able to be serviced by augmentation of existing infrastructure.

This stage includes land on the Wandobah Road to the south of Stage 1; and land to the east of the existing urban area; as well as a small pocket of land adjoining the proposed Wandobah Road Reserve and the Mullaley Road, to the west of the Wandobah Road.

Stage 2 in total comprises some 78 hectares of raw land. It will supply the land needs of the town for between 5 and 11 years should mining-related development occur, and for over 20 years if population growth should continue at the same rate as at present.

5.6.3. Stage 3

Stage 3 will involve the utilisation of land only to the west of the Wandobah Road. It will require major augmentation to servicing infrastucture.

If high rates of growth should pursue, this stage could be required to be begun to be developed as early as 8 years hence. If population growth should occur at the same rate as at present, the need could be as far away as even 30 years or more. The more likely case lies between the two, in either low or medium growth rate figures.

The usage of land in Stage 3 will also naturally depend on the rate of growth. With mine-related development, this could be as fast as 3 to 4 years, or as long as 7 years. If the current rate of population growth occurs, it will satisfy the land needs of Gunnedah for a further 11 or 12 years.

The land reserves in this stage are large, and substantially cover the residential areas to the west of the Wandobah Road but still on the town-ward side of the hills.

At the time of development of Stage 3 it would also appear appropriate that a full-sized neighbourhood commercial centre should be established on the land indicated to the west of the Wandobah Road. As outlined earlier in this report, however, a smaller development on this site may be warranted at an ealier stage of growth of the town and Council should permit and provide for this centre as interest is shown in it.

5.6.4. Stage 4

Stage 4 involves the development of vast reserves of land which are available to the town on the far side of the hills to the west of the Wandobah Road, and across to the Blackjack Road.

These reserves will provide adequate land at all rates of growth for the next 20 years and more.

Table 5.11: Staging of Development

Stage	1	2	3	4
Area (hectares)	145[1]	78	78	300
Capacity (dwellings)	1,087	585	585	2,250
Land Bank Allowance (lots)	700	700	700	700
Supply of Land (number of years hence)				
Base growth rate	9	20+	20+	20+
Low growth rate	4	11	18	20+
Medium growth rate	2	6	10	20+
High growth rate	2	5	8	20+

1. This figure allows for school and open space proposals and 107 hectares of this land which is already zoned for residential uses.

2. The land usage figures allow for 120 dwellings either existing or which can be built on subdivided lots within Stage 1 lands, and for 130 vacant lots in the existing urban area outside the area of Stage 1. A combination of factors also results in 55 additional dwellings being allocated to lots within this area.

6. ACTIONS AND RECOMMENDATIONS

6.1 Study Recommendations

It is considered that the adoption of the following recommendations will enable Council to implement the Preferred Planning Strategy for the future development of Gunnedah.

6.1.1 General Planning Procedure

1. Council should publicly exhibit this Environmental Study for a period of not less than 14 days, and preferably in the vicinity of one month, in accordance with Section 58 of the Environmental Planning and Assessment Act.

2. Council should allow a period of 14 days to receive and consider any submissions made by members of the public during this exhibition period.

3. If considered appropriate, Council should require the Study to be supplemented and modified in the light of submissions made.

4. Council should give public notice of its intention to prepare a Draft Local Environmental Plan, and give public notice of the aims, objectives, policies and strategies to be adopted in the Plan.

5. Council should instruct Planning Workshop Pty Ltd to prepare the Draft Local Environmental Plan.

6.1.2 Rural Residential Areas

6. Provision should be made for rural residential zones with subdivision controlled such that land is subdivided to an average allotment size of 8,000 square metres with a minimum allotment size of 4,000 square metres.

6.1.3 Residential Development

7. Council should develop, adopt and enforce stringent regulations and standards relating to the proliferation of temporary accommodation in Gunnedah.

8. Council should closely monitor residential land and dwelling supply and demand in Gunnedah to avoid the likelihood of increased pressure for temporary accommodation.

9. Council should prepare a register of subdivision and building activity adopting the base figures of this study to enable the land market to be monitored effectively.

10. In the event of shortages in residential land becoming apparent from this monitor, Council should enter the land development market in order to ensure a continuing adequate land release to meet needs.

6.1.4 Retail/Commercial Areas

11. Council should reserve a suitable site for a neighbourhood level shopping and community centre located within the main areas of expansion of the town. This site should be large enough for expansion of the centre to regional status if required.

12. Council should prohibit expansion of the Town Centre retail/commercial core beyond the defined limits shown on the Structure Plan, unless a major retailer is unable to secure a site within this zone and proposes a major retail development embracing a variety store or discount supermarket such as Woolworths, Coles or K-Mart, on a site adjoining the defined core.

13. In this instance, Council should consider any such application on its merits, but give preference to an application relating to a site to the north-east of the core, or alternatively to the south in the commercial 'frame'. It should preferably be located out of the floodplain.

14. Council should give consideration to the desirability and practicability of malling portions of Elgin Street, in particular the area between Bloomfield Street and Conadilly Street. This would enable the creation of an attractive civic area in the vicinity of the new Council Chambers, Post Office and Court House, and the provision of an area of open space in an increasingly office-oriented part of town. This would appear even more desirable if a large retail development was established to the north-east of the existing core.

6.1.5 Industrial Development

15. Council should purchase the land under consideration to the east of the Blackjack Road and north of the Mullaley Road for industrial use.

16. Council should develop the majority of this land for a high standard, rural service industry estate.

17. Council should promote the advantages and desirability of this estate among potential users, particularly in relation with the 'Ag-quip' exhibition.

18. Council should give consideration to the development of a planned factory unit development on part of this land.

19. Council should allocate part of this land for entertainment/ amusement activities. In particular, Council should encourage the use of a suitable site for a drive-in theatre and attempt to engage the interest of an entrepreneur in the development of a site in this manner.

20. All land related to the abattoir, including land required for zoning, should be zoned Special Uses Abattoir in order to identify and preserve it for such uses.

21. Council should stage the development of its proposed industrial estate so that approximately 20 hectares can be released over the next 10 years and up to 47 hectares over the next 20 years.

22. Council should continually monitor the demand for industrial land in order to be able to determine any change in these staging requirements.

6.1.6 Community Facilities

23. Council should encourage the formation of a new Occasional Child Care Association in Gunnedah with the aim of working toward the establishment of a second Occasional Child Care Centre in the town within a period of 4 to 5 years. It is recommended that the location of this centre should be in the newly expanding parts of Gunnedah.

24. The Department of Youth and Community Services should be approached by Council with a view to the introduction of a Family Day Care Scheme in Gunnedah or otherwise a long day care centre.

25. Council should liaise with the Department of Youth and Community Services to consider the establishment of a youth drop-in centre to provide facilities for co-ordination and promotion of youth group activities, to provide counselling services and to assist in the provision of emergency accommodation.

26. Council should discuss with the St. Vincent de Paul Society and representatives of the Department of Youth and Community Services the extent of, and possible solutions to, the problems of providing low cost emergency accommodation.

27. Council should encourage and expedite, in whatever way possible, the provision of a balanced range of aged persons' accommodation as indicated in this report.

28. Council should investigate the need for a Drug Detoxification Unit in Gunnedah.

6.1.7 Sporting/Leisure/Cultural Functions

29. Council should permanently abandon the use of the Rifle Range for shooting purposes. If the Rifle Club should be revived and desire such a range to be re-established, Council should require such a use to be located in a rural area outside the Study Area.

30. Council should permit, and encourage if appropriate, the relocation of the motor cycle track to the proposed location to the north of the Mullaley Road and west of the existing industrial area.

31. Council should give close consideration to the development of Pensioners Hill as a recreation resource which will be utilised by surrounding industrial areas. It could examine the possibility of creating a native 'urban forest' by the scattering of native seed etc., and could incorporate a lookout, lunch areas and fitness trail possibly linked to the Wandobah Road reserve for the use of industrial workers.

32. The plan of development of the Wandobah Road reserve should be further worked on by Council with the idea of better incorporating it into the overall structure adopted as a result of this Study. In particular, Council should consider:

    * the dual use of the fitness/jogging track for bicycling;

    * the relocation of this track to the Wandobah Road side of the waterway;

    * the expansion of this waterway to form a significant water feature through this reserve.

33. Council should further investigate the possibility of installing a connecting bicycleway around the town by the approximate route shown on the Structure Plan.

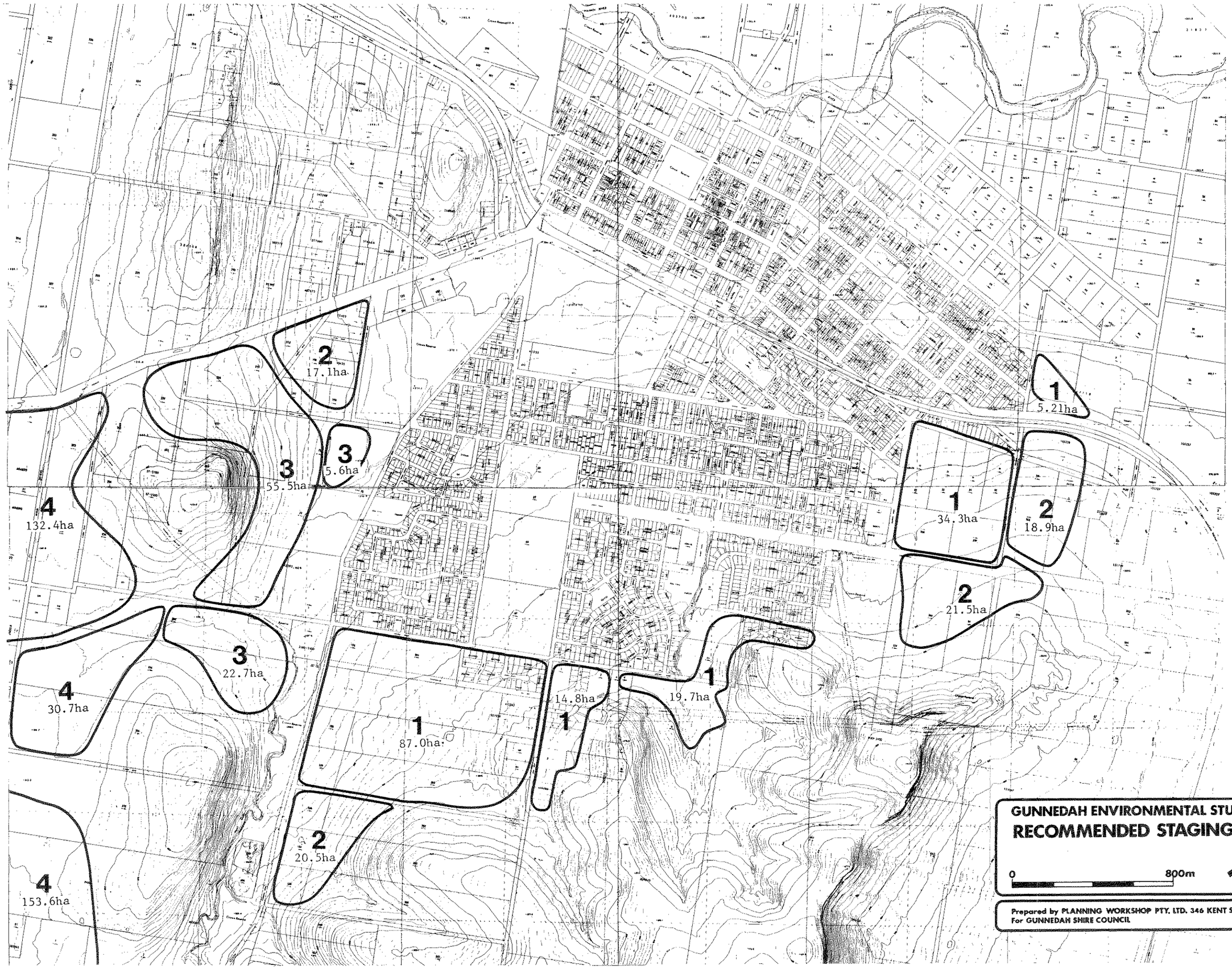
34. Council should consider the suitability of inclusion of a facility such as a waterslide in the new recreation area to be developed to the west of the Wandobah Road, if such a project is not found feasible within the Memorial Pool. It should then canvass this prospect locally or with various organisations in the leisure industry.

35. Likewise, it would appear that a site suitable for a commercial amusement facility such as an indoor bowling alley might be identified and canvassed in the same manner. Findings of the Youth Survey could be used in support of the interest in such facilities in Gunnedah.

36. Council should consider the possibility of remodelling Wolseley Park as a botanical garden (with the exception of the tennis courts).

37. Council should consider incorporating a low cost outdoor amphitheatre with either permanent or removable stage, suitable for dramatic performances or recitals of reasonable size within the remodelled park.

38. Council should consider the possibility of establishing a multi-purpose hall within the Showground for the use of clubs and community uses and also exhibition use at Show times. This should be designed to provide small spaces which can be used by individual clubs on either a temporary or permanent letting basis, and a large central meeting hall. The design of such a centre should be one that can be extended as required, and should be able


2
17.1ha
3
5.6ha
3
55.5ha
4
132.4ha
1
5.21ha
1
34.3ha
2
18.9ha
2
21.5ha
3
22.7ha
4
30.7ha
1
87.0ha
1
14.8ha
1
19.7ha
2
20.5ha
4
153.6ha
GUNNEDAH ENVIRONMENTAL STUDY
RECOMMENDED STAGING 26
0
800m
Prepared by PLANNING WORKSHOP PTY. LTD. 346 KENT ST., SYDNEY
For GUNNEDAH SHIRE COUNCIL

to be particularly low cost while attractive. This may be able to fulfil small club needs and eliminate the proliferation of many small individual club premises on the Showground, while potentially attracting State Government funding.

6.1.8 Traffic and Parking

39. Council should retain Bloomfield Street in the immediate future as the alternative heavy traffic by-pass for the town. To improve the attractiveness of Bloomfield Street for this purpose, the following improvements are recommended:

    * Provision of a direct link between Bloomfield Street and Curlewis Road.

    * Widening of the footpath in Bloomfield Street to provide only a 4 lane carriageway for traffic.

    * Reconstruction of the section of Bloomfield Street between Tempest Street and Warrabungle Street to provide 4 fully sealed lanes.

    * Increasing the radii of the south-east corner of the intersection of Bloomfield Street with Warrabungle Street.

    * Provision of better sign-posting at the extremity of the centre.

    * Installation of traffic signals at the intersection of Bloomfield and Henry Streets.

    * Installation of 'Give Way' signs at all side streets along the 'Alternative Heavy Vehicle Route'.

    * Declaration of Conadilly Street through the town centre a light traffic thoroughfare.

40. Council should make adequate provision for the possibility of long term development of Maitland Street as the alternative heavy vehicle route. This provision should include the allocation and/or securing of funds, the ear-marking and preservation of land required, and the publicity of its proposal.

41. Council should make similar provision for the re-orientation of the Manilla Road to the north-west of Greyhound Park. The action of implementing this proposal should occur as soon as practicable.

42. Council should pursue plans to widen the railway overbridge at Abbott Street.

43. Council should consider the instigation of a system of roundabouts as a traffic control method within the town. A priority programme of installation of these roundabouts should be formulated by Council's Engineer. Intersections, the suitability of which we consider should particularly be investigated, are shown on the Structure Plan.

44. A road hierarchy should be established by Council and appropriate traffic control measures ('Give Way' signs, 'Stop' signs and roundabouts wherever possible) installed as soon as practicable to implement this heirarchy. The major elements of this hierarchy should be as shown on the Structure Plan.

45. As part of this structure, Council should implement the closure of Carroll Street at Kamilaroi Road, ensuring adequate access is provided for adjoining residents. This will enable traffic to be directed onto Porcupine Street and George Street as a structural connecting route.

46. Council should clarify the direction of traffic flow on Stock Road, either by declaring each side of the centre 'One Way' or installing measures which indicate its two-way nature.

6.1.9 Historical/Archaeological Features

47. Council should conserve the historic buildings and sites identified in the Study by the incorporation of clauses in the Local Environmental Plan regulating the demolition or renovation of these buildings.

48. These controls should be applied to the buildings identified but unrecorded, as well as those listed by the National Trust or Heritage Commission and pending classification.

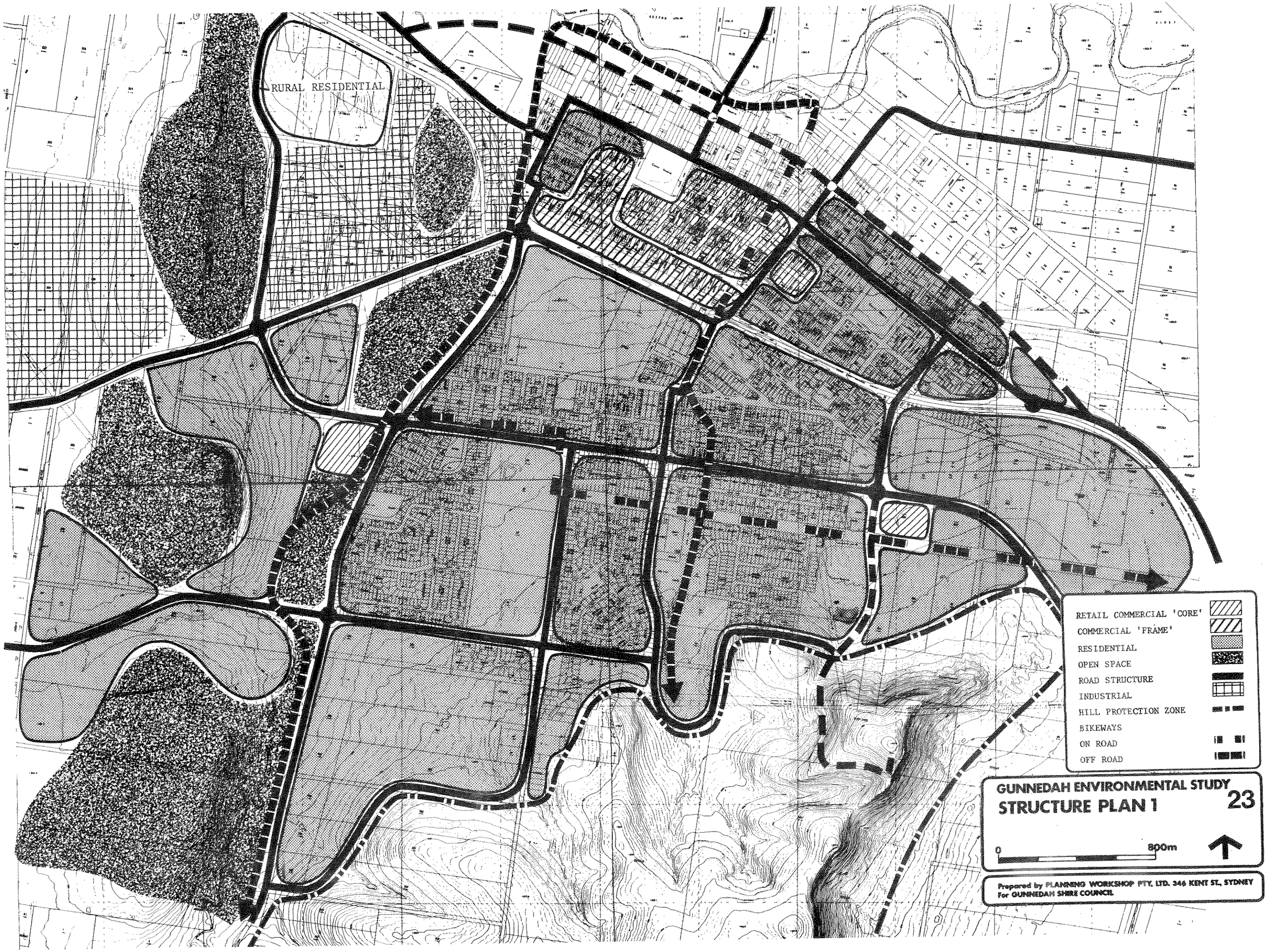
49. Council should request that the National Trust and Heritage Council investigate the buildings and sites identified, but unlisted, to consider their suitability for classification.

50. The National Parks and Wildlife Service should investigate the significance of the rocky knob on the Tamworth Road, and if appropriate, take measures to ensure its protection. It may also be appropriate for the service to examine some Aboriginal Caves believed to exist on the Soil Conservation Research Station.

6.1.10 Environmental/Aesthetic Matters

51. Council should restrict the development of the existing cemetery on the Wandobah Road to the existing Portion 76 and reserve a site well outside potential urban expansion areas identified in this Study for the future development of a general and lawn cemetery.

52. Council should impose access control on new industrial areas along the Mullaley Road so that no direct property access is provided.


RURAL RESIDENTIAL
RETAIL COMMERCIAL 'CORE'
COMMERCIAL 'FRAME'
RESIDENTIAL
OPEN SPACE
ROAD STRUCTURE
INDUSTRIAL
HILL PROTECTION ZONE
BIKEWAYS
ON ROAD
OFF ROAD
GUNNEDAH ENVIRONMENTAL STUDY
STRUCTURE PLAN 1
23
0
800m
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For GUNNEDAH SHIRE COUNCIL

RETAIL COMMERCIAL 'CORE'
COMMERCIAL 'FRAME'
RESIDENTIAL
OPEN SPACE
ROAD STRUCTURE
INDUSTRIAL
HILL PROTECTION ZONE
BIKEWAYS
ON ROAD
OFF ROAD

GUNNEDAH ENVIRONMENTAL STUDY
STRUCTURE PLAN 2

24

0 800m

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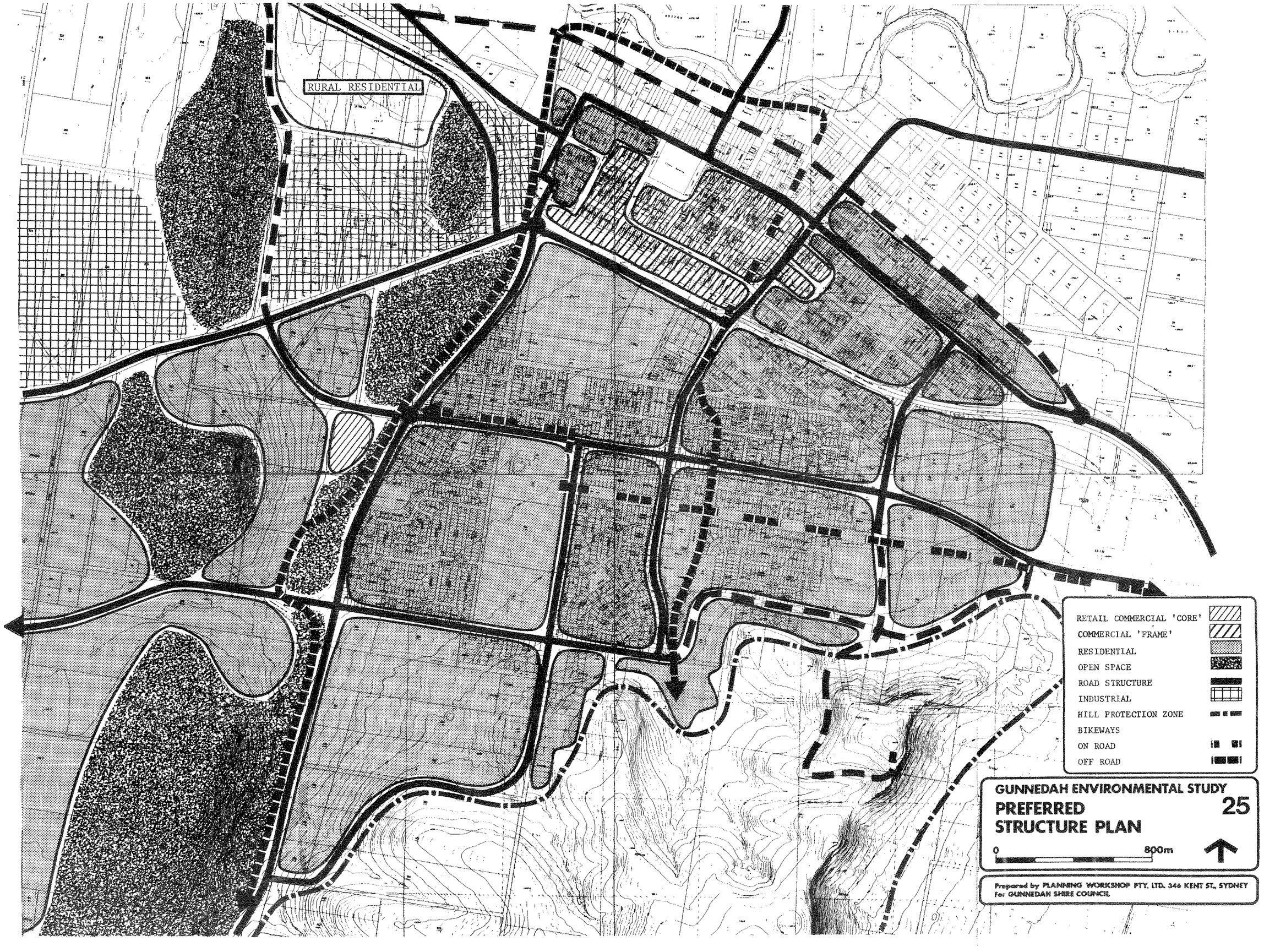
For GUNNEDAH SHIRE COUNCIL


RURAL RESIDENTIAL
RETAIL COMMERCIAL 'CORE'
COMMERCIAL 'FRAME'
RESIDENTIAL
OPEN SPACE
ROAD STRUCTURE
INDUSTRIAL
HILL PROTECTION ZONE
BIKEWAYS
ON ROAD
OFF ROAD
GUNNEDAH ENVIRONMENTAL STUDY
PREFERRED STRUCTURE PLAN
25
0
800m
Prepared by PLANNING WORKSHOP PTY. LTD. 346 KENT ST., SYDNEY
For GUNNEDAH SHIRE COUNCIL

53. Council should require provision of a landscaped 20 metre wide buffer zone on either side of the Mullaley Road adjacent to proposed new development.

54. An environmental buffer should be identified around the Gunnedah Colliery and an on-going planting programme required to be maintained in order to ensure the visual protection of future residential areas from mining activity.

55. Council should ensure that the Gunnedah Colliery does not stockpile any material upwind of residential areas which could cause a nuisance to existing or future residents.

56. Council should submit to the Inquiry relating to the Gunnedah Colliery Proposal that alternative arrangements should be investigated for the transport of coal from the Blackjack Mine. In particular, the feasibility of loading coal at Curlewis to avoid unnecessary transportation through Gunnedah, should be investigated. If coal continues to be loaded at the existing siding, the feasibility of a conveyor belt to the west of the Blackjack Road should be investigated to eliminate trucking movements along this road which will eventually conflict with the adjoining residential development.

57. Council should develop and implement a landscaping programme for the street frontages of the Hunter Street cemetery in order to increase its attractiveness and integration into the surrounding district.

58. Council should adopt the tree line identified in this Study as an upper height limit to the extent of urban development on surrounding hillsides.

6.1.11 Policy/Statutory Matters

59. Council should adopt the guidelines relating to development on flood liable land set out by the State Government wherever practicable.

60. Council should refer every application for development proposed on flood liable land to the Water Resources Commission for concurrence.

61. Subject to that concurrence, Council should only consider giving approval to any development on flood liable land only if it is located outside a known floodway, and subject to conditions which ensure that the floor level of the proposed development is raised above the known flood level.

62. Council should seek specialist legal advice from counsel versed in Local Government matters in relation to ensuring that legal liability for flood damage does not accrue to Council.

63. Council and the Pastures Protection Board should confer with a view to acqwuiring the land parcel DP 217629 for open space purposes and to ensure its continuing use as a Travelling Stock Route.

64. Council should consider resolving to grant permanent use of the roads identified in Section 4.10 as Travelling Stock Routes.

65. Council should determine reasonable development standards, incorporate them in appropriate codes relating to industrial development, residential flats and parking, and adopt them as a policy guide to intending developers.

6.2 Low Cost Town Improvement Recommendations

While the recommendations contained above are considered necessary to adopt and implement the planning principles and objectives to be embodied in the Gunnedah Draft Local Environmental Plan, there are various other actions which can be taken simply to improve the appearance and attractiveness of the town of Gunnedah.

These recommendations are put forward simply as suggestions which Council may care to consider and implement. They are not critical to the carrying out of the Plan for the town, but would undoubtedly enhance the final result of it and the future appearance of the town.

6.2.1 'Problems'

There are various 'problems' or features within the town centre which present the opportunity for improvement without major capital cost or works.

Over-wide Main Streets

Many of Gunnedah's very wide streets, despite their attractiveness, have little functional purpose, frequently being far wider than needed to support the traffic volumes on them. At the same time they provide danger for the pedestrian and an unnecessarily large, unaesthetic display of bitumen.

Lack of Medians or Protective Devices

Despite the width of such streets, very few pedestrian 'havens' are available. The crossing of Conadilly Street, in particular, presents a hazard to pedestrians, with only one signalised crossing over its length and non-signalised crossings presenting some degree of danger due to their extreme width, unbroken even by a centre median. Significant crossing of Conadilly Street also occurs other than on pedestrian crossings - the risk in such cases being further exacerbated.

Lack of Shade

A large proportion of car parking for shoppers occurs on-street in Conadilly Street. A major need for shoppers in Gunnedah's climatic conditions is the provision of protection from the summer sun. Shade can easily be provided by Council within newly planned car parks. However, it is less easily incorporated into the main street where it is presently lacking in the areas most heavily used for shopper parking.

Lack of Consistent Landscaping Theme

The above problem correlates with the lack of an integrated landscaping theme throughout the town, and particularly along the main street. Gunnedah contains remnants of two major exotic plantings:

* date palms in central median strips adjacent to the railway station; and

* silky oaks (Grevillea robusta) along parts of Conadilly Street (especially the eastern end of the town centre), Elgin Street, Wolseley Park, and scattered generally throughout the town.

Elsewhere there are planted avenues of Australian natives, generally within newer areas to the south of the railway line. However, there is no concerted theme integrating the town as a whole, or providing visual or aesthetic coherence even within the major streets.

Variation in Street Furniture

Neither is there a consistent theme in the provision of street furniture. Street seating, planters, garbage bins, etc. currently vary in design, colouring etc. However, we believe Council is aware of this inconsistency and has selected some types of street furniture which it will now exclusively use.

Inadequate Signposting of Historic Features

There has in the past been an attempt to provide an historic town tour. Items of interest are signposted. However, these signs are not obvious and, in places, are in disrepair and difficult to read.

Lack of Attractiveness of Town Approaches

As is common in many places, industrial areas have been relegated to the outskirts of town. While this may be the most desirable objective from the point of view of separating these uses from other parts of the town, it inevitably results in an approach to the town which does not give a good first impression (or last impression) to the visitor. This has occurred to a significant extent in Gunnedah.

Untidiness of Industrial Area

The industrial areas suffer from lack of application of an industrial development code, as noted earlier. However, parts of them are also unnecessarily untidy, and the general level of upkeep is not high.

Lack of Integration of Some Public Uses with Residential Areas

Some large public land uses, most particularly the hospital and the Hunter Street cemetery, abut residential development and are poorly screened from them. Both the type and intensity of such uses demand some form of segregation.

Little Use Made of the River Environs

The river environs of Gunnedah are one of its more attractive features. However, little development of the banks for recreational purposes has occurred and the river is poorly linked with the remainder of the town.

6.2.2 Opportunities

Various opportunities are presented to overcome these 'problems', and thereby to enhance the future development of the township.

Suggestions which are put forward for consideration with the aim of stimulating discussion of the most appropriate methods of 'beautifying' or improving the urban facade of the town, are as follows:

Landscaping of the Town Centre

Due to the width of Conadilly Street, there are several alternate opportunities presented to beautify the town centre while eliminating the safety hazards which presently exist.

The most common approach to solving the problem of over-wide streets is to construct a centre median. This can be landscaped to provide an aesthetic greenery effect, and will provide some measure of pedestrian protection. However it has deficiencies. It is not usually considered desirable for angle parking to be established around a central median (thereby, in this case, necessitating the elimination of kerb parking), due to the conflict of pedestrians and passsing traffic. Therefore, unless parallel parking is provided both centrally (a concept which introduces hazard to the alighting car passenger), and kerbside, the shade provided is of little functional benefit.

An alternate, and we consider, more desirable, solution is the development of landscaped kerbside parking bays. The deveplopment of such bays has several advantages:

* it provides space for the planting of street trees outside the shop awning line;

* it allows shade to be provided over car parking areas;

* it enables the obscuring of rows of cars by landscaping;

* it allows the clear differentiation of parking from no parking or no standing areas;

* it allows the extension of pavements to the outside line of the parking bay, a measure which effectively reduces the width, and thereby danger, of the pedestrian crossing.

This kind of design is illustrated in Figure A. It involves the removal of no more than 1 in 6, and up to 1 in 12, parking spaces, which it is considered will not bring about a parking problem in Gunnedah.

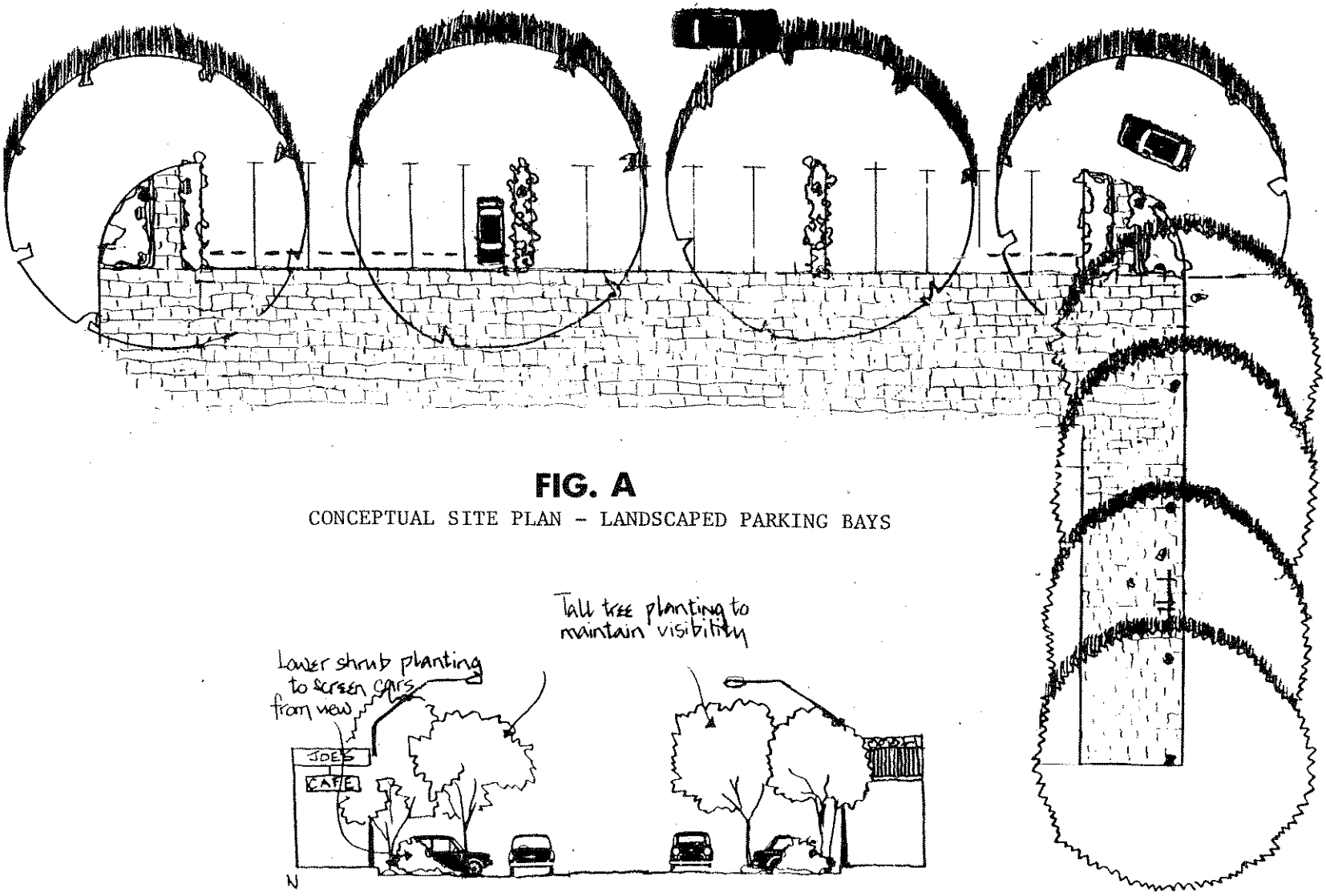


FIG. A

CONCEPTUAL SITE PLAN - LANDSCAPED PARKING BAYS

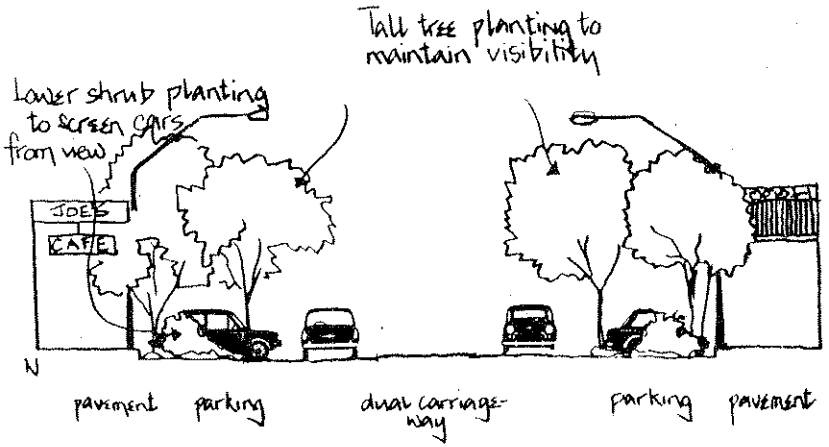


FIG. B

CROSS SECTION - CONADILLY STREET

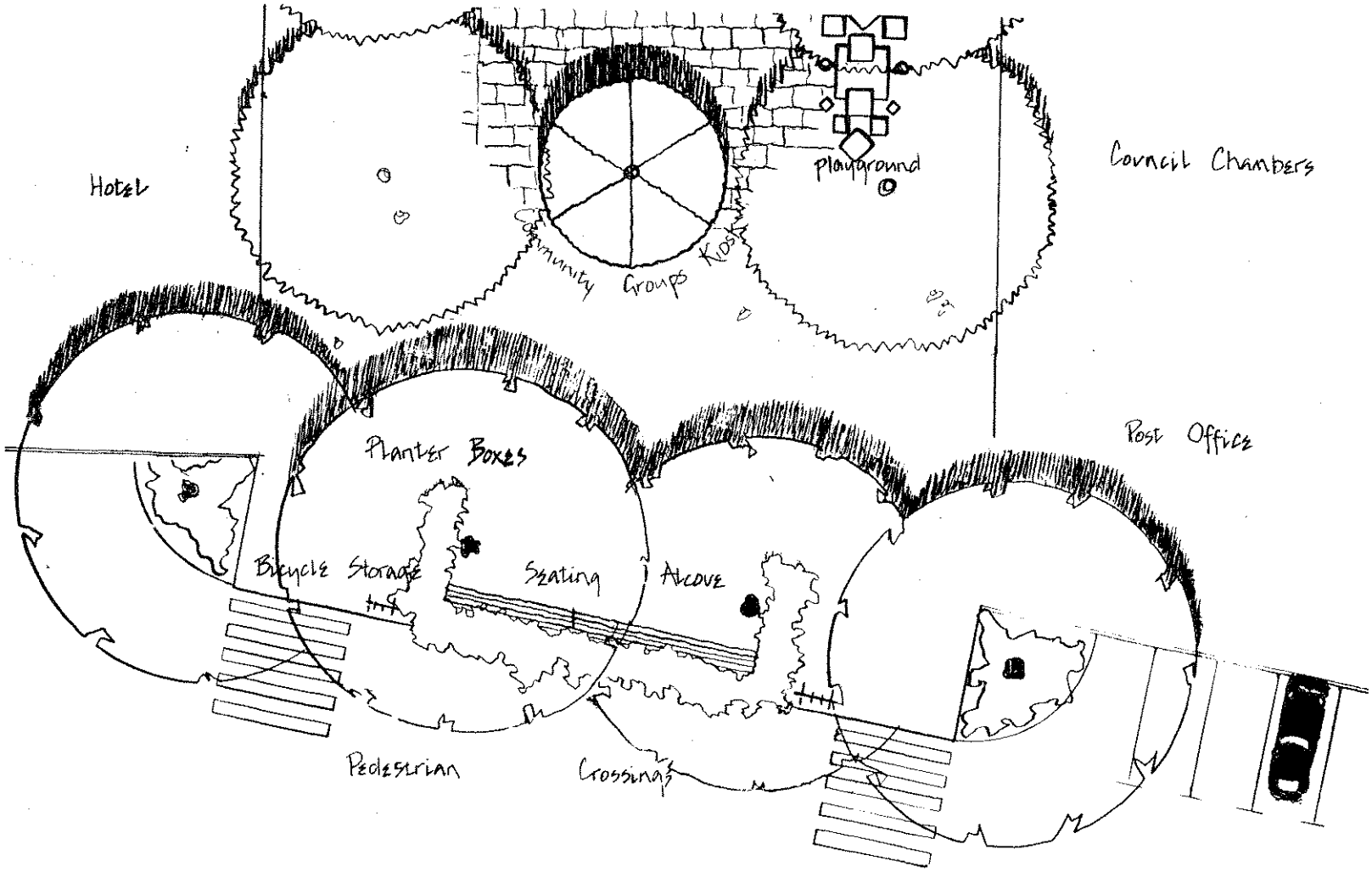


FIG. C

CONCEPTUAL SITE PLAN - ELGIN STREET MALL

It is suggested that the dominant landscape theme should be rows of silky oaks, to consolidate the existing remnants, with ground level cover of bark mulch and Australian native shrubs.

It is suggested that such landscaped bay parking eventually be developed along either side of Conadilly Street, from Chandos Street to Abbott Street as shown by the cross-section, Figure B. It can be integrated into the suggested Elgin Street Mall as shown on Figure C. Figure D illustrates the extended pavement concept designed to protect pedestrian crossings. The protected crossing concept could also be applied at the signalised intersection which is unnecessarily wide (eliminating a sole left-turn lane) and would benefit from the provision on all four corners of a paved, mall-like area which could be adorned with planter boxes, bark gardens, seating etc. This area could extend the whole distance of the 'no standing' area back to the landscaping for the first parking bay.

Standardisation of Street Furniture

Council should pursue its intention of consistently adopting a particular style of street furniture, which integrates with the character of the town, is durable and low maintenance. It is envisaged that it would progressively replace existing furniture with this design.

Highlighting of Historic Features

This study has identified further historic features worthy of note which might now be included on an historical town tour. It is suggested that Council might encourage the Historical Society to produce an up-to-date pamphlet which outlines the history of each feature, and assist in the development of a standardised historical signpost, possibly of a traditional design which can be placed at all items of historical merit.

Planting of Town Approaches

Council should undertake a concerted tree planting programme along all main routes as they enter and leave the town, eventually extending this programme some distance from the built-up area. This will not only enhance the visitor's impression of the town, but provide existing mature trees when development spreads into such outskirts.

Tidying of Industrial Area

Owners of properties in the industrial area should be encouraged to tidy their properties as much as possible. Council may also be able to improve the appearance of the area by footpath tree planting and increased maintenance.

Landscaping of Public Uses

The rear of the hospital, in particular, and the street frontage of the Hunter Street cemetery, should be landscaped to enhance their appearance and assist their integration with surrounding residential areas. It may be possible, with an interesting landscaping design, to eventually make the Hunter Street cemetery into an historical park-like environment.

Development of Other Recreation Areas

Further consideration should be given to the value of the river and its environs as a passive recreation resource. It may be possible for Council to engage the interest of local Apex, Rotary, Lions Clubs etc. to clear and informally develop some such land for riverside picnicking.

APPENDIX 1

SPECIFICATIONS OF THE DEPARTMENT OF ENVIRONMENT AND PLANNING RELATING TO THE PREPARATION OF THE STUDY

New South Wales Government

Department of Environment and Planning

NORTHERN REGIONAL OFFICE

T1/7/29.

RECEIVED 25 MAR 1982

N.S.W. Government Offices
49 Victoria Street, Grafton 2460
P.O. Box 6, Grafton 2460
Telex: AA66966

Telephone: (066) 42 0666

Contact:
Mr. D. Kanaley
Our reference:
82/1819 DK:HM
Your reference:
PWG:VG T1/7/29

The Shire Clerk
Gunnedah Shire Council
P.O. Box 63
GUNNEDAH 2380

23 MAR 1982

Dear Sir,

Proposed Local Environmental Plan - Gunnedah Township and Environs.

I refer to Council's letter of 22nd February, 1982, concerning the above proposed local environmental plan for the town of Gunnedah and its surrounding area.

2. Pursuant to Section 74(2)(b) of the Environmental Planning and Assessment Act, 1979, the Director of Environment and Planning agrees that the provisions of Sections 57, 58, 59, 60, 61(a) to (d) and 65(1)(b) shall apply. It is agreed with Council's opinion that an environmental study is necessary before the draft local environmental plan can be made.

3. After considering Council's preliminary brief for the proposed environmental study, I consider the brief should be expanded to include the impact of coal mining development on the town. The impact of coal mining developments is going to be very significant. Council needs to be in a position where it is well aware not only of land use needs but of social and physical infrastructure needs. I would also like to suggest that Council refine and generally tighten up the brief before entering contractual agreements with Planning Workshop. It should be made more explicit as to what is required so that only sufficient information is gathered to meet the needs of Council in preparing the draft local environmental plan.

4. Should Council require further assistance in this matter please contact Mr. David Kanaley on (066) 42 0629.

Yours faithfully,

R. Nichols,
Regional Manager
(Northern Regions)

APPENDIX 2

DIRECTIONS UNDER SECTION 117 OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT

ENVIRONMENTAL PLANNING AND
ASSESSMENT ACT, 1979

DIRECTIONS UNDER SECTION 117(2)

I, the Minister for Planning and Environment, in pursuance of Section 117(2) of the Environmental Planning and Assessment Act, 1979 hereby direct .... Council to exercise its functions under Division 4 or 5 of Part 111 of the Act in relation to the preparation of a draft local environmental plan in accordance with the principles specified in the Schedule hereto.

ERIC BEDFORD
Minister for Planning
and Environment

Sydney, 27th August, 1980.

SCHEDULE

1. MODEL PROVISIONS

Draft Local Environmental Plans shall adopt all of the provisions of any set of Model Provisions made under Section 33 of the Act insofar as those provisions are relevant to the provisions of that plan.

2. CIRCULARS TO COUNCILS

Draft Local Environmental Plans shall be consistent with:

State Planning Authority Circulars:

49 & 69; 67 & 74 & 76; 72.

Planning & Environment Commission Circulars:

7; 13; 15 & 22; 16 & 29; 21; 27; 30 & 33; 35 & 44; 36 & 47; 39; 43; 45.

3. RESERVATIONS

(i) Local Open Space

Draft Local Environmental Plans shall not alter or remove an existing reservation or zoning for local open space, other than by increasing the area reserved or zoned, or by making minor adjustments.

(ii) Other Open Space or Special Uses or Major Roads

Draft Local Environmental Plans shall not create, alter or remove an existing reservation or zoning for Regional/County Open Space, Special Use or Main, County or Arterial Road without the approval of the relevant public authority.

(iii) Requests of Public Authorities

Draft Local Environmental Plans shall include Open Space, Special Uses or other zonings and reservations which are requested by public authorities and are relevant to those authorities' functions.

4. MINISTER OR PUBLIC AUTHORITY APPROVAL/CONCURRENCE

(i) Existing Provisions

Draft Local Environmental Plans shall not remove an existing requirement to obtain the approval/concurrence of a Minister or public authority, without the approval of the relevant Minister or public authority.

(ii) Requested Provisions

Where a Minister or public authority requests the inclusion of a consultation, approval or concurrence provision (relating to himself or itself), such a provision shall be included in a draft Local Environmental Plan.

(iii) New Provisions

Local Environmental Plans shall not introduce a requirement to obtain the approval/concurrence of a Minister or public authority without the approval of that Minister or public authority.

5. DEVELOPMENT BY THE CROWN

Draft Local Environmental Plans shall not alter or remove the existing requirement that Council may not, without the Minister's approval, refuse to grant consent, or attach conditions to a consent to an application for development by the Crown, statutory authority or instrumentality.

6. SAVINGS

Draft Local Environmental Plans shall not alter or remove existing savings provisions relating to:

(i) certain developments by public authorities or public utility undertakings;

(ii) use by the Crown of existing buildings;

(iii) home occupations.

7. EXISTING GENERAL PROVISIONS

The following General Provisions in deemed instruments embody principles of State and Regional significance and shall be maintained in draft Local Environmental Plans:

(i) Provisions for the protection of, or development controls relating to:

(a) flood liable land;

(b) water catchment areas;

(c) historic buildings and precincts;

(d) unstable lands or lands subject to subsidence.

(ii) Provisions relating to:

(a) foreshore building lines;

(b) parking provision for commercial or residential flat buildings.

8. RURAL ZONES

(i) Draft Local Environmental Plans shall retain existing provisions which enable a dwelling house to be erected on an existing parcel.

(ii) Draft Local Environmental Plans shall retain existing provisions relating to the erection of workers' dwelling houses.

(iii) Draft Local Environmental Plans shall retain existing zones and provisions relating to the control of traffic generating development or access on major road frontages.

(iv) Draft Local Environmental Plans shall not rezone rural land for urban purposes except where such action is justified by an Environmental study, or where in accordance with the Sydney Region Outline Plan, the land has been released by the Minister for Planning and Environment.

9. RESIDENTIAL ZONES

(i) Draft Local Environmental Plans shall contain a requirement that residential development is not permitted until land is adequately serviced with water and sewerage (or arrangements satisfactory to the Council, or other appropriate authority, have been made to service it).

(ii) Draft Local Environmental Plans shall retain existing provisions enabling a dwelling house to be erected on an existing allotment.

(iii) Provisions in deemed planning instruments relating to the minimum lot size for a dwelling house shall not be increased in draft Local Environmental Plans.

(iv) Draft Local Environmental Plans shall maintain existing zonings or availability of land for medium and high density residential flat development except that these may be altered, without reducing the overall quantity, where an Environmental study justifies. Local Environmental Plans may increase zonings for medium/high density residential flat development in areas which have high access and/or amenity, within environmental constraints.

(v) Draft Local Environmental Plans shall not increase existing standards relating to residential flat development (except in rural regions, where justified by an Environmental Study).

(vi) Draft Local Environmental Plans in the Sydney Region shall retain provisions to allow dual occupancy of dwelling houses; in other Regions, draft Local Environmental Plans may include such provisions.

10. BUSINESS ZONES

(i) Draft Local Environmental Plans shall not change the location of existing zonings or availability of land for business development.

(ii) Draft Local Environmental Plans shall retain existing floor space ratio controls.

11. INDUSTRIAL ZONES

Draft Local Environmental Plans shall not reduce existing zonings or availability of land for industrial development.

12. ENVIRONMENTAL PROTECTION

(i) Draft Local Environmental Plans shall not alter or remove existing zonings, or identification, of land for scenic protection areas, environment protection areas, escarpment preservation areas, conservation areas, harbour or foreshore protection areas, coastal protection areas etc. (except that these may be altered or increased where justified by an Environmental Study).

(ii) Provisions in deemed instruments, relating to subdivision and development controls for land referred to in (i) shall be retained in draft Local Environmental Plans (except that these may be amended where justified by an Environmental Study).

13. CORRIDORS

(i) Draft Local Environmental Plans shall not alter or remove existing zonings or identification of land for special use, open space, communications or other corridor purposes.

(ii) Provisions in deemed instruments, relating to subdivision and development control of land in corridors shall be retained in draft Local Environmental Plans.

14. DESIGNATED DEVELOPMENT

Draft Local Environmental Plans shall not identify development as "Designated Development" unless it is likely to have a substantial impact on the environment.

15. OUT OF DATE INSTRUMENTS

Where a deemed environmental planning instrument does not embody the policies in the above Directions Nos. 3-13, any subsequent draft Local Environmental Plan shall include new provisions designed to give effect to such of those policies as are relevant to the land or the subject matter the subsequent instrument addresses.

16. AIRPORT NOISE

Draft Local Environmental Plans shall not rezone land for residential purposes, nor increase residential densities in areas where the Noise Exposure Forecast 1985 levels exceed 30 units for urban areas, or 25 units for rural areas.

FIG. D

AN EXISTING EXAMPLE OF THE EXTENDED FOOTPATH: LONGUEVILLE ROAD, LANE COVE

ENVIRONMENTAL PLANNING AND
ASSESSMENT ACT, 1979

DIRECTIONS UNDER SECTION 117(2)

I, the Minister for Planning and Environment, in pursuance of section 4(8) and section 117(2) of the Environmental Planning and Assessment Act, 1979 hereby

(i) revoke Clause 9(iv) of the Direction dated 27th August, 1980 as set out in Schedule 1 hereto; and

(ii) direct (See.*) Council to exercise its functions under Divisions 4 or 5 of Part III of the Act in relation to the preparation of a draft local environmental plan in accordance with the principles specified in Schedule 2 hereto.

ERIC BEDFORD
Minister for Planning
and Environment

Sydney, 14th April, 1982.

* Direction applies to all Local Government Areas in New South Wales.

SCHEDULE 1

Draft Local Environmental Plans shall maintain existing zonings or availability of land for medium and high density residential flat development except that these may be altered, without reducing the overall quantity, where an Environmental study justifies. Local Environmental Plans may increase zonings for medium/high density residential flat development in areas which have high access and/or amenity, within environmental constraints.

SCHEDULE 2

Draft Local Environmental Plans which zone land for residential purposes

(i) shall not contain provisions which will result in a reduction of the permissible residential density on any land to which the plan applies; and

(ii) shall in as much as is practicable and compatible with the environmental quality of the area, provide for a variety of housing forms and increase the permissible residential density on the land.

APPENDIX 3

STATE ENVIRONMENTAL PLANNING POLICIES NUMBERS 1, 4 AND 5

STATE ENVIRONMENTAL PLANNING POLICY No 1

[42901] Citation

1 This State environmental policy may be cited as "State Environmental Planning Policy No 1 – Development Standards" (hereinafter referred to as "the Policy").

[42902] Interpretation

2 In this Policy, except in so far as the context or subject-matter otherwise indicates or requires –

"Act" means the Environmental Planning and Assessment Act, 1979;

"development application" includes an application for consent referred to in clause 7(1) of the Miscellaneous Acts (Planning) Savings and Transitional Provisions Regulation, 1980;

"development standards" has the meaning ascribed thereto in section 4(1) of the Act.

[42903] Aims, objectives, etc

3 This policy provides flexibility in the application of planning controls operating by virtue of development standards in circumstances where strict compliance with those standards would, in any particular case, be unreasonable or unnecessary or tend to hinder the attainment of the objects specified in section 5(a)(i) and (ii) of the Act.

[42904] Land to which Policy applies

4 This Policy applies to the State.

[42905] Relationship to other environmental planning instruments

5 This Policy prevails over any inconsistency between it and any other environmental planning instrument, whenever made.

[42906] Making of applications

6 Where development could, but for any development standard, be carried out under the Act (either with or without the necessity for consent under the Act being obtained therefor) the person intending to carry out that development may make a development application in respect of that development, supported by a written objection that compliance with that development standard is unreasonable or unnecessary in the circumstances of the case, and specifying the grounds of that objection.

[42907] Consent may be granted

7 Where the consent authority is satisfied that the objection is well founded and is also of the opinion that granting of consent to that development application is consistent with the aims of this Policy as set out in clause 3, it may, with the concurrence of the Director, grant consent to that development application notwithstanding the development standard the subject of the objection referred to in clause 6.

[42908] Concurrence

8 The matters which shall be taken into consideration is deciding whether concurrence should be granted are –

(a) whether non-compliance with the development standard raises any matter of significance for State or regional environmental planning; and

(b) the public benefit of maintaining the planning controls adopted by the environmental planning instrument.

[42909] Objections under s 342NA, etc

9 An objection made or purporting to have been made under section 342NA or 342VA of the Local Government Act, 1919, at any time before this Policy takes effect, not being an objection which had prior to 1st September, 1980, been referred to the Local Government Appeals Tribunal, shall be deemed to be an objection referred to in clause 6.

[The next page is p 2151]

STATE ENVIRONMENTAL PLANNING POLICY No 4

[inserted Gaz 181 of 4 Dec 1981 p 6196]

[43021] Citation

1 This State environmental planning policy may be cited as "State Environmental Planning Policy No 4 — Development Without Consent".

[43022] Interpretation

2 (1) In this Policy, except in so far as the context or subject-matter otherwise indicates or requires—

"council", in relation to the carrying out of development, means the council of the area in which the development is to be carried out;

"floor space", in relation to a building, means the area of a floor of the building, where the area of the floor is taken to be the area within the outer face of the external enclosing walls as measured at a height of 1 400 millimetres above the floor level, excluding—

(a) columns, fin walls, sun control devices and any elements, projections or works outside the general line of the outer face of the external wall;

(b) lift towers, cooling towers, machinery and plant rooms and ancillary storage space and vertical air-conditioning ducts;

(c) car-parking needed to meet any requirements of the council and any internal access thereto; and

(d) space for the loading and unloading of goods.

(2) Part II of the Environmental Planning and Assessment Model Provisions, 1980, applies to and in respect of this Policy in the same way as it applies to and in respect of a local environmental plan by which that Part is adopted and so applies as if the reference to "the local environmental plan" in clause 4 (1) of that Part were a reference to this Policy.

(3) A written notice given to a council under clause 7 or 8 with respect to a change of the use of a building is a sufficient written notice, within the meaning of that clause, only if—

(a) it is given by—

(i) the owner of the building; or

(ii) the occupier of the building, with the consent of the owner of the building,

and contains a statement that it is so given executed by that owner; and

(b) it contains a description of the building sufficient to identify the building and a statement of the particular purpose for which the building will be used after the notice has been given.

(4) Nothing in this Policy shall be read or construed as—

(a) affecting any requirement to comply with a development standard;

(b) authorising the carrying out of any development that is prohibited under the Act, except where the carrying out of the development is so prohibited by reason only of a requirement for the obtaining of development consent before it may be carried out;

(c) authorising the change of an existing use, within the meaning of Division 2 of Part IV of the Act, to another use; or

(d) authorising an alteration to, or the extension or rebuilding of, a building or work being used for an existing use, within the meaning of Division 2 of Part IV of the Act.

(5) Nothing in this Policy shall be construed as permitting, without development consent being obtained therefor, development of the purposes of—

(a) the construction or erection of, or the carrying out of work for the purpose of, an aircraft landing field or helicopter landing pad or any other facility for the landing or taking off of aircraft or helicopters;

(b) the use of land for the landing or taking off of aircraft or helicopters;

(c) a home industry;

(d) the conversion of a dwelling-house into 2 dwellings; or

(e) the alteration of or addition to, or the extension or demolition of, any building or work—

(i) which is specified in any other environmental planning instrument, whether made before or after this Policy; and

(ii) in respect of which that instrument makes a requirement that it shall not be altered, added to, extended or demolished (so as to materially affect the external or internal appearance of the building) without development consent,

whether or not it is referred to in that instrument as a historic building or work.

[43023] Aims, objectives, etc

3 This Policy is designed to permit development of minor environmental planning significance to be carried out on land without the necessity for development consent being obtained therefor, where—

(a) the carrying out of that development is not prohibited under the Act, except by reason only of a requirement for the obtaining of development consent before that development may be carried out; and

(b) the development is carried out in accordance with any development standard applying in respect of the development,

but without affecting any requirement to obtain consent or approval under any other Act in respect of the carrying out of development.

[43024] Application of Policy

4 (1) Subject to subclause (2), this Policy applies to the State.

(2) This Policy does not apply to—

(a) land which is reserved under an environmental planning instrument for use exclusively for a purpose referred to in section 26(c) of the Act;

(b) land, other than land referred to in paragraph (a), which is reserved under an environmental planning instrument for use exclusively for any purpose or thing for which a site could have been reserved under section 342G(3)(e), (f), (g), (h), or (j) of the Local Government Act, 1919, as in force immediately before 1st September, 1980; or

(c) land, other than land referred to in paragraph (a) or (b), which a public authority may, under an environmental planning instrument, be required to acquire by the owner of the land.

[43025] Inconsistency between instruments

5 Subject to section 74(1) of the Act, in the event of an inconsistency between this Policy and another environmental planning instrument, whether made before or after this Policy, this Policy shall prevail to the extent of the inconsistency.

[43026] Subdivision

6 Where, in the absence of this clause, a subdivision of land could be carried out, but only with development consent, for—

(a) the purpose of—

(i) widening a public road;

(ii) making an adjustment to a boundary between allotments, being an adjustment that does not involve the creation of any additional allotment;

(iii) rectifying an encroachment upon an allotment;

(iv) creating a public reserve;

(v) consolidating allotments; or

(vi) excising from an allotment land which is, or is intended to be, used for public purposes, including drainage purposes, bushfire brigade or other rescue service purposes or public conveniences; or

(b) the purpose of subdividing the land into 2 allotments,

the subdivision may be carried out without that consent, but, in the case of a subdivision of land for the purpose specified in paragraph (b), only if the land is not an allotment created by a previous subdivision carried out without development consent by reason of the operation of this clause.

[43027] Shops and commercial premises, etc

7 (1) Subject to subclause (5), where—

(a) a building is lawfully used, or has been lawfully constructed to be used, for the purposes of a shop of a particular kind; and

(b) the building could not, but for this clause, be used for the purposes of commercial premises or a shop of another kind, except with development consent being obtained therefor,

the building may, without the necessity for development consent being obtained therefor, upon a sufficient written notice being given to the council, be used for the purposes of commercial premises or a shop of another kind.

(2) Subject to subclauses (4) and (5), where—

(a) a building is lawfully used, or has been lawfully constructed to be used, for the purposes of commercial premises of a particular kind; and

(b) the building could not, but for this clause, be used for the purposes of a shop or commercial premises of another kind, except with development consent being obtained therefor,

the building may, without the necessity for development consent being obtained, upon a sufficient written notice being given to the council, be used for the purposes of a shop or commercial premises of another kind.

(3) Where—

(a) a building is lawfully used, or has been lawfully constructed to be used, for the purposes of a social or sporting club (other than a club registered under the Registered Clubs Act, 1976) or a community or cultural centre; and

(b) the building could not, but for this clause, be used for any other of the purposes referred to in paragraph (a), except with development consent being obtained therefore,

the building may, without the necessity for development consent being obtained therefor, upon a sufficient written notice being given to the council, be used for any other of those purposes.

(4) Subclause (2) does not authorise the use of a building for the purposes of a shop, if—

(a) the shop will have—

(i) a floor space of more than 200 square metres at ground level; or

(ii) a total floor space of more than 500 square metres; or

(b) the shop will not have a rear service access or access to off-street loading facilities, unless the council has, upon receipt of the written notice referred to in subclause (2), notified the person wishing to carry out the development that the access is not required.

(5) Subclauses (1) and (2) do not authorise the use of a building for the purposes of a shop or commercial premises in which—

(a) restricted publications, within the meaning of the Indecent Articles and Classified Publications Act, 1975, are shown, exhibited, displayed, sold, or otherwise rendered accessible or available to the public;

(b) a business to which section 10 of that Act applies is conducted; or

(c) a business is conducted, an object of which is the display or exhibition of any article, within the meaning of that Act, that is primarily concerned with sexual behaviour, but is not printed matter.

(6) Where a building is used for the purposes of a shop or commercial premises in pursuance of this clause—

(a) the curtilage of the shop or commercial premises shall not be used for storage or display purposes; and

(b) the hours of operation of the shop or commercial premises shall not, in the case of a building used for the purposes of a shop or commercial premises immediately before the commencement of the use authorised by this clause, extend outside the hours during which the shop or commercial premises were so used at that time.

(7) Where, immediately before the commencement of a use of a building authorised by this clause, a condition relating to the maintenance of landscaping was imposed upon the use of the building or the use of the land upon which the building was erected, that condition applies to and in respect of the use of the building so authorised or the use of the land upon which it is erected in the same way as it applies to and in respect of that former use.

[43028] Industry and light industry

8 (1) Subject to subclauses (3) and (4), where—

(a) a building is lawfully used, or has been lawfully constructed to be used, for the purposes of an industry, other than a light industry; and

(b) the building could not, but for this clause, be used for the purposes of a light industry, except with development consent being obtained therefor,

the building may, without the necessity for development consent being obtained therefor, upon a sufficient written notice being given to the council, be used for the purposes of a light industry.

(2) Subject to subclauses (3) and (4), where—

(a) a building is lawfully used, or has been lawfully constructed to be used, for the purposes of a light industry of a particular kind; and

(b) the building could not, but for this clause, be used for the purposes of a light industry of another kind, except with development consent being obtained therefor,

the building may, without the necessity for development consent being obtained therefor, upon a sufficient written notice being given to the council, be used for the purposes of a light industry of another kind.

(3) Subclauses (1) and (2) do not authorise the use of a building for the purposes of a light industry, if—

(a) the total floor space of the building exceeds 500 square metres, or, where there is more than one building on the allotment on which that building is erected, the total floor space of all of the buildings erected on that allotment exceeds 500 square metres; or

(b) the building does not have rear service access or access to off-street loading facilities.

(4) Where a building is used for the purposes of a light industry in pursuance of this clause—

(a) the curtilage of the building shall not be used for storage or display purposes; and

(b) the hours of operation of the light industry shall not—

(i) in the case of a building used for the purposes of an industry immediately before the commmncement of the use authorised by this clause, extend outside the hours during which the building was so used at that time; and

(ii) in any other case, extend outside the hours between 6 am and 6 pm.

(5) Where, immediately before the commencement of a use of a building authorised by this clause, a condition relating to the maintenance of landscaping was imposed upon the use of the building or the use of the land upon which the building was erected, that condition applies to and in respect of the use of the building so authorised or the use of the land upon which it is erected in the same way as it applied to and in respect of that former use.

[43029] Alteration of a building or work

9 (1) In subclause (2), a reference to the alteration of a building or work is a reference to the making of changes—

(a) to the internal fabric or appearance of the building or work, whether or not involving structural alterations; or

(b) to the external fabric or appearance of the building or work, being changes that involve the repair or renovation, or the painting, plastering or other decoration, of the building or work,

but does not include a reference to the enlargement or extension of the building or work.

(2) Where—

(a) a building or work could not, but for this clause, be altered except with development consent being obtained therefor; and

(b) the building or work is erected or carried out on land which is not within an area described in an environmental planning instrument as a foreshore scenic protection area, a harbour foreshore preservation area or a beach front scenic protection area,

the building or work may be altered without the necessity for development consent being obtained therefore.

[43030] *Certain ancillary or incidental development*

10 (1) This clause applies to development on land for a purpose that is ancillary or incidental to a purpose for which the land may be used, being development—

(a) for the purposes of parking, loading facilities, drainage, workers amenities, pollution control, security or for other similar purposes; or

(b) which consists of the erection of fences, greenhouses, conservatories, garages, summer-houses, private boat houses, fuel sheds, tool houses, cycle sheds, aviaries, milking bails, haysheds, stables, fowl-houses, pig sties, barns or the like,

but does not apply to development authorised by clause 9.

(2) Where, in the absence of this subclause, any development to which this clause applies (other than development for a purpose that is ancillary or incidental to the use of land only for the purposes of a dwelling-house) could be carried out on land, but only with development consent being obtained therefor, the development may be carried out without that consent, if—

(a) where any part of the land was used, immediately before the development is carried out—

(i) as a means of entrance to, or exit from, the land;

(ii) for the loading, unloading, manoeuvring or parking of vehicles; or

(iii) for landscaping, being landscaping required to be carried out or maintained by the Act, by reason of a condition imposed under the Act,

the carrying out of the development does not prevent or restrict that use of the part of the land; and

(b) the land is not within an area described in an environmental planning instrument as a foreshore scenic protection area, harbour foreshore preservation area or a beach front scenic protection area.

(3) Where, in the absence of this subclause, any development to which this clause applies, other than development for any of the purposes referred to in subclause (1)(a), could be carried out on land (being land on which development for the purposes of a dwelling-house may be carried out), but only with development consent being obtained therefor, the development may be carried out without that consent, if the land is not within an area described in an environmental planning instrument as a foreshore scenic protection area, harbour foreshore preservation area or a beach front scenic protection area.

[The next page is 2161]

ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979

STATE ENVIRONMENTAL PLANNING POLICY NO. 5—HOUSING FOR AGED OR DISABLED PERSONS

HIS Excellency the Governor, with the advice of the Executive Council, and in pursuance of the Environmental Planning and Assessment Act, 1979, has been pleased to make the State Environmental Planning Policy set forth hereunder in accordance with the recommendation made by the Minister for Planning and Environment. (76-20072)

ERIC BEDFORD,
Minister for Planning and Environment

Sydney, 19th February, 1982.

STATE ENVIRONMENTAL PLANNING POLICY No. 5—HOUSING FOR AGED OR DISABLED PERSONS

Citation

1. This State Environmental Planning Policy may be cited as "State Environmental Planning Policy No. 5—Housing for Aged or Disabled Persons".

Interpretation

2. In this Policy, except in so far as the context or subject-matter otherwise indicates or requires—

"aged person" means a person aged 55 years or over,

"disabled person" means a person of any age who, as a result of having a mental, physical or sensory impairment is substantially limited in his opportunities to enjoy a full and active life;

"dwelling" means a room or suite of rooms occupied or used, or so constructed or adapted as to be capable of being occupied or used, as a separate domicile;

"hostel" means a hostel housing aged persons or disabled persons where cooking and dining, laundering, cleaning and other facilities are provided on a shared basis and where a person having nursing or social work experience or other similar experience provides services for and maintains the residence on a full-time basis;

"housing for aged or disabled persons" means residential accommodation which may take any building form, which is or is intended to be used permanently as housing for the accommodation of aged persons or disabled persons and which may consist of hostels or a grouping of 2 or more self-contained dwellings, and includes any of the following facilities provided for use in connection with that accommodation—

(a) accommodation for staff employed or to be employed in connection with that accommodation;

(b) chapels;

(c) medical consulting rooms;

(d) meeting rooms;

(e) recreation facilities;

(f) shops;

(g) therapy rooms; or

(h) any other facilities for the use or benefit of aged persons or disabled persons;

"self-contained dwelling" means a dwelling or part of a building, whether attached to another dwelling or not, housing aged persons or disabled persons, where private facilities for cooking, sleeping and washing are included in the dwelling or part of the building, but where clothes washing facilities or other facilities for use in connection with the dwelling or part may be provided on a shared basis;

"support service" means a service which assists aged persons or disabled persons, including meals-on-wheels, day care centres for aged persons, home nursing, domiciliary help, transport and other like services provided by hospitals, hostels or nursing homes;

"the Act" means the Environmental Planning and Assessment Act, 1979;

"unit" means either a self-contained dwelling or a bed in a hostel.

Aims, objectives, etc.

3. The aims, objectives, policies and strategies of this Policy are—

(a) to enable development for the purpose of housing for aged or disabled persons throughout the State so as to increase availability of that type of accommodation and to provide a wider choice of residential accommodation for aged persons or disabled persons;

(b) to establish development standards which, if met, will not be grounds for refusal of development consent; and

(c) to ensure that applicants and councils take into consideration the availability of support services for aged persons or disabled persons when a development application to which this Policy applies is submitted for determination.

Application of Policy

4. This Policy applies to the State.

Relationship with other planning instruments

5. (1) Anything in any other environmental planning instrument (whether made before or after this Policy) which would, but for this Policy, prohibit or restrict or enable the consent authority to prohibit or restrict the carrying out of development for the purpose of residential accommodation by reason that the accommodation is to be used for housing for aged or disabled persons shall not apply to that development.

(2) Except as provided in subclause (3), any other environmental planning instrument (whether made before or after this Policy) shall, to the extent, if any, to which it is inconsistent with this Policy, not apply to development to which this Policy applies.

(3) Nothing in this Policy requires development consent to be granted for the carrying out of development on any land if that development could, but for this Policy, lawfully be carried out on that land pursuant to an environmental planning instrument without development consent.

Consent authority

6. The council of the local government area in which development for the purpose of housing for aged or disabled persons is or will be carried out shall be the consent authority having the function to determine a development application relating to that development.

Where development to which this Policy applies may be carried out

7. Development for the purpose of housing for aged or disabled persons may be carried out by any person, with the consent of the consent authority—

(a) on land on which development may be carried out, with or without development consent, for the purpose of—

(i) dwelling houses;

(ii) residential flat buildings;

(iii) hospitals; or

(iv) special uses—churches;

(b) on land on which development for the purpose of housing for aged persons, units for the aged or homes for the aged could, immediately before this Policy came into effect, have been carried out, with or without development consent, and

(c) on land specified in Schedule 1 to this Policy.

Residents

8. A person not being an aged person or a disabled person may reside with an aged person or a disabled person in housing for aged or disabled persons.

Applications to which consent may not be refused

9. The consent authority, in respect of an application made to it for development consent to carry out development for the purpose of housing for aged or disabled persons made by the Crown, a public authority, or another person jointly with the Crown or a public authority—

(a) shall not refuse to grant its consent to the application; and

(b) shall not attach any conditions to its consent to the application,

except with the approval of the Minister.

Circumstances in which consent may not be refused

10. (1) In this clause—

"ground level" means the level of a site as if no development had taken place on it;

"height", in relation to a building, means the distance measured vertically from any point on the building (not being a vent, chimney, lift tower or other service installation) to the ground level immediately below that point;

"landscaped area" means that part of the site not occupied by any building, except for open air recreation facilities, paved pedestrian areas or swimming pools, which part is to be landscaped by way of the planting of gardens, lawns, shrubs or trees and is to be available for use and enjoyment by the occupants of the building to be erected on the site, but does not include so much of the site as is to be used for driveways, parking areas or drying yards.

(2) Development consent shall not be refused for the carrying out of development for the purpose of housing for aged or disabled persons on land referred to in clause 7 on the ground of—

(a) building height, where no building to which the proposed development relates has a height of more than 8.5 metres;

(b) density, where the residential density to be created by the proposed development shall be not more than 80 units per site hectare;

(c) landscaped area, where—

(i) in the case of housing having a residential density of more than 60 units per site hectare, the landscaped area is not less than 50 square metres per unit; or

(ii) in the case of housing having a residential density of or of less than 60 units per site hectare, the landscaped area is not less than 70 square metres per unit;

(d) parking, where—

(i) the proposed development is for the purpose of self-contained dwellings, the application for development consent is not made as referred to in subparagraph (ii) and not less than 1 parking space for each 2 self-contained dwellings shall be provided; or

(ii) the proposed development is for the purpose of self-contained dwellings, the application for development consent is made by the Crown, a public authority or another person jointly with the Crown or a public authority, and not less than 1 parking space for each 10 self-contained dwellings shall be provided; or

(e) parking, where the proposed development is for the purpose of a hostel and—

(i) not less than 1 parking space for each 10 units in the hostel;

(ii) 1 parking space for each 2 persons, if any, to be employed in connection with the development; and

(iii) 1 adequately screened space suitable for parking an ambulance,

shall be provided.

(3) The consent authority shall not consent to development for the purpose of housing for aged or disabled persons in residential zones where residential flat buildings are not permitted unless no building to which the proposed development relates has a height of more than 8.5 metres.

(4) The consent authority shall not consent to development for the purpose of self-contained dwellings, unless—

(a) not less than the number of self-contained dwellings representing 45 per cent of the total number of self-contained dwellings to which the application for development consent relates shall incorporate wheelchair access to each of them; and

(b) not less than the number of self-contained dwellings representing 5 per cent of the total number of self-contained dwellings to which the application for development consent relates shall incorporate continuous wheelchair access to and within each of them.

Support services

11. The consent authority shall not consent to development for the purpose of housing for aged or disabled persons unless written evidence is furnished to the consent authority which establishes to the satisfaction of the consent authority—

(a) that—

(i) a hostel;

(ii) a hospital; or

(iii) a nursing home,

is or will be provided within a reasonable time on the same site as, or on another site in the vicinity of, the site on which the proposed development is to be carried out, by the applicant alone or in conjunction with another person; or

(b) that support services for aged persons or disabled persons are or will be available within a reasonable time, and are or will be able to provide for the residents of the development in need of such services.

Development by the Housing Commission of New South Wales

12. Clauses 10 (4) (b) and 11 do not apply in respect of an application for development made by the Housing Commission of New South Wales or another person jointly with that Commission.

Development for the purpose of a hospital or nursing home

13. Where development for the purpose of housing for aged or disabled persons may be carried out and is carried out on any land, development for the purpose of a hospital or nursing home may be carried out on that land with the consent of the consent authority.

Suspension of certain provisions of the Local Government Act, 1919

14. (1) For the purpose of enabling development to be carried out in accordance with this Policy or a consent granted under the Act in relation to development carried out in accordance with this Policy—

(a) any proclamation made under section 309 (1) of the Local Government Act, 1919;

(b) section 314 (1) (c) of that Act; and

(c) Schedule 7 to that Act,

to the extent necessary to serve that purpose, shall not apply to the development.

(2) Pursuant to section 28 of the Environmental Planning and Assessment Act, 1979, before the making of this clause—

(a) the Governor approved of subclause (1); and

(b) the Minister for the time being administering the provisions of the Local Government Act, 1919, referred to in subclause (1) concurred in writing in the recommendation for the approval of the Governor of that subclause.

Schedule 1

1. All that piece or parcel of Crown land in the vicinity of Wentworth Avenue, East Killara, in the Municipality of Ku-ring-gai, Parish of Gordon and County of Cumberland, being portion 833, shown on plan catalogued C10043-2030 in the Crown Lands Office, Sydney.

2. All those pieces or parcels of land in the vicinity of Harrow Avenue and Eastbank Avenue, Cabramatta, in the Municipality of Fairfield, Parish of St Luke and County of Cumberland, being lots 160 to 166 inclusive, Deposited Plan 219192.

3. All that piece or parcel of land in the vicinity of Alma Road and Henry Lawson Drive, Padstow Heights, in the Municipality of Bankstown, Parish of Bankstown and County of Cumberland, being lot 2, Deposited Plan 596169.

4. All those pieces or parcels of land in the vicinity of Bassett Street and Mona Street, Mona Vale, in the Shire of Warringah, Parish of Narrabeen and County of Cumberland, being—

(a) lots 9 and 10, section 4, Deposited Plan 71080;

(b) lot 4, Deposited Plan 162852;

(c) lot Y, Deposited Plan 164204; and

(d) lot 2, Deposited Plan 521990.

5. All those pieces or parcels of land in the vicinity of Clissold Street and Boundary Road, East Wahroonga, in the Municipality of Ku-ring-gai, Parish of Gordon and County of Cumberland, being—

   (a) lots 32 and 33, Deposited Plan 7954; and

   (b) lot A, Deposited Plan 337473.

6. All those pieces or parcels of land in the vicinity of Ulmarra Place, East Lindfield, in the Municipality of Ku-ring-gai, Parish of Gordon and County of Cumberland, being lots 1 to 25 inclusive, Deposited Plan 219818.

7. All those pieces or parcels of land in the vicinity of King Street, Manly Vale, in the Shire of Warringah, Parish of Manly Cove and County of Cumberland, being those 2 several parts of the area of 4.046 9 hectares of land within Deposited Plan 945658, which comprises the residue of the land contained in Certificate of Title, volume 2438, folio 105, following the exclusion of the lands comprised within Instruments of Transfer allotted dealing Nos F.89448 and G.905317 by the Registrar-General. (7081)

APPENDIX 4

SHOWGROUND STRUCTURES/USES

PLANNING WORKSHOP PTY LTD

Showground Structures/Uses

Structure	Uses (other than Show Society)
Show pavilion	Basketball
Namoi Valley/County Council Hall	Storage
Dining hall	Show use only
Cubs/Scouts Hall	Used for regular meetings
Commercially owned shed	Storage
Junior Farmers Pavilion	Storage of Show materials
Wool Pavilion	~~Not used other than possibly for storage~~ Gdah Spinners & Weavers group from 11/8/82
Commercial Shed	Furniture Storage
Kiosk	Storage of Scout gear
Pig Pavilions	Not used
Grandstand (constructed in 1976 under RED scheme)	Shower, toilets under-utilised by Rugby
Poultry Pavilion	Meetings
Pottery Club Headquarters	Club and Show use
Gymnastic Centre (built by Council with private donations)	Lyle and Griffiths Centre
Lapidary Club	Club and Show use
Sheltered Workshop	Storage
Cattle Pavilion	Storage of ring furniture
Secretary's Office/Administration	Permanently manned in business hours only during Show time - used periodically otherwise
Junior Rugby League and Cricket Shed	Storage and Kiosk
Horse stalls	Some stables let
John Longmuir Playing Fields	Basketball, playing fields, cricket. Formerly used for parking at Show, also camping by Show associated people.

APPENDIX 5

TRAFFIC AND PARKING COUNTS

APPENDIX A

TABLE A1: Classification Counts — LOCATION: HENRY STREET, North of Talibah Street — DATE: 3/5/82 — DAY: Monday

Time Period	Southbound				Northbound				Total			
	Light Vehicles	Rigid H.V.	Semi-Trailers	Total	Light Vehicles	Rigid H.V.	Semi-Trailers	Total	Light Vehicles	Rigid H.V.	Semi-Trailers	Total
8 - 9 am	96	3	4	103	100	7	6	113	196	10	10	216
9 - 10 am	94	2	2	98	110	6	5	121	204	8	7	219
10 - 11 am	86	8	6	100	77	9	2	88	163	17	8	188
11 - Noon	73	2	6	81	76	8	1	85	149	10	7	166
Noon - 1 pm	59	5	2	66	71	6	4	81	130	11	6	147
1 - 2 pm	58	2	-	60	58	7	5	70	116	9	5	130
2 - 3 pm	64	2	5	71	66	5	9	80	130	7	14	151
3 - 4 pm	97	1	5	103	69	4	6	79	166	5	11	182
4 - 5 pm	83	4	1	88	79	4	4	87	162	8	5	175
5 - 6 pm	70	3	6	79	65	3	-	68	135	6	6	147
6 - 7 pm	52	1	3	56	31	-	3	34	83	1	6	90
7 - 8 pm	26	-	-	26	29	1	3	33	55	1	3	59
TOTAL No.	858	33	40	931	831	60	48	939	1,689	93	88	1,870
TOTAL %	92.2	3.5	4.3	100	88.5	6.4	5.1	100	90.3	5.0	4.7	100

APPENDIX A

TABLE A2: Classification Counts — LOCATION: CONADILLY STREET, West of Warrabungle Street — DATE: 3/5/82 — DAY: Monday

Time Period	Eastbound				Westbound				Total			
	Light Vehicles	Rigid H.V.	Semi-Trailers	Total	Light Vehicles	Rigid H.V.	Semi-Trailers	Total	Light Vehicles	Rigid H.V.	Semi-Trailers	Total
8 - 9 am	100	12	6	118	95	16	9	120	195	28	15	238
9 - 10 am	86	10	4	100	88	15	7	110	174	25	11	210
10 - 11 am	62	7	5	74	75	6	4	85	137	13	9	159
11 - Noon	89	13	9	111	76	13	4	93	165	26	13	204
Noon - 1 pm	81	7	2	90	88	5	5	98	169	12	7	188
1 - 2 pm	70	9	4	83	76	11	8	95	146	20	12	178
2 - 3 pm	75	16	9	100	102	17	8	127	177	33	17	227
3 - 4 pm	89	19	11	119	104	21	10	135	193	40	21	254
4 - 5 pm	124	18	9	151	112	24	7	143	136	42	16	294
5 - 6 pm	107	16	6	129	103	19	16	138	210	35	22	267
6 - 7 pm	44	24	9	77	54	16	8	78	98	40	17	155
7 - 8 pm	26	9	7	42	25	8	3	36	51	17	10	78
TOTAL No.	953	160	81	1,194	998	171	89	1,258	1,951	331	170	2,452
TOTAL %	79.8	13.4	6.8	100	79.3	13.6	7.1	100	79.6	13.5	6.9	100

APPENDIX A

TABLE A3: Classification Counts — LOCATION: NEW STREET, North of South Street — DATE: 3/5/82 — DAY: Monday

Time Period	Southbound				Northbound				Total			
	Light Vehicles	Rigid H.V.	Semi-Trailers	Total	Light Vehicles	Rigid H.V.	Semi-Trailers	Total	Light Vehicles	Rigid H.V.	Semi-Trailers	Total
8 - 9 am	195	12	-	207	110	16	1	127	305	28	1	334
9 - 10 am	153	11	4	168	132	13	3	148	285	24	7	316
10 - 11 am	122	15	1	138	126	13	3	142	248	28	4	280
11 - Noon	122	12	1	135	149	18	6	173	271	30	7	308
Noon - 1 pm	137	7	1	145	177	7	1	185	314	14	2	330
1 - 2 pm	156	6	1	163	160	12	2	174	316	18	3	337
2 - 3 pm	167	7	2	176	160	15	1	176	327	22	3	352
3 - 4 pm	170	16	3	189	158	13	2	173	328	29	5	362
4 - 5 pm	199	17	2	218	235	22	2	259	434	39	4	477
5 - 6 pm	127	8	1	136	230	8	5	243	357	16	6	379
6 - 7 pm	64	1	4	69	131	3	1	135	195	4	5	204
7 - 8 pm	75	4	1	80	61	3	1	65	136	7	2	145
TOTAL No.	1,687	116	21	1,824	1,829	143	28	2,000	3,516	259	49	3,824
TOTAL %	92.5	6.4	1.1	100	91.4	7.2	1.4	100	91.9	6.8	1.3	100

TABLE A4: Classification Counts LOCATION: SOUTH STREET (TR 72) East of View Street DATE: 3/5/82 DAY: Monday

Time Period	Westbound				Eastbound				Total			
	Light Vehicles	Rigid H.V.	Semi-Trailers	Total	Light Vehicles	Rigid H.V.	Semi-Trailers	Total	Light Vehicles	Rigid H.V.	Semi-Trailers	Total
8 - 9 am	86	5	1	92	116	10	2	128	202	15	3	220
9 - 10 am	64	5	1	70	99	5	2	106	163	10	3	176
10 - 11 am	74	1	-	75	97	4	5	106	171	5	5	181
11 - Noon	53	12	-	65	89	7	2	98	142	19	2	163
Noon - 1 pm	98	3	3	104	125	5	1	131	223	8	4	235
1 - 2 pm	98	-	-	98	89	2	1	92	187	2	1	190
2 - 3 pm	69	2	2	73	115	2	-	117	184	4	2	190
3 - 4 pm	91	9	3	103	97	4	1	102	188	13	4	205
4 - 5 pm	111	6	2	119	142	4	-	146	253	10	2	265
5 - 6 pm	77	-	2	79	128	2	1	131	205	2	3	210
6 - 7 pm	51	1	1	53	59	2	1	62	110	3	2	115
7 - 8 pm	28	3	2	33	40	1	2	43	68	4	4	76
TOTAL No.	900	47	17	964	1,196	48	18	1,262	2,096	95	35	2,226
TOTAL %	93.3	4.9	1.8	100	94.8	3.8	1.4	100	94.1	4.3	1.6	100

APPENDIX A

TABLE A5: Classification Counts — LOCATION: CURLEWIS ROAD, East of Boundary Road — DATE: 3/5/82 — DAY: Monday

Time Period	Westbound				Eastbound				Total			
	Light Vehicles	Rigid H.V.	Semi-Trailers	Total	Light Vehicles	Rigid H.V.	Semi-Trailers	Total	Light Vehicles	Rigid H.V.	Semi-Trailers	Total
8 - 9 am	49	5	4	58	32	1	3	36	81	6	7	94
9 - 10 am	55	-	2	57	39	1	2	42	94	1	4	99
10 - 11 am	38	2	2	42	43	-	5	48	81	2	7	90
11 - Noon	52	3	-	55	38	-	2	40	90	3	2	95
Noon - 1 pm	34	1	2	37	22	1	3	26	56	2	5	63
1 - 2 pm	69	1	3	73	27	1	5	33	96	2	8	106
2 - 3 pm	43	-	8	51	30	-	3	33	73	-	11	84
3 - 4 pm	42	1	4	47	38	3	6	47	80	4	10	94
4 - 5 pm	56	2	6	64	57	-	4	61	113	2	10	125
5 - 6 pm	42	-	7	49	57	-	3	60	99	-	10	109
6 - 7 pm	31	-	7	38	31	-	3	34	62	-	10	72
7 - 8 pm	27	-	-	27	14	-	7	21	41	-	7	48
TOTAL No.	538	15	45	598	428	7	46	481	966	22	91	1,079
TOTAL %	90.0	2.5	7.5	100	90.0	1.5	9.5	100	89.5	2.1	8.4	100

APPENDIX A

TABLE A6: Classification Counts LOCATION: BLOOMFIELD STREET, East of Marquis Street DATE: 3/5/82 DAY: Monday

Time Period	Westbound				Eastbound				Total			
	Light Vehicles	Rigid H.V.	Semi-Trailers	Total	Light Vehicles	Rigid H.V.	Semi-Trailers	Total	Light Vehicles	Rigid H.V.	Semi-Trailers	Total
8 - 9 am	104	16	5	125	88	12	1	101	192	28	6	226
9 - 10 am	92	8	4	104	94	5	3	102	186	13	7	206
10 - 11 am	81	9	1	91	85	8	2	95	166	17	3	186
11 - Noon	93	10	4	107	85	10	3	98	178	20	7	205
Noon - 1 pm	75	2	3	80	98	8	3	109	173	10	6	189
1 - 2 pm	86	4	-	90	76	10	8	94	162	14	8	184
2 - 3 pm	89	12	3	104	67	8	5	80	156	20	8	184
3 - 4 pm	104	14	2	120	89	17	6	112	193	31	8	232
4 - 5 pm	94	20	2	116	90	13	6	109	184	33	8	225
5 - 6 pm	94	9	3	106	100	14	2	116	194	23	5	222
6 - 7 pm	27	6	1	34	27	7	1	35	54	13	2	69
7 - 8 pm	53	3	-	56	54	3	-	57	107	6	-	113
TOTAL No.	992	113	28	1,133	953	115	40	1,108	1,945	228	68	2,241
TOTAL %	87.5	10.0	2.5	100	86.0	10.4	3.6	100	86.8	10.2	3.0	100

APPENDIX A

TABLE A7: Classification Counts — LOCATION: CHANDOS STREET, North of Maitland Street — DATE: 3/5/82 — DAY: Monday

Time Period	Southbound				Northbound				Total			
	Light Vehicles	Rigid H.V.	Semi-Trailers	Total	Light Vehicles	Rigid H.V.	Semi-Trailers	Total	Light Vehicles	Rigid H.V.	Semi-Trailers	Total
8 - 9 am	51	6	1	58	30	6	2	38	81	12	3	96
9 - 10 am	47	3	1	51	30	3	1	34	77	6	2	85
10 - 11 am	11	5	2	18	15	4	1	20	26	9	3	38
11 - Noon	25	3	-	28	25	6	2	33	50	9	2	61
Noon - 1 pm	20	3	2	25	17	4	-	21	37	7	2	46
1 - 2 pm	24	1	-	25	14	4	-	18	38	5	-	43
2 - 3 pm	24	6	-	30	37	5	4	46	61	11	4	76
3 - 4 pm	23	6	-	29	34	4	31	39	57	10	1	68
4 - 5 pm	23	6	1	30	30	4	1	35	53	10	2	65
5 - 6 pm	23	5	2	30	27	4	1	32	50	9	3	62
6 - 7 pm	22	5	3	30	13	4	-	17	35	9	3	47
7 - 8 pm	14	1	1	16	7	2	1	10	21	3	2	26
TOTAL No.	307	50	13	370	279	50	14	343	586	100	27	713
TOTAL %	83.0	13.5	3.5	100	81.3	14.6	4.1	100	82.2	14.0	3.8	100

APPENDIX A

TABLE A8: Classification Counts LOCATION: CONADILLY STREET, West of Marquis Street DATE: 3/5/82 DAY: Monday

Time Period	Westbound				Eastbound				Total			
	Light Vehicles	Rigid H.V.	Semi-Trailers	Total	Light Vehicles	Rigid H.V.	Semi-Trailers	Total	Light Vehicles	Rigid H.V.	Semi-Trailers	Total
8 - 9 am	186	10	7	203	182	15	3	200	368	25	10	403
9 - 10 am	214	8	3	225	210	9	4	223	424	17	7	448
10 - 11 am	202	7	2	211	206	10	3	219	408	17	5	430
11 - Noon	221	10	2	233	222	8	1	231	443	18	3	464
Noon - 1 pm	234	11	2	247	241	9	3	253	475	20	5	500
1 - 2 pm	229	13	7	249	224	12	4	240	453	25	11	489
2 - 3 pm	182	8	2	192	183	6	2	191	365	14	4	383
3 - 4 pm	226	10	10	246	301	10	12	323	527	20	22	569
4 - 5 pm	276	12	9	297	243	9	5	257	519	21	14	554
5 - 6 pm	249	11	12	272	203	8	2	213	452	19	14	485
6 - 7 pm	135	3	6	144	116	8	6	130	251	11	12	273
7 - 8 pm	134	3	7	144	122	4	5	131	256	7	12	275
TOTAL No.	2,488	106	69	2,663	2,453	108	50	2,611	4,941	214	119	5,274
TOTAL %	93.4	4.0	2.6	100	94.0	4.1	1.9	100	93.7	4.1	2.2	100

APPENDIX B

Number Plates and Total Volumes at Cordon Stations* (1.30 pm to 5.30 pm, Monday 3rd May 1982)

Location	Entering Study Area				Exiting Study Area				Total		
	Direction	Number Plates Recorded	Volume	Ratio	Direction	Number Plates Recorded	Volume	Ratio	Number Plates Recorded	Volumes	Ratio
External Cordon Stations											
1 Henry St. N of Talibah St.	Southbound	55	316	17.4	Northbound	54	297	18.2	109	613	17.8
2 Conadilly St. W of Warrabungle St.	Eastbound	75	450	16.7	Westbound	96	489	19.6	171	939	18.2
3 New St. N of South St.	Northbound	134	738	18.2	Southbound	162	821	19.7	296	1,559	19.0
4 South St. E of View St.	Eastbound	98	483	20.3	Westbound	67	367	18.3	165	850	19.4
5 Curlewis Rd. E of Boundary Rd.	Westbound	17	190	8.9	Eastbound	22	173	12.7	39	363	10.7
Sub-Total		379	2,177	17.4		401	2,147	18.7	770	4,324	17.8
Internal Station											
6 Bloomfield St. E of Marquis St.	Eastbound	53	394	13.5	Westbound	67	440	15.2	120	834	14.4
TOTAL		432	2,571	16.8		468	2,587	18.1	890	5,158	17.3

* Semi-Trailers not included in this Table having all been recorded.

APPENDIX C

Origin-Destination of Trips - Gunnedah (1.30 pm to 5.30 pm, Monday 3rd May 1982)

Origin	Ext. Cordon Stat. No.	External Cordon Stations 1 LR	1 ST	2 LR	2 ST	3 LR	3 ST	4 LR	4 ST	5 LR	5 ST	7 LR	7 ST	Sub-Total LR	Sub-Total ST	Sub-Total Total	Study Area LR	Study Area ST	Study Area Total	TOTAL LR	TOTAL ST	TOTAL
HENRY ST. N of Talibah St.	1	-	-	23 6*	2 1*	12	-	12	3	4	-	15	6	72	12	84	244	3	247	316	15	331
CONADILLY ST. W of Warrabungle St.	2	30 12*	2 10*	-	-	36	4	-	-	39	8 7*	11	-	128	31	159	322	3*	325	450	34	484
NEW ST. N of South St.	3	17	-	22	3	-	-	-	-	-	1	-	1	39	5	44	699	3*	702	738	8	746
SOUTH ST. E of View St.	4	39	1	-		-	-	-	-	-	-	-	-	39	1	40	444	-	444	483	1	484
CURLEWIS RD. E of Boundary Rd.	5	5	1	22 11*	10 6*	-	-	11	2	-	-	4	-	53	19	72	137	4*	141	190	23	213
CHANDOS ST. N of Maitland St.	7	9	3	7	-	-	-	-	-	3	-	-	-	19	3	22	91	-	91	110	3	113
Sub-Total		112	17	91	22	48	4	23	5	46	16	30	7	350	71	421	1,937	13	1,950	2,287	84	2,371
Study Area		185	3	398	17	773	5	344	3	127	3	109	-	1,936	31	1,967	-	-	-	1,936	31	1,967
TOTAL		297	20	489	39	821	9	367	8	173	19	139	7	2,286	102	2,388	1,937	13	1,950	4,223	115	4,338

LR = Light and rigid heavy vehicles ST = Semi-Trailers * Through trips via Internal Station 6 - BLOOMFIELD ST., E of Marquis St.

APPENDIX 6

AGRICULTURAL CAPABILITY ASSESSMENT

RECONNAISSANCE OF RURAL LAND CAPABILITY

Class 1

Land capable of regular cultivation for cropping (cereals, oilseeds, fodder etc.) or intensive horticulture (vegetables, orchards). It has avery good capability for agriculture, where there are only minor or no constraints to sustained high levels of production. It includes irrigated areas with high production.

All, or nearly all, of the following conditions are to be satisfied:

* Lands are either level or very gently sloping.

* Soils are deep, well to imperfectly drained, and have good water holding capacity.

* Soils can be maintained in good tilth and productivity.

* Erosion damage is nil to slight and potential for future damage is low.

* Productivity is high to moderately high for a wide range of adapted field crops.

* The soils have a moderate to high capability to withstand frequent cultivation and artificial irrigation without serious damage.

* Any adverse soil physical and chemical restraints are capable of economic amelioration.

* Economic losses caused by floods are low in the long term.

* Lands are not likely to accumulate excessive salt or develop prolonged high water tables following irrigation.

* Lands are not exposed to recurrent extremes of climate to an extent that productivity is seriously affected.

* Intensive production has been facilitated by existing local or regional infrastructure (such as drainage schemes, irrigation networks or levee banks), except for those parts which have suffered damage beyond economic amelioration.

Class 2

Land suitable for cultivation for cropping, but not suited to continuous cropping or intensive horticulture. It has good capability for agriculture, but where constraints limit the cropping phase to a rotation with improved pasture and thus reduce the overall level of production.

* Class 2 lands can be either (a) or (b):

  (a) where pockets of Class 1 land are too small for general agricultural use and occupy between 25% and 75% inside a zone of a lower class, then that whole zone should be placed in Class 2 provided that the productivity of crops appropriate to that zone is very high; otherwise the zone should be included in Class 3.

(b) all or nearly all of the following conditions are to be satisfied:

- Land may be level to moderately steep.
- Soils are deep to moderately deep, well drained and have good available water capacity.
- Climatic and environmental conditions are particularly favourable for sensitive crops whose cultivation would be seriously impaired in adjacent areas with less favourable characteristics.
- Erosion damage or hazard is low to moderate: soil conservation measures may be required.
- Soils have a moderate to high capacity to withstand frequent cultivation and artificial irrigation without serious damage, except for those on steeper lands which have a low capability and require conservation works.
- Soils can be maintained in good tilth and productivity.
- For a wide range of field crops, adapted to the region, their productivity is high to moderately high.
- Any adverse soil physical and chemical restraints are capable of economic amelioration.
- Economic losses caused by floods the low in the long term.
- These lands where existing local or regional infrastructure (such as drainage schemes, irrigation networks or levee banks) has been provided for intensive production - except for those parts which have suffered damage beyond economic amelioration.
- Lands are not likely to accumulate excessive salt or develop prolonged irrigation.

Class 3

Land suitable for grazing - well suited to pasture improvement and can be cultivated for an occasional cash crop or forage crop in conjunction with pasture management. The overall level of production is moderate as a result of high environmental costs which limit the frequency of ground disturbance. Has a moderate capability for agriculture. Pasture land capable of sustained high levels of production, although conservation measures may be required.

More than one condition is to be satisfied:

* Lands have either many moderate or few severe limitations of those listed under Class 5, restricting the extent of arable agriculture.
* Sustained high to moderately high levels of productivity of pastures adapted to the region are easily maintained.

* Lands may be very gently to steeply sloping.

* Soils may be deep or shallow, well drained to poorly drained.

* Erosion damage is nil to moderately severe but conservation works are feasible.

* Under artificial irrigation, level lands are incapable of sustained high levels of production because of unsuitable soil-physical properties incapable of economic amelioration.

Class 4

Land suitable for grazing and not suitable for cultivation. Agriculture is based on native pastures or improved pastures relying on minimum tillage techniques. The overall level of production is low. Environmental constraints make arable agriculture uneconomic.

All or nearly all of the following conditions are to be satisfied:-

* Lands are hilly or rolling with steep or moderately steep slopes.

* The degree of stoniness or rockiness is slight to severe but not extreme.

* Erosion damage or hazard is moderate to severe and control works are necessary; severely eroded areas are only capable of economic restoration by the establishment of permanent pasture.

* Soil physical handicaps are sufficiently severe to prevent cultivation but will allow some pasture growth providing year round feed for a low stocking rate.

* While extremes of salinity, salt hazard, toxicity, deficiency, acidity or alkalinity may be present they are not so severe as to prevent plant growth but instead may combine to depress yields seriously and place severe restrictions on the range of suitable pasture species.

* Where land is subject to periodic inundation and high water tables, these conditions are generally of short duration.

* Where permanent high water tables exist, the land can be drained sufficiently to permit some pasture growth.

* The density of bush or scrub may be low to high, but not extremely high.

* Where the population of feral and noxious animals is high it does not impose a severe limitation to grazing.

* Where the density of weeds is high, successful eradication is only possible by a continuing program.

Class 5

Land suited for only rough grazing or land not suited to agriculture. Agricultural production is very low or zero. Severe or absolute constraints to production are imposed by environmental factors.

These lands have either a single very severe limitation, or a combination of two or more severe limitations from the following list are present:

* Extremes of:
  - slope;
  - stoniness or rockiness;
  - erosion hazard or damage by wind or water;
  - soil physical handicaps;
  - salinity or salt hazard;
  - surface water or flooding;
  - toxicity or deficiency;
  - acidity or alkalinity;
  - high watertables incapable of economic drainage; or
  - bush or scrub uneconomic to clear.

* Large populations of feral animals inhabit the area.

* High densities of weeds and timber regrowth which are uneconomic to eradicate.

* These are timbered or previously timbered upland areas where clearing has led or may lead to excessive movement of salt into the groundwater.

The Department of Agriculture recommends that Class 2 and 3 land should where possible, be retained for primarily agricultural uses.

No Class 1 land was specifically identified because parcels of this land were too small to be represented at this level of planning. Furthermore, such areas are usually surrounded by Class 2 land and as such have been included in this category.

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TANNERY

TANNERY (EFFLUENT DISPOSAL)

ABATTOIR

GUNNEDAH

GUNNEDAH AERODROME

TANNERY (EFFLUENT DISPOSAL)

GUNNEDAH

GUNNEDAH

10 mg/m²/month

20 dB(A)

REDUCED AFFECTATION

EXISTING URBAN AREA

AREA SERVICED USING EXTENSION TO EXISTING SERVICES

AREA REQUIRING INDEPENDENT OR MAJOR AUGMENTATION

EXISTING MINING LEASES

LINE OF DUST DEPOSITION AFFECTATION

LINE OF NOISE AFFECTATION

PROPOSED OPENCUT MINING LEASE

STUDY AREA BOUNDARY

GUNNEDAH ENVIRONMENTAL STUDY

SETTLEMENT SUPPORT CONSTRAINTS

21

0 2km

Prepared by PLANNING WORKSHOP PTY. LTD. 346 KENT ST., SYDNEY
For GUNNEDAH SHIRE COUNCIL