

9. Urban infrastructure

This section examines the key infrastructure issues, constraints and opportunities relating to the provision of urban infrastructure in Upper Lachlan. Existing capacities and augmentation opportunities are covered, with particular reference to ensuring future needs associated with residential and non-residential growth are satisfactorily met.

9.1 Groundwater

9.1.1 Assessment method

A desktop analysis was undertaken to identify groundwater corridors and/or catchments that will require protection from new urban development. This is to ensure that groundwater quality and quantity in the Upper Lachlan LGA is appropriately protected from further growth.

The geological units of the Upper Lachlan were divided into two main aquifer systems. These aquifers were then ranked for their potential to contribute towards a long-term sustainable water supply for the towns and villages. These aquifers were ranked as follows:

1. tertiary basalts
2. general fractured rock units.

9.1.2 Groundwater vulnerability to contamination

Groundwater vulnerability mapping techniques have been used to identify specific regions across NSW where human activities may pose a risk to important aquifer systems. To date, vulnerability mapping has not been compiled for the Upper Lachlan LGA. The tools used for vulnerability mapping are designed to allow planners, developers, and government agencies to make more informed judgements about the potential for groundwater contamination from surface activities. The primary characteristics for the assessment of groundwater vulnerability are:

- Groundwater salinity (quality).
- Depth to the watertable (amount of material over the aquifer to filter any contaminants).
- Soil permeability (the speed with which contaminants can filter to the water table).
- Geology (aquifer characteristics).

9.1.3 Incompatible land uses / threats to groundwater

Incompatible land uses that can affect groundwater quality include industries or activities that can potentially contaminate the groundwater table. In a rural environment, these industries and activities typically include:

- waste disposal (i.e. landfills) or waste storage sites
- tanneries
- heavy industries

- fuel depots
- golf courses
- unsewered villages
- intensive agriculture uses
- intensive agriculture facilities, including sheep dips.

Unsewered villages can pose a genuine threat to groundwater quality, as potential contamination sources can be distributed over a broad area. Groundwater bores close to on-site effluent disposal systems (domestic or council systems) can become a significant threat to aquifers, potentially providing a preferential pathway for contamination to enter the aquifers.

Areas of primary concern, where groundwater is vulnerable to contamination, include recharge areas with shallow watertables. Within Upper Lachlan, no areas with these characteristics have been identified. The basalts around Crookwell and Taralga are potentially a source of good quality groundwater. These areas are vulnerable to groundwater contamination due to the fractured and porous nature of the basalt (refer Figure 9-1).

The town water in Crookwell is supplemented by two boreholes (GW065579 and GW065580), which are registered within a database managed by the Department of Water and Energy. These bores are located approximately seven kilometres east of Crookwell, in Parkers Gully. The location of the wells is shown on Figure 9-1.

9.1.4 Well-head protection policy

Well-head protection plans are a component of groundwater management plans, which are developed to keep town water supply bores free from contamination. The recommended protection plan (refer Figure 9-1) incorporates the following three buffer zones to protect the groundwater source:

- inner protection zone (minimum 50 metre radius)
- outer protection zone (400 day groundwater travel time)
- catchment area.

The purpose of the well head protection plan is to exclude any high risk activities that may cause groundwater contamination, including incompatible uses.

A well head protection policy needs to be prepared to manage the area of basalt geology around Crookwell, in accordance with the *NSW Groundwater Quality Protection Policy* (Department of Land and Water Conservation 1998) prepared by the then Department of Land and Water Conservation.

9.1.5 Constraints

Much of the groundwater in the Upper Lachlan is suitable for some domestic, agricultural and limited industrial uses, although some groundwater from low yield systems is unsuitable for drinking.

Although eastern parts of the LGA are associated with the Hawkesbury and Lake George basins, most of the area is within the Lachlan River catchment. Some parts of the LGA in the Lachlan catchment have a high groundwater vulnerability ranking. New developments

within these areas will require the assessment of surface and groundwater conditions, leading to the preparation of remedial action plans.

The low to moderate groundwater vulnerability rating for upland areas in the Lachlan catchment suggests that future land use changes there should involve groundwater investigations.

9.1.6 Management issues

One area within Upper Lachlan that should be given special protection to ensure that water quality and quantity are not compromised by future activities, is the basalt area around Taralga, where production bores have the capacity to supplement the town water supply. Special protection is needed in this area, as it is potentially a source of good quality groundwater and vulnerable to groundwater contamination, due to the fractured and porous nature of the basalt within the region.

Investigation of groundwater sources would comprise hydrogeological investigations to determine potential bore locations within a defined region. Drilling of test bores would be undertaken to seek water of adequate yields at a selected site. Although residential development is unlikely to compromise these resources, agricultural and employment uses have the potential to affect water quality. Also, further development would reduce the quantity of groundwater recharge, and surface water run-off is likely to increase if increased hardstand areas are constructed.

The Council's comprehensive development control plan that will be prepared subsequent to the implementation of the Upper Lachlan Local Environmental Plan, may include provisions requiring landscaping and in conjunction with requirements of the Building and Sustainability Index (BASIX), surface run-off from future development would be minimised and re-used where possible.

Upper Lachlan falls within the Lachlan, Hawkesbury-Nepean and Murrumbidgee Catchment Management Authority areas. All three of these catchment management authorities have set water targets in their 2003–04 Blueprint Plans. (Department of Infrastructure, Planning and Natural Resources 2004). These Blueprint plans are intended to achieve sustainable groundwater extraction within the 10 year life of the Blueprint Plan. Further building on the Blueprint Plans, Catchment Action Plans (CAPs) have been prepared. These CAPs, although non-regulatory, identify targets and timeframes for actions in managing the catchment. All three of the catchment management authorities have prepared and commenced implementation of a CAP.

A regional approach to managing and protecting groundwater supplies and quality will be an integral component of environmental planning across the region. Future activity within Upper Lachlan, including subdivision, would need to be cognisant of groundwater impacts associated with development.

9.2 Water supply

9.2.1 Existing infrastructure and capacity

Crookwell, Taralga and Gunning and Dalton have their own water supply, treatment and distribution systems. Crookwell, Gunning and Taralga rely on surface water extraction,

Dalton relies on groundwater extraction. Crookwell's water supply is also supplemented by groundwater extraction.

Water supply to Upper Lachlan Shire is derived from a variety of sources including rivers, creeks and bores. Reticulated water is supplied to approximately 90% of the town limits. Non-reticulated water sources, such as springs, dams, bores, rainwater tanks and local stream extraction, were used by 10% of the urban and 100% of the rural population.

Table 9-1 Reticulated water sources within the Upper Lachlan Shire Council area

Source	Town supplied (population)	Capacity (megalitres)
Woolshed Creek	Taralga (390)	27ML off stream storage
Lachlan River	Gunning (560)	Flow of river extraction
Bores (x2)	Dalton (130)	Bores
Kentgrove Creek	Crookwell (2300)	407ML (Kentgrove Dam)

Source: Upper Lachlan Shire Council

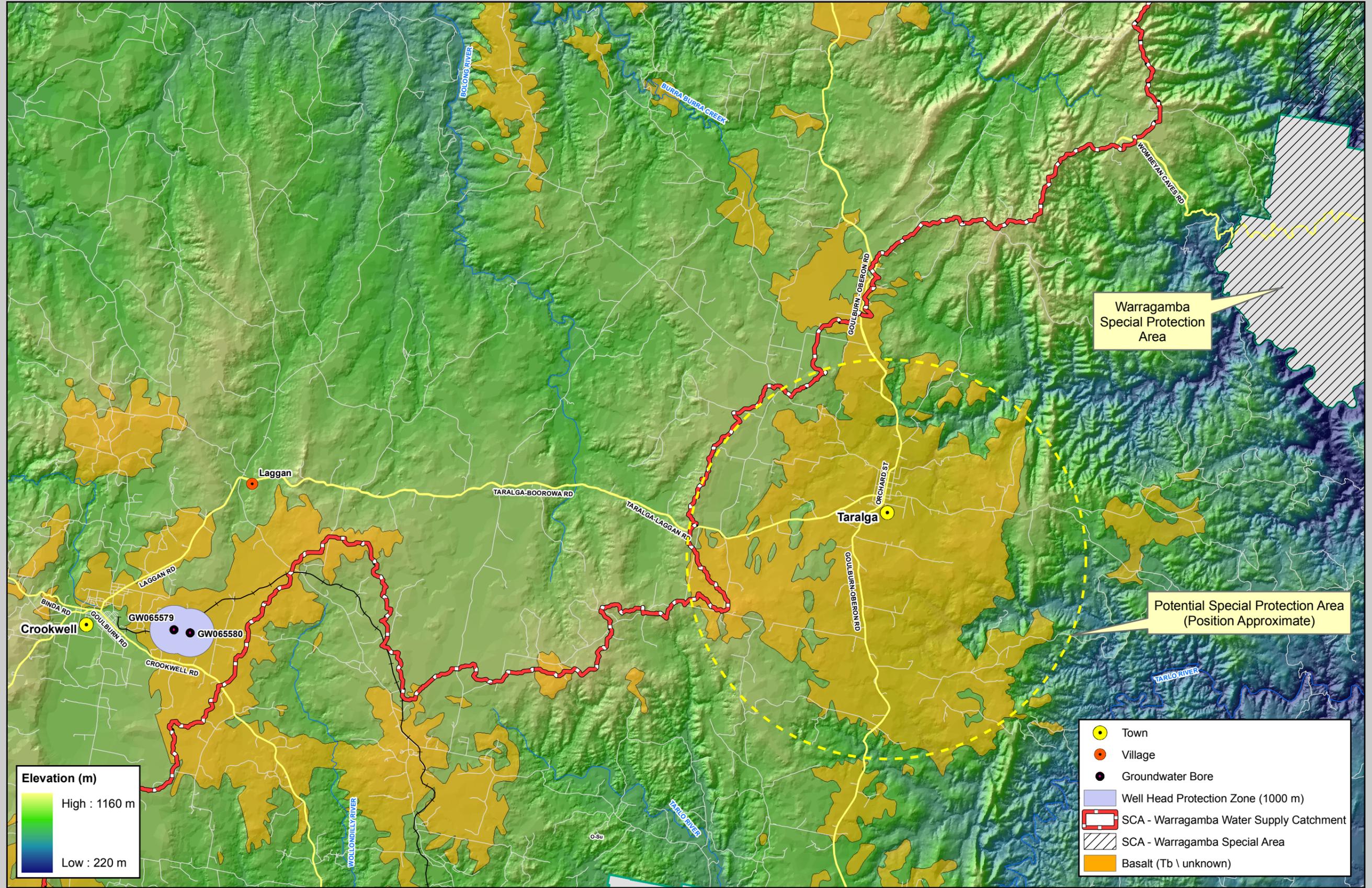
Raw (untreated) water for Crookwell is stored at Crookwell Dam also known as Kentgrove Dam. Water is also transported from the Crookwell Dam to the surrounding villages of Bigga, Binda, Tuena, Laggan and Grabben Gullen, to supplement on-site rainwater tanks during extended dry periods.

The water filtration plant at Crookwell has a total capacity of 2.0 megalitres per day. The plant provides pre-dosing with soda ash and alum and has two parallel filtration streams, comprising a gravity filter and two upflow clarifiers with a pressure filter. A powdered activated carbon facility removes toxic organics. The treated water is post-dosed with soda ash and chlorinated. Water supply to Crookwell has also been augmented by two emergency production bores.

Gunning is supplied with water from the Lachlan River. Water is drawn through an in-river extraction well which provides filtration. The supply is chlorinated. Water supply for Gunning is generally secure, except during peak summer periods and flood events. River flows can be significantly reduced during summer, limiting extraction capacity, whereas, during flood events, mud and debris can restrict the intake well.

Taralga's water is sourced from a small weir on the normally flowing spring-fed Woolshed Creek. The Creek has stopped flowing on several occasions in recent years, requiring water extraction from elsewhere along the Creek. An investigation into opportunities to supplement the water supply and improve the water treatment system is currently being undertaken and is likely to include the use of groundwater to supplement, or provide a new independent, water supply.

Dalton has a reticulated water supply which is fed by two bores linked to a 300,000 litre service reservoir. The treatment of water supply currently includes ultra-violet disinfection and chlorination. Council has advised that there are currently concerns with the water quality of the bores, particularly in relation to iodine levels (Richardson 2005). A reverse osmosis package treatment plant is currently being investigated.



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Collector currently relies on water tanks and onsite domestic groundwater bores for water supply. The village has recently experienced growth in residential development. It is anticipated that a water reticulation system may be required in the future. Water supply will most likely be from groundwater sources as opportunities for a surface water supply to the village are limited.

Groundwater bores have recently been installed in the villages of Bigga, Binda, Tuena, Jerrawa, Collector, Gunning and Taralga. The bores provide an emergency non-potable water supply for the villages and potential supplementary potable water supply bores for Taralga, Gunning and Collector.

Gunning Water Master Plan

The Gunning Water Master Plan (GHD 2005) was prepared to identify possible options to service expected residential growth and expansion of the existing village zone. Expected growth is generally in the form of rural residential development, ranging in minimum lot sizes from 2,000 to 5,000 square metres.

The Master Plan investigates a number of sewerage system and water supply options. Cost estimates for each option are also provided, together with an evaluation of cost-effectiveness to Council. Key issues identified in the Master Plan include:

- The existing system has a capacity of 200 equivalent tenements based on a peak daily demand of 5,000 litres per day per equivalent tenement as per the *Water Supply Investigation Manual Guidelines* prepared by the Department of Public Works. Although there are 295 connections that exceed the existing design supply, Council has advised that the Gunning water supply is generally adequate. Development concepts were prepared based on changed consumption patterns that reduce the demand on potable water supply, including the installation of water efficient devices, rainwater tanks and on-site greywater or effluent irrigation.
- The sewage treatment plant will require upgrading once the 1,000 equivalent persons design capacity is reached. As at March 2005, 600 people were connected. Although the future connected population will depend on the number of lots that adopt on-site treatment, this will vary between 1,065 and 1,500 equivalent persons based on the expected expansion of the town.

It is expected that population growth within Gunning will resemble that of the broader LGA. Where alternative approaches are taken to water use and on-site treatment, it is unlikely that augmentation of the existing water supply system or sewage treatment plant will be required prior to 2020. Based on the findings of the *Gunning Water Master Plan*, it is expected that these facilities would retain adequate capacity to accommodate current growth forecasts to 2020.

Constraints

Water restrictions are imposed on a town by town basis dependant on seasonal rainfall variations. Water restrictions are typically imposed 20 percent of the time across the Upper Lachlan Shire.

Supplementing the water supply to Crookwell and Gunning with recycled effluent for non-potable use, from the respective sewage treatment plants, is unlikely to be feasible. Limited public open spaces are available for irrigation and together with the relatively low

development density that results in long reticulation pipe lengths, this adversely affects the viability of providing reticulated service systems. This option may be considered either when there is a number of large recycled water consumers available in the immediate area (such as industry, horticulture or viticulture operations) or when there is a greater density of development.

Any new development at Crookwell, Gunning, Collector, Dalton and Taralga will need to be supported by a reliable and secure water supply system. Crookwell has had Level 1 to Level 3 water restrictions over the past 3 years due to severe drought conditions. During the summer months, Gunning is generally placed on water restrictions to manage the shortfall in water supply. Taralga has experienced intermittent water restrictions for the last five years.

Management issues

As a prelude to promoting growth within and around established towns or villages, a detailed assessment will be required to ensure adequate servicing of properties is made available prior to occupation. The Section 117 *Direction 21 - Residential Development* under the *Environmental Planning and Assessment Act 1979* requires that:

“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)”.

Several management approaches are also available to ensure water use is appropriately managed through residential and non-residential land uses including:

- Requiring new developments to have water efficient devices and appliances installed to reduce water consumption in accordance with BASIX. BASIX is the building sustainability index, which is a NSW government initiative. BASIX is a web-based design tool that ensures each new residential dwelling design meets the NSW Government's targets of up to 40 percent reduction in water consumption and a 25 % reduction in greenhouse gas emissions, compared with the average home.
- Requiring new developments to have rainwater tanks installed and plumbed directly for non-potable water consumption.
- Encouraging grey water re-use and substitution of raw water and/or potable water where possible, although this can cause problems with sewerage systems if too much grey water is re-used.
- Encouraging retro-fitting of water efficient devices and appliances in existing developments.
- Implementing schemes to reduce water losses in storages and during transportation.
- Implementing stormwater harvesting, water reclamation and recycling schemes.
- Encouraging substitution of raw water with recycled water to generate environmental flows.

Water saving approaches will extend the capacity of the existing water supply to towns and villages. Also, the potential for groundwater supplies should be considered to supplement existing supplies, where available. Accurate identification of groundwater availability will require detailed site assessment and drilling to determine capacity. This will require state government assistance to implement such investigations.

9.3 Electricity

9.3.1 Existing infrastructure and capacity

Country Energy provides electricity to most of the Upper Lachlan and provides a field service centre at Crookwell. Much of the electricity infrastructure is located to the south of the LGA, which reflects settlement patterns and, therefore, demand patterns. The following electricity facilities are located within the Upper Lachlan:

- a dual 330 kilovolt (kV) line along Hume Highway south of Gunning
- a 330 Kv line operating south of Myrtleville in a south-west direction north of Dalton and further west
- a 330 Kv line following a north–south alignment, approximately 15 kilometres east of Taralga
- a 132 Kv line between Breadalbane and Gunning
- a 66 Kv line servicing Crookwell, originating from Goulburn.

Figure 9-4 illustrates existing electrical infrastructure in Upper Lachlan

9.3.2 Wind farms

Australia's first grid-connected wind farm was opened in 1998 in the Upper Lachlan Shire. The wind farm is reported to generate enough electricity to serve the average demand of 3,500 homes.

Given the strategic importance of wind farms as a clean energy source, wind farms worth more than \$30 million (or worth more than \$5 million where in an environmentally sensitive area of State significance) are defined as major projects pursuant to *State Environmental Planning Policy (Major Projects) 2005*. Undertakings identified as major projects are assessed under Part 3A of the *Environmental Planning and Assessment Act 1979* and determined by the Minister for Planning.

Council is considered a key stakeholder with regard to any major project within Upper Lachlan Shire and would be appropriately consulted for any proposal. Council would be invited to prepare a submission to the Department of Planning to be taken into consideration as part of the Director General assessment report.

Wind farms would be made a permissible development (only with consent) within the Rural zones.

History of wind farming as an energy source

Wind energy is beginning to expand rapidly in use across Australia. Australia is now rated as one of the top 10 markets for wind power worldwide (BTM Consult, 2002). By the start of 2003, Australia's installed wind energy had increased to over 100 MW, up from less than 4 MW in 1998. This growth trend is well in excess of the world average, and has continued across Australia particularly in NSW.

The strong breezes found in NSW are ideal for wind power generation however this resource has remained underutilised. Background wind speeds in NSW are comparable to northern Europe, where a large portion of international wind generation is installed. Figure

9-2 illustrates the various wind speeds generated across NSW and clearly demonstrates that much of the Southern Highlands are located in medium to high wind generating areas.

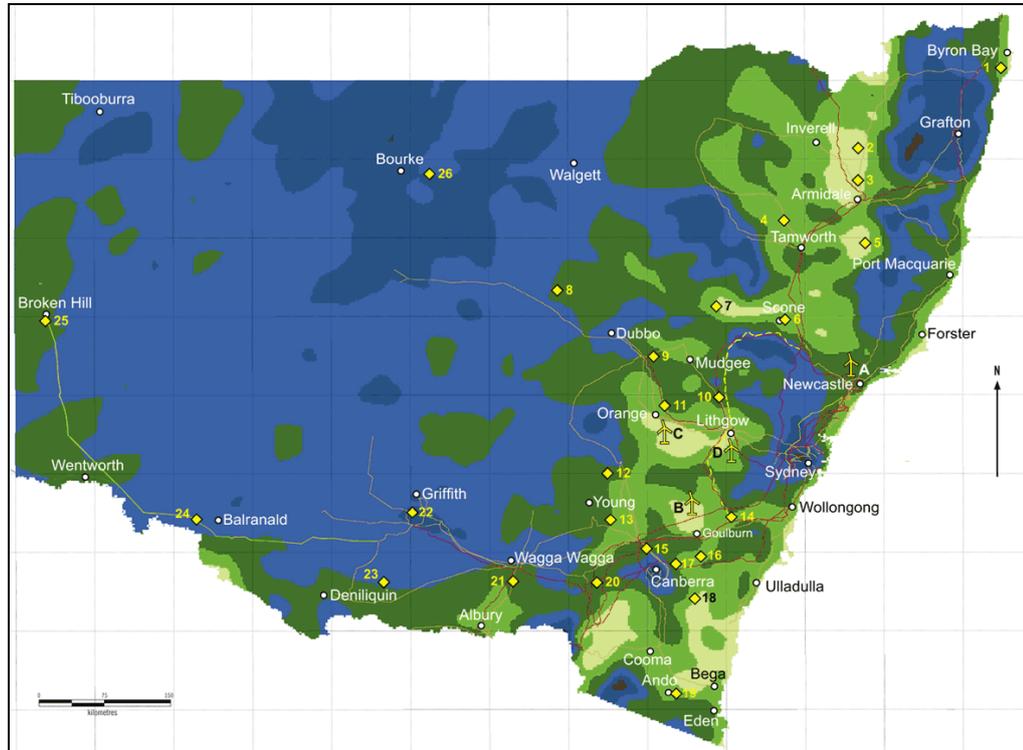


Figure 9-2 NSW Wind Atlas

Source: Sustainable Energy Development Authority

The wind atlas demonstrates that many of the sites with good potential for wind power generation are situated on the western side of the Great Dividing Range. This is because the hills and ridges of the mountains funnel the calmer background winds that blow from west to east across NSW inland. While the wind is also strong in coastal areas, wind generation is unlikely to occur here due to existing residential development and national park areas. the availability of good wind areas, NSW also has an extensive electricity transmission network, providing relatively good access for new wind farms to “plug in” to the national electricity grid. (SEDA 2003)

As illustrated on the NSW wind map, Upper Lachlan is located amongst the highest wind generating areas within NSW. Crookwell Wind Farm is denoted with “B” on the map and generates 4.8 megawatts of energy. Denoted by “C” on the map is Blayney wind farm (9.9 megawatts) and “D” denotes Hampton wind farm (1.3 megawatts). Few areas across NSW that are located away from the sensitive coastal areas generate similar wind capacity to areas within Upper Lachlan.

Gunning Wind Farm

The development application for the Gunning Wind Farm also known as ‘Walwa’ was lodged on the 31 March 2004 accompanied by an Environmental Impact Assessment by Delta Electricity. The project consisted of two interrelated facilities, a wind farm and a transmission line. The wind farm would be connected to the electricity grid by a 15 kilometre transmission line operating at 132Kv. Development consent was granted by Upper Lachlan Council of the 3 November 2004 with 52 separate conditions of consent attached to the consent.

The site of the proposed Gunning Wind Farm is located 15 kilometres north east of Gunning on the private property of 'Walwa' which was formerly cleared pastoral land. The wind farm proposes 32 turbines with a potential capacity of 60 MW. The wind turbines are to be spaced 230 to 250 metres apart and will be internally connected by underground overhead cable.

Crookwell II

The Crookwell II Wind Farm is one of the largest wind farm approved in NSW to date and is reported to be worth \$175 million. The proposal was for 46 wind turbines which would create a total generation capacity of 92 MW of clean green power. This would generate enough electricity for 40,000 households and would avoid emitting 228,000 tonnes of harmful green house gases.

The wind farm is proposed to be built on an area of 2,088 hectares consisting of the 'Gundowring' and 'Ahgunyah' properties just outside of Crookwell. Crookwell II is owned by an international corporation Gamesa Energy in cooperation with TME Australia.

The approval process included a significant archaeological component assessing the impacts of Aboriginal archaeological sites and cultural heritage values within the wind farm area.

Taralga Wind Farm

The original proposal for a wind farm at Taralga wind farm comprised the construction and operation of 62 wind turbines and associated infrastructure. Based on 62 turbines, the proposal would have a generating capacity of between 93.2 and 124.2 megawatts and an estimated capital investment value of \$185 million.

The site of the proposed wind farm is 3 kilometres east of Taralga, approximately 38 kilometres east of Crookwell, 35 kilometres north of Goulburn and 140 kilometres south-west of Sydney. The site is on land zoned *1(a) General Rural* under the *Mulwaree Local Environmental Plan 1995*.

In January 2006, the Minister for Planning conditionally approved the proposed construction and operation of a wind farm with 54 wind turbines, each with a capacity of between 1.5 and 2 megawatts, and associated infrastructure. The conditions of this consent have the effect of limiting the number of turbines to a maximum of 54. Of the 54 turbines, four will require further assessment under a staged consent process.

The Environmental Impact Statement prepared for the proposal by (Geolyse 2004), indicates that the approved proposal would generate electricity equivalent to the average annual consumption of at least 29,160 households, whilst avoiding emissions of at least 192,860 tonnes of carbon dioxide equivalent per annum. Benefits that would be introduced by the proposal include a valuable source of renewable energy to the Upper Lachlan. It would also assist electricity retailers to:

- secure a supply for the increasing demand for electricity in the region
- meet consumer demands for renewable energy in the form of green power
- satisfy their obligations under the Commonwealth's Mandatory Renewable Energy Target and the NSW Government's Greenhouse Gas Abatement Scheme.

The Department of Planning was satisfied that the proposal is consistent with NSW and Commonwealth Government policies on renewable energy and greenhouse reduction. Wind

farm proposals are also consistent with the *National Greenhouse Strategy* the Mandatory Renewable Energy Target (MRET) scheme, the Green Power Accreditation program and the NSW Greenhouse Abatement Scheme. The Department of Planning's determination is valid for a period of up to 3 years.

Cullerin Range Wind Farm

The proposed Cullerin Wind Farm is located on the Cullerin Range, midway between Gunning and Breadalbane and about 40 km south west of Goulburn. The Cullerin Range rises approximately 100 metres above the surrounding landscape and extends for approximately 30 km, running north-south along the Great Dividing Range. The wind turbines are to be located along a section of the Range for approximately 3.5 km.

The site is bordered to the north by the Old Hume Highway (Cullerin Road) and Old Sydney Road and to the south by the Hume Highway and a 330 kV transmission line. The Great Southern Railway (Sydney to Melbourne Railway) passes about 1 km to the north of the site. A nature reserve, the Wet Lagoon, lies 5 km east of the site. Gunning (10 km west), Breadalbane (8km east) and Collector (10 km south) are the nearest towns to the site.

On the 21st February 2007, the Minister for Planning conditionally approved the proposed construction and operation of up to 15 wind turbines on tubular steel towers up to 80 m high at the hub, including associated infrastructure (substation and transmission connection to the existing Country Energy 132 kV system on the site, control room and equipment storage facilities). Construction on the wind farm has commenced.

9.3.3 Management issues

Electricity generated through wind farms may be directed to the electricity grid network and may not be used for local needs. Where efficiencies could occur by using locally generated power for local demands, this should be encouraged by utility providers.

As with other utility providers, negotiations with Country Energy should be undertaken to ensure that any works or connections required as part of further growth outside of serviced areas should be undertaken prior to any detailed planning.

As part of any development, the proponent will be required to provide certain developer-funded connection works, as set out in Country Energy's (November 2004) *Capital Contributions Guidelines*. Generally, Country Energy will fund the shared asset work up to the linkage point. The developer would be required to fund the dedicated connection work beyond the linkage point.

Where transmission lines pass through future growth areas, provision of easements should be considered as part of the overall site planning. An alternative approach could include the location of a line in a road reserve or other suitable existing easement (where available), subject to the agreement of Country Energy.

Figure 9-2 illustrates that areas across Upper Lachlan, particularly within central Upper Lachlan, generate amongst the most wind in NSW as identified on the NSW wind atlas (Sustainable Energy Development Authority). Figure 9-3 also illustrates the existing wind monitoring towers that measure wind speeds approximately 65 metres above ground level to replicate the expected height of modern wind turbines.

9.4 Gas

9.4.1 Existing infrastructure and capacity

A high pressure natural gas pipeline currently exists from Goulburn, through Boorowa, Dalton, Gunning and Marulan, to Sydney (refer Figure 9-4). This 1,300 millimetre pipeline operates at 5,000 kilopascals. Although the pipeline runs through Upper Lachlan, it is not accessed within the Shire and, therefore, gas is not supplied to any areas within the Upper Lachlan.

A 219 millimetre high pressure ethane pipeline also operates within the gas pipeline easement. This pipeline operates at 10,000 kilopascals, however it is not available to service areas through which it traverses.

There are currently no constraints on the high pressure pipelines, which operate at their maximum allowable capacity.

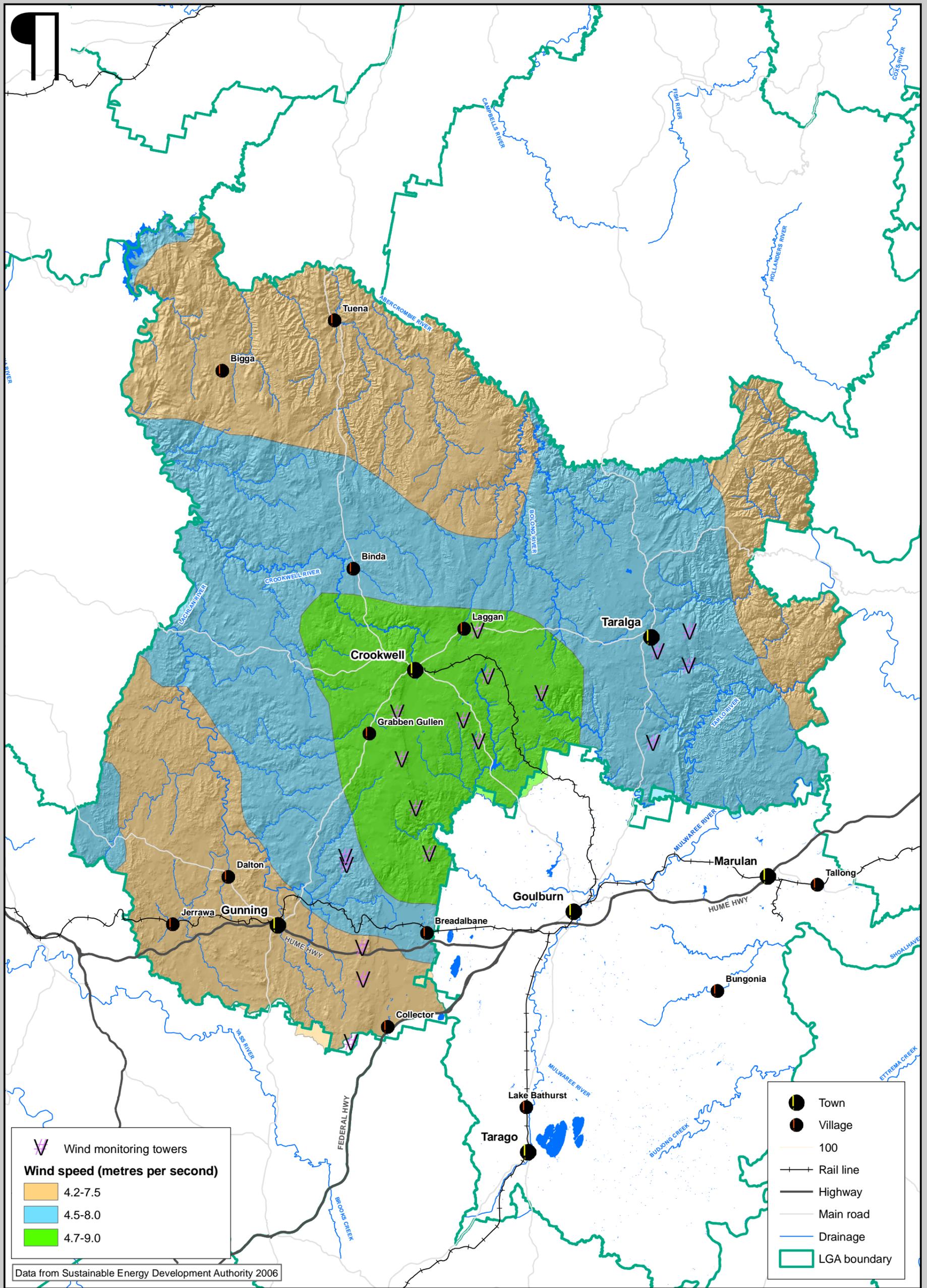
Although ongoing interest in the provision of natural gas has been expressed by the local community, particularly for the larger towns, service providers have yet to deliver the necessary infrastructure. No plans have indicated the delivery of natural gas to towns or villages in the short to medium term.

Country Energy does supply liquid petroleum gas to all towns and the majority of villages within Upper Lachlan, including Crookwell, Taralga, Gunning, Breadalbane, Collector, Bigga, Binda and Laggan.

9.4.2 Management issues

Based on discussions with service providers, there are currently no planned improvements to the existing high pressure gas main within Upper Lachlan Shire. Furthermore, there are no immediate plans to provide natural gas to any towns or villages within the local government area.

Given the forecast rate of growth across Upper Lachlan, and extensive distances between Crookwell, Taralga and the surrounding villages, the relative cost of introducing and maintaining the necessary infrastructure is high. Crookwell is some 40 kilometres north of the existing easement. A proposal that is cost-effective to service providers is, therefore, unlikely and the infrastructure is unlikely to be implemented by 2020.



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9.5 Telecommunications

9.5.1 Existing infrastructure and capacity

All telecommunications exchanges within Upper Lachlan are fibre optic exchanges. Integrated Services Digital Network (ISDN) is a fully digital communications technology that is implemented throughout the infrastructure of the existing worldwide telephone network. ISDN can provide services and capabilities that are not available through a standard telephone service and is currently available at the majority of exchanges. Mobile phone towers are located along the M54, which runs north–south through the LGA and at Crookwell.

Telstra have released the NextG (3rd Generation Network) which replaces the analogue mobile phone network. Most built up areas, such as Crookwell, Gunning and Taralga, have NextG coverage, providing voice and internet capability to the majority of the populated areas. Many of the smaller villages, such as Bigga have limited network coverage (an external aerial is required for voice and internet activities) and need to be considered as part of a broader strategy to bring these areas up to national standards. Such a strategy could include surrounding LGAs and would identify specific needs that would assist with conveying needs to service providers and the NSW Government.

Asymmetric Digital Subscriber Line (more commonly known as ADSL) is a broadband technology which uses existing copper wired telephone networks. ADSL uses a range of frequencies over existing telephone lines to deliver much higher speeds than standard dial up internet. ADSL coverage is generally available at the towns of Gunning and Crookwell however, limited ADSL coverage is available within the rural and more isolated areas, including areas west of Crookwell. Generally, broadband internet is not readily available within Upper Lachlan Shire.

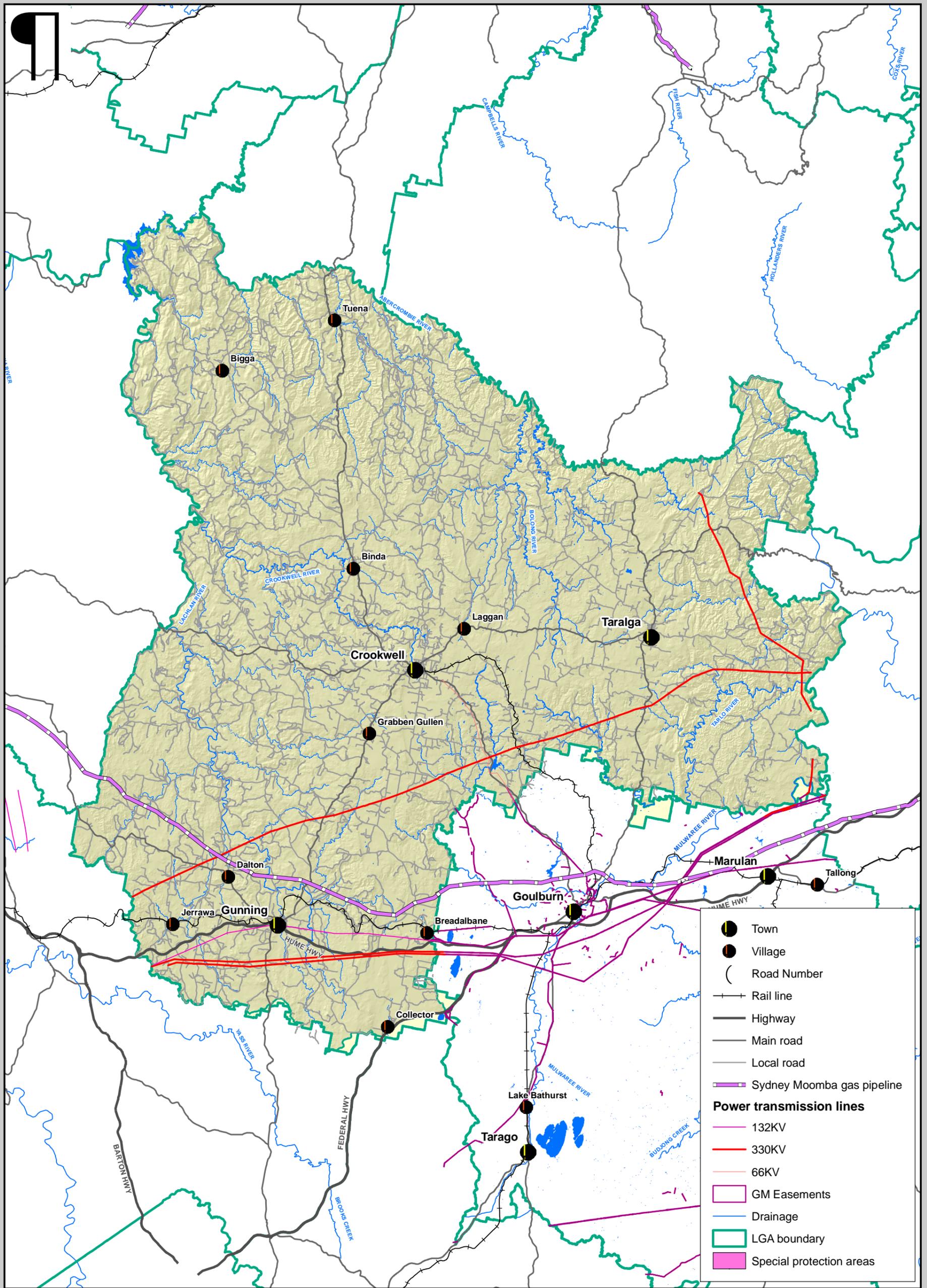
Future growth at Crookwell will create increased infrastructure pressures and result in higher expectations for residential services and facilities. Most of these services are currently unavailable or expensive due to provision and operational costs.

9.5.2 Management issues

New mobile towers have been constructed at Taralga to increase mobile coverage. Residents have also approached Telstra Country Wide for a new mobile tower in Bigga, to improve services to this village and surrounding rural areas (not yet constructed). The introduction of new mobile phone towers will increase the ADSL coverage across the LGA. Telstra is also looking to improve coverage west of Crookwell, by introducing new towers to other locations in the area. No details, however, were available on the timing or location of future facilities at the time of preparation of this Strategy.

The establishment of the company Southern Phone in the area was funded by the Commonwealth Government's Networking the Nation Program. That Program was established following the first stage of the sale of Telstra, with the aim of improving telecommunications services in regional Australia. Only local councils can be shareholders in this unlisted public company. Upper Lachlan Shire Council is a stakeholder of the company. The service aims to improve the currently poor telecommunication infrastructure

in the area.



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Although augmentation of some services is currently proposed in selected areas across the Upper Lachlan, a broader strategy is required for regional NSW to bring these areas up to national standards. Based on the expected growth in activity within the Sydney–Canberra Corridor to 2020, commitment from the NSW Government and utility providers should be focused on nationally important growth areas, in order to attract development and investment. Such a strategy would require a coordinated effort on a regional front. to demonstrate specific gaps in services and the most cost-effective approach to satisfying this need.

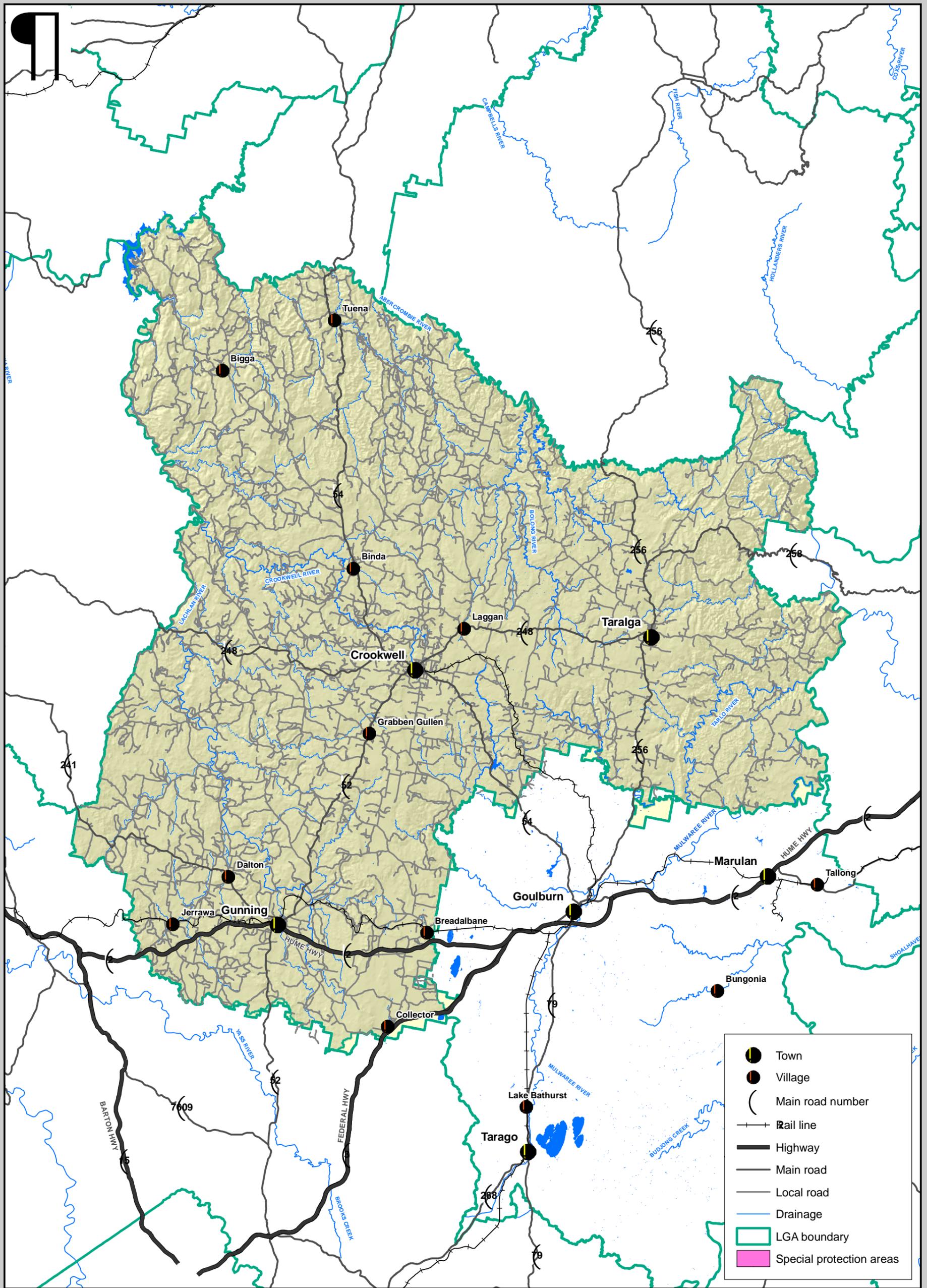
9.6 Transport, networks and services

9.6.1 Existing infrastructure and capacity

The following assessment of future traffic and transport issues in the Upper Lachlan was based on discussions and representations from various stakeholders, including Upper Lachlan Council Officers, the Roads and Traffic Authority of NSW, RailCorp and private bus operators.

The Upper Lachlan has a total road network in excess of 2,013 kilometres, comprising:

- State roads under the jurisdiction of the Roads and Traffic Authority, where the construction and maintenance is undertaken by Council under single invitation maintenance contract to the Roads and Traffic Authority
- regional roads under the jurisdiction of Council but where funding for maintenance of regional roads is provided by way of Regional Road Block grants through the Roads and Traffic Authority
- Enhancement and repair programs on Regional Roads are jointly funded by Council and the Roads and Traffic Authority (generally 50:50).



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- local urban and rural roads under the Council's jurisdiction, where construction and maintenance are funded by the Council.

Figure 9-5 illustrates the road network across Upper Lachlan including highways, main and local roads.

The Upper Lachlan road network comprises a combination of sealed and unsealed roads. Table 9-2 summarises, for each type of road described above, the length of sealed and unsealed road sections across Upper Lachlan.

Table 9-2 Road network in Upper Lachlan

Road type	Sealed (kilometres)	Unsealed (kilometres)	Total (kilometres)
Local rural	419.061	1,169.833	1,588.894
Local urban	52.436	28.015	80.451
Regional	168.802	82.113	250.915
State	78.460	14.580	93.040
Total	<i>718.759</i>	<i>1,294.541</i>	<i>2,013.300</i>

The Hume Highway and Federal Highway at Gunning are part of the national highway network and a strategic road link of national importance. The Hume Highway is fully funded and maintained by the Roads and Traffic Authority and is not included in Table 9-2 above. Also not included in Table 9-2 are other public roads, which are not maintained by Council. The roads within Upper Lachlan are generally two lane, two way roads.

Main Road (MR) 54 (Goulburn/Crookwell/Bathurst Road), is a major north-south road that forms the primary link between Crookwell and Goulburn in the south-east and Binda, Tuena and Bathurst/Orange regions to the north.

MR248 (Laggan Road), is an east-west road also running through the town centre of Crookwell, linking it to Laggan and Taralga to the north-east and Boorowa to the west.

MR52 (Grabben Gullen Road), branching off from MR54 to the west of Crookwell, links Crookwell with Gunning, Queanbeyan and Canberra to the south.

MR256 provides a direct connection from Taralga to Goulburn in the south, and from Taralga to Oberon in the north. Figure 9-5 shows the road network within the Upper Lachlan Council.

Other State and Regional Roads within Upper Lachlan include:

- MR 241 – Gunning, Rye Park, Boorowa
- MR 258 – Mittagong, Wombeyan Caves to Junction with MR 256.

Council has a clearly defined road hierarchy to assist it in the management of the road network. The road hierarchy consists of six categories based on the road use (annual average daily traffic, AADT), the locality of the road (urban or rural), and the type of road (sealed or unsealed). The six road hierarchy categories are summarised in Table 9-3.

Table 9-3 Road hierarchy in Upper Lachlan

Road category	Urban sealed	Rural sealed	Unsealed road
Category 6	AADT > 750	AADT > 500	AADT > 250

Category 5	400 < AADT < 750	300 < AADT < 500	175 < AADT < 250
Category 4	200 < AADT < 400	150 < AADT < 300	100 < AADT < 175
Category 3	50 < AADT < 200	50 < AADT < 150	25 < AADT < 100
Category 2	AADT < 50	25 < AADT < 50	10 < AADT < 25
Category 1	–	AADT < 25	AADT < 10

Category 6 roads have the highest road usage, while Category 1 roads have the least road usage (and in many instances Category 1 roads could be compared to private access roads). It is noted categories can vary along the length of a road.

Approximately 32.7 percent of regional roads and 15.7 percent of state roads remain unsealed. Some federal funding is available through Roads to Recovery Grants.

For the financial year 2006–2007, Upper Lachlan Shire Council received \$1,267,886 in NSW Government financial assistance grants (NSW FAGs) to improve the local road network. Similarly for the financial year 2005–2006, Council received \$1,216,225 (NSW FAGs) and for the financial year 2004–2005, the amount received was \$1,260,278 (NSW FAGs). Also in the financial year 2006–2007, Upper Lachlan Shire Council received \$ 2,379,709.71 in funding for the Regional Roads Repair Program, Regional Roads Block Grant, Street Lighting and Roads to Recovery program.

Figure 9-5 illustrates designated B-Double routes within Upper Lachlan. There are two types of B-Doubles – 19 metre and 25 metre. The 19 metre B-Doubles may use any local road as long as the load does not exceed 50 tonnes and 25 metre B-Doubles must only use designated routes which are the Hume Highway and MR 54 between Goulburn and Crookwell saleyards via Laggan Road and MR52 at Gunning between the Hume Highway and the stockpile at the Grosvenor Street intersection. The use of non-approved routes by B-Double vehicles is against the law and heavy on the spot fines may be imposed. Use of non designated routes by B-doubles may result in the road pavement being severely damaged and in some cases may cause bridge failure.

9.6.2 Traffic volumes

Traffic volumes on key roads within the Upper Lachlan were sourced from the Roads and Traffic Authority's *Traffic Volume Data for Southern Region* (2003). Table 9-4 shows the AADT values (in axle pairs per day) for various years between 1984 and 2003, and the estimated growth per annum between the latest year and the earliest year where data was available.

Table 9-4 demonstrates that the Hume Highway carries the highest level of traffic within Upper Lachlan, in excess of 13,000 vehicles per day. This figure growing at a rate of between 5 and 7 % per annum. The traffic volumes on the Hume Highway reflect its role as the main trunk route between Sydney and Melbourne and part of the national highway network.

Goulburn Street, west of Spring Street in Crookwell, has the next highest daily traffic volumes at approximately 5,100 vehicles per day. This has been growing at a rate of approximately 1 % per annum. This count station was located in the centre of Crookwell between Roberts Street and Spring Street; however, east of Prospect Street and west of Stephenson Street, traffic volumes significantly reduced to approximately 1,500 to 1,200 vehicles per day respectively. Although the growth rate at these two locations has been in the order of 2 % per annum, these figures indicate that a vast majority of vehicular movements are within Crookwell and do not comprise through-traffic along the MR54.

Table 9-4 Traffic volumes (AADT) on key roads in Upper Lachlan

Town	Road	Location	1984	1988	1992	1994	1997	2000	2003	% Growth
Crookwell	MR248 Taralga-Boorowa	Laggan, south of Roslyn Rd	490	469	610	623	571	539	620	1.4%
Crookwell	MR54 Goulburn-Ilford	South of MR248, Boorowa Rd	650	810	996	894	908	908	993	1.5%
Crookwell	MR52 Canberra-Crookwell	Crookwell, south of Willis Street	490	529	462	545	466	595	473	-0.2%
Crookwell	Goulburn Road	Crookwell, south of Prospect Street	1,150	1,157	1,284	1,832	1,426	1,498	1,557	1.9%
Crookwell	Laggan Road	Crookwell, 0.5 kilometres west of Woodward Lane	-	530	605	639	672	593	616	1.1%
Crookwell	Boorowa Road	Crookwell, 0.6 kilometres west of Stephenson Street	-	879	854	934	-	-	1,122	1.8%
Crookwell	Goulburn Road	Crookwell, west of Spring Street	-	4,496	5,332	5,214	-	-	5,126	0.9%
Gunning	Hume Highway	1 kilometre west of MR52, Gundaroo Road	5,860	7,433	7,670	-	10,751	10,548	13,094	6.5%
Gunning	Hume Highway	3km east of Road to Collector	5,950	5,762	6,539	-	10,810	10,516	-	4.8%
Gunning	MR52 Canberra-Crookwell	Gunning - North of Yass Street (Old Hume Highway)	140	158	196	229	196	239	268	4.8%
Gunning	MR52 Canberra-Crookwell	8 kilometres south SH2, Hume Highway, Gunning Bypass	260	324	353	432	436	535	528	5.4%
Gunning	MR241 Gunning-Temora	Dalton -1.0 kilometre south of Rugby Road	257	270	285	276	324	255	266	0.2%
Gunning	Yass Road	Gunning - north of MR241, Waratah Street	7,040	7,227	7,443	1,597	1,134	1,133	1,166	-4.4%
Gunning	Collector-Gunning Road	Gunning – 1 kilometre south of MR52, Yass Street	-	112	180	445	491	456	527	24.7%
Gunning	Gundaroo Road	Gunning - 0.8 kilometres south of Hume Street	-	384	420	448	522	626	628	4.2%
Gunning	Boorowa Road	Gunning - 0.4 kilometres west of Medways Lane	-	325	359	-	344	330	325	0.0%
Taralga	MR256 Goulburn Oberon	Taralga -6.5 kilometres south of MR248	420	437	487	542	575	552	745	4.1%
Taralga	MR248 Taralga-Boorowa	Taralga - west of MR256. Goulburn Road	440	201	118	254	114	101	121	-3.8%

Other roads in Upper Lachlan have traffic volumes less than 500 vehicles per day. The traffic on these roads is generally increasing at a rate of one to five % per annum with selected roads experiencing no growth in traffic volumes including MR241 west of Medways Lane. A small number of roads indicate falling traffic volumes including Yass Road Gunning – North of MR241 (Warrataw Street). Figures provided by the Roads and Traffic Authority indicated traffic on Collector-Gunning Road (south of Yass Street) experienced growth of approximately 25 % per annum but in absolute terms, this resulted in an increase of approximately 400 vehicles per day.

The falling volumes on Yass Road, Gunning and the growth on Collector Road – Gunning Road correspond with the Gunning bypass becoming effective. A Regional Road Review Panel Application has been submitted to include Collector Road – Gunning Road as a Regional Road.

Traffic in Upper Lachlan has been experiencing moderate changes in traffic volumes over the past 20 years. Traffic has stabilised over the last few years to its current level for the majority of locations. An exception is the Hume Highway, which has experienced sustained growth since 1984.

9.6.3 Crash data

For the eight year period to December 2007, Table 9-5 indicates a total of 726 crashes. Of these, 17 were fatal crashes, 295 injury related crashes where at least one road user sustained personal injury, and 414 tow-away accident events. On a year by year basis, the total yearly crashes, fatalities and injuries, vary and no clear trend can be drawn.

Table 9-5 Crash severity (2000 – 2007)

Year	Fatal	Injury	Non-casualty	Total
2000	1	42	68	111
2001	3	35	71	109
2002	3	38	46	87
2003	2	34	64	100
2004	2	25	50	77
2005 - 2007	6	121	115	242
<i>Total</i>	<i>17</i>	<i>295</i>	<i>414</i>	<i>726</i>

Source: Roads and Traffic Authority

For the period of 2000 to 2004, 484 crashes recorded in Upper Lachlan, three crashes (two in 2001 and one in 2002) involved pedestrians, with one crash involving a cyclist (recorded in 2003). Crashes involving pedestrians and/or cyclists only resulted in injury.

Table 9-6 indicates the number of crashes by severity and location for the top ten sites in the Upper Lachlan. The Hume Highway at Gunning recorded the highest total number of crashes, as well as the highest fatal, injury and non-casualty crashes. The location with the next highest total number of crashes was the Federal Highway at Collector, where 40 crashes were recorded (with no fatalities).

Table 9-6 Crashes by severity and severity and location (2000 – 2004)

Location	Fatal	Injury	Non-casualty	Total
Hume Hwy, Gunning	2	17	36	55
Federal Hwy, Collector	0	15	25	40
Hume Hwy, Jerrawa	0	8	20	28

Federal Hwy, Lake George	1	9	17	27
Junction Pt Rd, Tuena	1	8	10	18
Hume Hwy, Cullerin	0	4	13	17
Hume Hwy, Breadalbane	1	3	10	14
Binda Rd, Crookwell	0	10	4	14
Goulburn Rd, Crookwell	0	6	7	13
Gundaroo Rd, Gunning	1	5	6	12
Total	11	174	299	484

Source: Upper Lachlan Shire Council

An analysis by Council of crash data for the period 2000 to 2005 has clearly shown the area of importance for Upper Lachlan is the area known as Junction Point Road. Table 9-7 identifies crashes recorded at Junction Point Road between 2000 and 2006.

Table 9-7 Recorded crashes at Junction Point Road

Year	2000	2001	2002	2003	2004	2005 (to Nov)	Dec.2005-Jan 2006
	11	5	10	5	5	8	4*

Source: Upper Lachlan
* includes one fatality

An important issue in analysing roads, are roads being commonly known by more than one name. This can impact on the recording of data and also on responses to emergencies requiring fire, ambulance or police. One example is the road from Crookwell to Laggan is known as Laggan Road, from Laggan to Taralga it is Taralga Road and from Taralga to Laggan it is Laggan Road. The road from Goulburn to Taralga is known both as Taralga Road and Oberon Road. A response to an emergency for Taralga Road could result in a response to the wrong LGA.

Gravel roads

A gravel road safety campaign was conducted during 2003–2005 through a partnership consisting of Upper Lachlan Council, Yass Valley Council, the NRMA – ACT Road Safety Trust, the Motor Accidents Authority and the Roads and Traffic Authority of NSW. The project highlighted the range of potential hazards motorists may encounter on unsealed roads and encompassed more than 13 separately executed strategies. The following provides the key objectives of the project:

- To reduce the number of motor vehicle crashes on unsealed roads
- Improve public awareness of the hazards and danger of driving on unsealed roads.
- To create working relationships between a range of road safety stakeholders from NSW and the Australian Capital Territory.
- Review engineering practices in respect to unsealed roads in the region.
- To promote the message “Slow down – drive to the conditions” and ensure it is understood by motorists who drive on unsealed roads.

An overall reduction of 30.96% in gravel road crashes has been achieved in the project area with a reduction of up to 43.7% for the Yass Valley Local Government Area and 15.83% for the Upper Lachlan Shire Council.

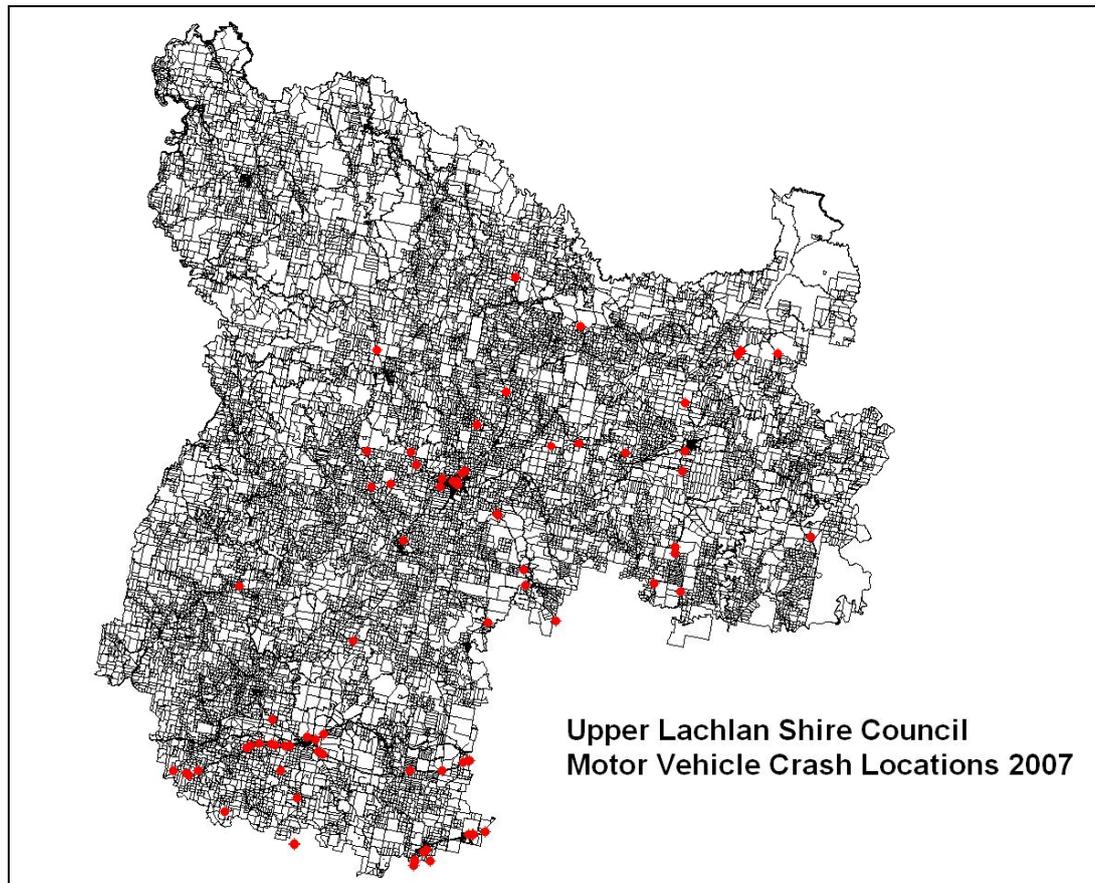


Figure 9-6 Motor vehicle crash locations, 2007 (Upper Lachlan Shire Council)

9.6.4 Public transport

Public Transport services within Upper Lachlan comprise school bus and private bus services. These services are the only public transport service between Crookwell, Gunning and Taralga and surrounding villages. The only rail link between Goulburn and Crookwell was closed in the 1980s.

A community service is currently operated by the Goulburn Mulwaree Council. This service provides transport for less mobile passengers, including the elderly, persons with a disability and carers. This service also serves people living in rural remote areas who may be isolated from alternative forms of transport. The service operates in the LGA of Goulburn Mulwaree and the Upper Lachlan. It is funded by the Goulburn Mulwaree Council under its Home and Community Care Program and the NSW Department of Transport's Community Transport Program.

This service operates four vehicles including:

- One commuter bus with a 21 seating capacity based in Goulburn.
- Three mini-buses with a seating capacity of 11 and 9 people, based in Crookwell and Goulburn.
- Two passenger vehicles based in Goulburn and Gunning.

The service is also supported by a fleet of 30 passenger vehicles and driven by local volunteers.

The service operates on a regular basis, providing return-day services from Crookwell and Goulburn, radiating out to other surrounding towns and villages (including between Taralga, Gunning, Tuena and Crookwell, and between Goulburn and Marulan, Crookwell, Bungonia and Wingello). On-call services are provided to shopping centres and hospitals, either on a weekly or fortnightly basis.

CountryLink also operates two rail services between Sydney and Melbourne, which stop daily at Gunning. This was reduced from three daily services. More recently, however, there have been discussions regarding the replacement of rail services by bus services.

Currently there is no taxi service within the Upper Lachlan.

9.6.5 Journey to work

Private motor vehicles dominate the modal split for journeys to work within the Upper Lachlan (refer Figure 9-7). Modal data was sourced from the 2001 Census for employed persons in the Upper Lachlan travelling to work. The data illustrates that the private motor vehicle (car, as driver and as passenger) has the highest share, at approximately 80 %. This is followed by walking at approximately 8.8 %. The combined public transport (i.e. bus, train) usage is less than 1 % for journey to work trips (Australian Bureau of Statistics 2001).

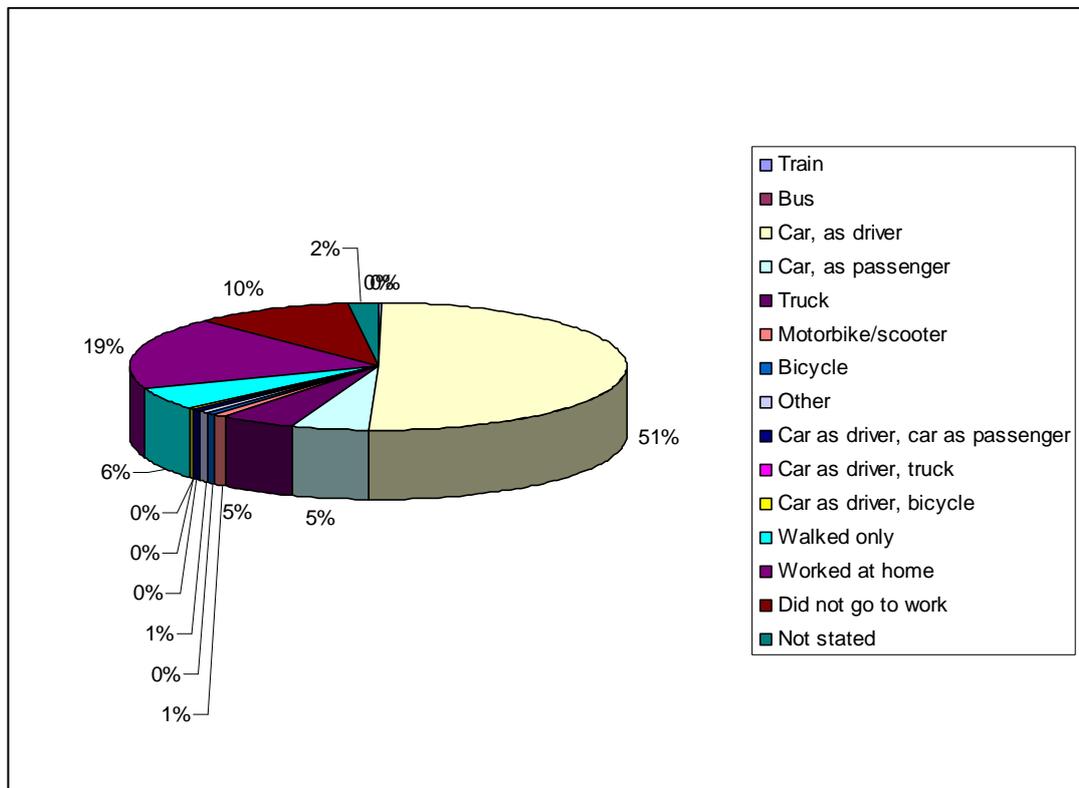


Figure 9-7 Mode of transport (ABS Census, 2006) split in Upper Lachlan

Source: Roads and Traffic Authority

Dependency on private motor vehicles for the journey to work is a key factor causing the relatively high car ownership in Upper Lachlan. Approximately 1,500 households (61 %) are dependent on private motor vehicles for their journey to work.

have two or more motor vehicles. Car ownership of two or more vehicles per household has increased from 59 % at the 1996 Census to 61 % at the 2001 Census (Australian Bureau of Statistics 1992, 2001).

9.6.6 Pedestrian Access and Bike Plan

A comprehensive Pedestrian Access and Bike Plan has been developed by Council. The aim of the Plan is to coordinate investment in safe, convenient and connected pedestrian routes and cycleways throughout Upper Lachlan. The areas listed for new works under the Plan have been identified by the community as important for enhancement to the existing network, sustainable safety, convenience and mobility.

Through a partnership with the Roads and Traffic Authority the footpath and cycleway networks in Upper Lachlan will be substantially improved over the next ten years through the development of new footpaths, improving existing ageing infrastructure at certain locations and sharing new networks with some additional cycleways as “shared ways”.

Works under this program commenced in April 2006 with the installation of a pedestrian refuge on Goulburn Road, Crookwell. The refuge will provide an important and safe link between two major sporting facilities in the township of Crookwell.

9.6.7 Key management issues

A key priority for Upper Lachlan relates to ensuring existing roads are adequate and adequate funds are available to maintain them to an acceptable standard. A further key issue Council is attempting to resolve is to increase the percentage of sealed roads across Upper Lachlan, however, maintenance of its existing assets must be the first priority.

Roads within Upper Lachlan generally do not present capacity issues, with the exception of Goulburn Road in Crookwell. Currently less than 70 % of the 's state and regional roads are sealed, posing a significant safety concern for both wet and dry periods.

The safety of school children on rural roads is another key issue within the LGA. Council has highlighted that an audit of rural bus routes should be undertaken to identify risks and hazards associated with public transport in rural areas. Examples of existing risks that need to be addressed include signage, and the provision of strategically located roadside indented bus areas (that permit buses to pull off the road entirely) and pedestrian storage areas.

Given the ageing population of the Upper Lachlan, any future traffic and transport planning for the LGA needs to take this demographic trend into consideration. Ageing patrons increase the demand for pedestrian networks, facilities for less able people, and public transport services.

The transport of livestock, farm produce and animal feed occurs throughout the . For economic reasons, many of these trips are generally undertaken using B-Double vehicles. To avoid unnecessary damage to local routes not designed for B-Double vehicles, the Council and local police can control the illegal use of roads by B-Double vehicles. Alternatively, the Council and Roads and Traffic Authority should aim to increase the existing network of B-Double routes within Upper Lachlan to accommodate truck routes where demand has been identified. This would assist farmers in transporting livestock, and produce/encourage rural economic development of the area.

Future road network planning within Upper Lachlan would be in conjunction with the Roads and Traffic Authority. Further growth and activity within the Upper Lachlan will place increasing pressure on the Council to seal unsealed road links, while minimising the number of access points to classified roads, ensuring safe ingress and egress, and minimising impacts on movement efficiencies along classified roads. Road network plans also need to integrate bus routes, cyclist and pedestrian linkages and facilities.

9.7 Sewerage

9.7.1 Existing infrastructure and capacity

Crookwell and Gunning are the only two sewered towns in Upper Lachlan Shire. Detailed planning has been undertaken for the provision of a sewage treatment plant at Taralga. Necessary approvals have been obtained and construction of a sewer system and a 450 equivalent persons sewage treatment plant is programmed to commence construction in February 2009.

Further growth in Gunning will require upgrading of the existing sewage treatment plant once the 1,000 equivalent persons design capacity is reached. The number of people connected (as at March 2005) was 600. Although the future connected population will depend on the number of allotments that adopt on-site treatment, this will vary between 1,065 and 1,500 equivalent persons based on the expected expansion of the village. The pumps in the Meadow Creek pump station are currently operating at capacity and will require upgrading.

The villages of Dalton and Collector both currently rely on on-site septic systems for sewage management. Given the forecast level of growth for the smaller villages across Upper Lachlan Shire and costs associated with the construction and operation of sewage treatment facilities, it is unlikely that the smaller villages will gain centralised sewage treatment works to 2020.

There are no effluent reuse schemes currently operating in Upper Lachlan Shire, however, the construction of a new sewage treatment plant at Taralga will involve effluent reuse. Opportunities for effluent reuse in Crookwell and Gunning are currently being investigated.

Sewage treatment facilities have the affect of restricting development of surrounding areas including residential uses when constructed within existing villages. The sewage treatment plant at Crookwell currently restricts development potential for a significant portion of the northern edge of town due to the need for an odour buffer. In assessing future development, Council would need to consider buffer distances in accordance with the STP Buffer Zone Land Use Planning Guidelines as prepared by the Water Directorate (2006).

9.7.2 Taralga sewerage scheme

Taralga is currently served by individual on-site septic tank systems. This approach has the potential to contaminate surface water and groundwater within the catchment area. This is of particular concern given the town's proximity to potential sources of groundwater. As part of a catchment-wide strategy to improve water quality within Upper Lachlan Shire, the Council has proposed a reticulated sewerage system for the town, with the support of Sydney Catchment Authority and the Department of Energy, Utilities and Sustainability.

A range of options have been examined as part of the environmental assessment of the proposal, as detailed in the Environmental Impact Statement prepared by Connell Wagner (2005). The preferred option for the proposal comprises:

- a conventional gravity system for the reticulation network within the Taralga township
- a rising main from the town to the sewage treatment plant
- a sewage treatment plant with a capacity of 650 equivalent persons, incorporating fine-screening, an intermittent decant extended aeration treatment process, tertiary filtration, ultraviolet disinfection, storm storage, and sludge lagoons for stabilisation of bio-solids
- disposal of treated effluent by a combination of irrigation on adjacent grazing land and precautionary discharges to Corroboree Creek.

Soil investigations were undertaken during the preparation of the environmental impact assessment for the proposed sewage treatment plant. These identified that the land immediately north and west of the proposed sewage treatment plant site was suitable for irrigation.

Sewage effluent would be treated to achieve a minimum standard of 150 cfu/100mL. This is appropriate for irrigation areas where the general public is excluded. In conjunction with other management practices (e.g. cessation of irrigation in windy conditions), the public health risk would be negligible and could be adequately managed.

Based on the detailed assessment of impacts, no other significant environmental issues associated with construction and operation of the proposed scheme were envisaged. The Environmental Impact Statement considers geology and soils, surface water and groundwater (including water quality), noise, air quality, Indigenous and non-Indigenous heritage, and traffic and access. Noise emissions associated with construction of the reticulation network within the village were identified as a relatively major impact within the context of the project. These would be of a relatively short duration for individual receptors and could be adequately mitigated through appropriate mitigation and management practices. Cumulative impacts of noise and odour associated with operation of the proposed sewerage treatment plant and the current waste transfer station were also assessed. It was concluded that these were not likely to be significant.

A Management Plan for the construction and operational impacts of the proposal was also prepared to ensure all identified impacts are adequately managed.

As required under the former *State Environmental Planning Policy No. 58 – Protecting Sydney’s Water Supply* (now superseded by *Drinking Water Catchments Regional Environmental Plan No 1*), a neutral or beneficial effect analysis was also prepared for the proposed scheme. This included consideration of the pre and post-development run-off volumes and pollutant loads, the anticipated effect on catchment water quality, water quality management strategies and the required maintenance and monitoring for the scheme. The analysis indicated that the proposal would have a beneficial effect on receiving water quality.

The scheme is considered to be compatible with the water quality objectives applying to the former *State Environmental Planning Policy No. 58 – Protecting Sydney’s Water Supply*. The effluent quality performance standards for the sewage treatment plant were determined as part of a catchment-wide review of sewage management, and were premised on their suitability in terms of protecting the drinking water catchment and the environmental health

of receiving waterways. Development of acceptable effluent quality criteria was undertaken in consultation with the then Department of Environment and Conservation in 2005.

9.7.3 Management issues

As with water supply, prior to further development within or surrounding sewage treatment facilities, connectivity must be made available at occupation. This will be the responsibility of individual developers and will be required to demonstrate how new sewerage networks interconnect with the existing core network.

Several measures are available to ensure adequate sewage management capacity is maintained in light of existing infrastructure and potential increases in demand. The various approaches may result in considerable capital expenditure for the Council. This would need to be assessed against alternative measures and commitments. Consideration will also need to be given to the availability of land for upgrade and/or augmentation of existing sewage treatment plants or associated operations.

Possible measures include:

- rehabilitation of the sewerage network to reduce overflow rates and infiltration
- upgrade of the sewage treatment plant to improve the quality of effluent
- augmentation of the sewage treatment plant to increase the treatment capacity in the event that growth exceeds expectations
- construction of a water recycling scheme to reduce demands on potable water.

9.8 Waste management

9.8.1 Existing infrastructure and capacity

Landfill sites exist at Crookwell, Gunning, Collector, Tuena and Bigga, with a waste transfer station at Taralga. Landfills at Crookwell, Gunning, Taralga and Collector are supervised while landfills at Bigga and Tuena are not supervised.

The life expectancy for landfills within Upper Lachlan are:

- Crookwell: 15-20 years
- Gunning: >20 years
- Collector: 5 years
- Tuena: 20 years (operates with no restriction)
- Bigga: >20 years (operates with keyed entry on weekends)

Domestic management services are operated by contractors in Crookwell and Taralga including Laggan, Grabben Gullen and Binda and en-routes to and from these locations. Domestic management services are operated by Council in Gunning and Dalton.

Upper Lachlan Shire Council operates a general household garbage collection system for Crookwell and Taralga and some areas close to these towns. Residents are required to dispose of their waste at the local waste facility and are charged by mass. Residents are currently not charged for the disposal of fully-sorted recyclable wastes at the waste facilities.

9.8.2 Management issues

An integrated waste management strategy is being prepared by Council to assess the remaining capacity of the existing landfills, and provide monitoring and reporting on the environmental performance of the operations. Ideally, this strategy would also discuss approaches to waste minimisation and waste management, including environmental initiatives such as recycling and re-use. The strategy should also consider environmental impacts of the existing and future landfills and identify mitigation and management measures that would be implemented.

Possible management approaches include:

- augmentation of existing landfills to improve site security, operations and capacity
- encouraging households and industries to minimise waste
- environmental and feasibility assessments for a new landfill site, including a risk assessment that identifies any potential for leaching into sensitive and protected areas
- assessment of sustainable waste management practices (an options report), such as recycling schemes and green waste management schemes.