

# State of the Environment Report 2001 / 2002



MUSWELLBROOK SHIRE COUNCIL

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PREPARED BY THE ENVIRONMENTAL SERVICES DEPARTMENT  
MUSWELLBROOK SHIRE COUNCIL

# **Muswellbrook Shire Council**

## **State of the Environment Report**

**2001/2002**

This report has been prepared by the Environmental Services Department, Muswellbrook Shire Council to fulfill the requirements of the Local Government Act 1993.

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# 1. INTRODUCTION

## 1.0 INTRODUCTION

Under the Local Government Act 1993, every Local Council in New South Wales is required to prepare a State of the Environment (SoE) Report for its Local Government Area (LGA) as part of its annual reporting requirements. Under the Act, the report for the year following Local Government Elections must be a comprehensive document. The reports in the intervening years between elections may be either a comprehensive or supplementary document, updating all important indicators. **The 2001/2002 SoE Report is a supplementary report.** The most recent comprehensive report was the 1999/2000 report.

The Local Government Act requires Council to:

1. Address the eight environmental sectors:

- Land
- Air
- Water
- Biodiversity
- Waste
- Noise
- Aboriginal heritage
- Non Aboriginal heritage

2. Provide for each environmental sector, as a basis of comparison in subsequent reports, a statement outlining the condition of the sector at the date of the report and make relevant comparison with the equivalent statement in the last (comprehensive) SoE report.

3. Report on all major environmental impacts and related activities, including management plans relating to the environment; special council projects relating to the environment, and the environmental impact of Council activities.

This State of the Environment report covers the period between July 2001 to June 2002 and provides information pertaining to the state of the Muswellbrook LGA. This report should be read in conjunction with the last comprehensive State of the Environment Report (1999/2000).

## **2. THE SHIRE OF MUSWELLBROOK**

### **2.0 OVERVIEW**

The Shire of Muswellbrook is centrally located in the Upper Hunter Valley, and covers an area of 3401.55 km<sup>2</sup> being located approximately 130 km north-west of Newcastle. Lake Liddell delineates the Muswellbrook Shire boundaries to the east, Wollemi National Park to the west, Aberdeen to the North and Coricudgy State Forest to the South. Muswellbrook is located at Latitude 32°15' South, Longitude 150°53' East, with an elevation of 144.2 metres above sea level.

The township of Muswellbrook is the main residential and commercial settlement in the Shire, with Denman and Sandy Hollow the two other small areas of settlement. The Muswellbrook Shire is bisected by the Hunter River, which flows from the upper reaches of the Barrington Tops past Muswellbrook and Denman where it is joined by the Goulburn River and continues in an easterly direction toward the coast at Newcastle. To the west of Muswellbrook, the countryside is undulating with Wybong and Sandy Creeks being the major drainage lines in the area. Similarly undulating hills dominate the landscape between Muswellbrook and Singleton, broken only by Lake Liddell. The rugged mountains of the Wollemi National Park are located in the south-west portion of the Shire. The National Park is a popular tourist attraction.

### **2.1 URBAN DESIGN**

Muswellbrook Shire is made up of two main settlement areas: Muswellbrook and Denman.

#### **2.1.1 Muswellbrook**

Muswellbrook is the main residential and commercial urban settlement with a population of 10,377 (ABS 2001). Muswellbrook is made up of approximately 830 hectares of urban area and approximately 57 hectares of urban green space, which represents:

- Muswellbrook urban green space per capita is equal to 0.005 ha per person.
- Residential density in Muswellbrook Urban Area is 12.5 persons per hectare of urban land.
- Within the Muswellbrook Urban Area of approximately 830 ha, an estimated 57 ha is Urban Green Space (6.9%).

#### **2.1.2 Denman**

Denman is located in the centre of the Muswellbrook Local Government Area and is located at a height of 110 metres above sea level. Denman has a population of 1,437 (ABS 2001). The approximate urban area of 100 ha with an additional 49 ha of urban green space. This represents:

- Denman urban green space per capita is equal to 0.034 ha per person.
- Residential density in the Denman urban area is equal to 14.4 persons per hectare of land.

## 2.2 DEMOGRAPHICS

According to the 2001 Census, the total population of the Muswellbrook area at that time was 15 281 persons. For demographics and other population information please refer to the aforementioned document and to the Muswellbrook Shire Council Community Profile, 1998.

## 2.3 CLIMATE

The climate of Muswellbrook and the Upper Hunter is characterised by warm dry summers and cool, dry winters. In summer the weather in the Muswellbrook region is dominated by synoptic high pressure systems which alternate with low pressure systems - “southerly busters”, every three to five days. Rainfall is highest in the summer months (Hyde et al, 1981), usually as the result of thunderstorms.

In winter the mid-latitude westerlies and high-pressure systems alternating with cold fronts modify the climate. The prevailing winds are north-westerly and are created via cold air drainage flows associated with the terrain. Winter is drier than summer, with regular frosts and fogs occurring from mid-autumn to late spring.

**Table 1: Climatic data for Muswellbrook Area for the 2001/2002 Financial Year.**

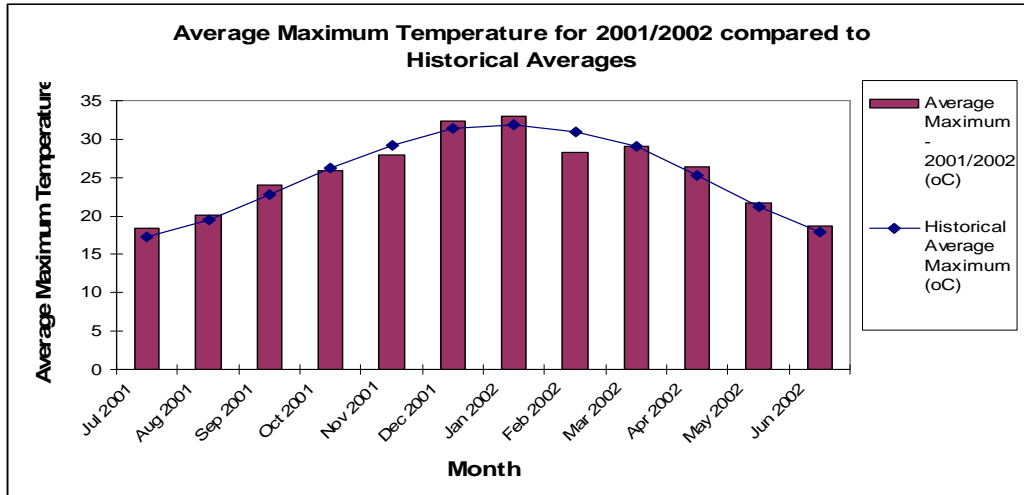
Month	Average Maximum - 2001/2002 (°C)	Historical Average Maximum (°C)	Average Minimum 2001/2002 (°C)	Historical Average Minimum (°C)	Actual Rainfall 2001/2002 year (mm)	Historical Average Rainfall (mm)
Jul 2001	18.3	17.3	4.8	3.7	43.7	44.3
Aug 2001	20.1	19.4	4.3	4.4	28.3	36.2
Sep 2001	24	22.8	7.9	6.9	15.5	41.6
Oct 2001	25.9	26.2	9	10.2	63	51.9
Nov 2001	28	29.2	13.1	13.1	40	57.8
Dec 2001	32.4	31.4	16.1	15.7	72.9	66.9
Jan 2002	33	31.8	16.9	17.1	51.2	78.6
Feb 2002	28.2	30.9	17.7	17	165.5	70.8
Mar 2002	29.1	29	14.2	15	67.6	58.7
Apr 2002	26.4	25.3	15.2	10.8	8.6	45
May 2002	21.6	21.2	7.7	7.4	38	41.5
Jun 2002	18.7	17.9	5.7	5.2	26.2	45.8
<b>Total</b>					<b>620.5</b>	<b>639.1</b>

Source: Bureau of Meteorology – Jerry’s Plains data.

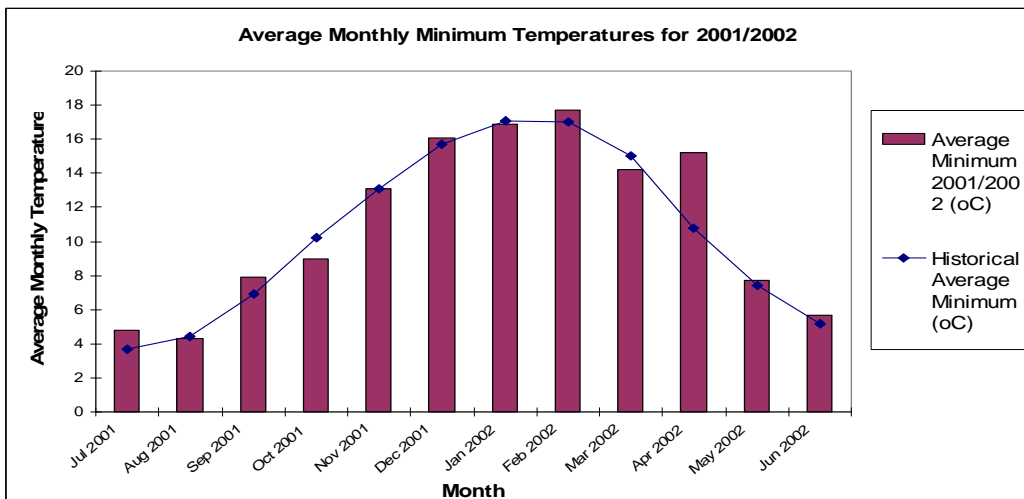
### 2.3.1 Temperature

The climate of the Upper Hunter Valley, which includes Muswellbrook, is characterised by hot summers with periods of humid, stormy conditions, and cool to mild, dry winters.

Temperature records for the 2001/2002 period at Jerry’s Plains are represented in Graphs 1 and 2 below, compared to historical averages for the Jerrys Plains area (Source: Bureau of Meteorology – Jerry’s Plains data)



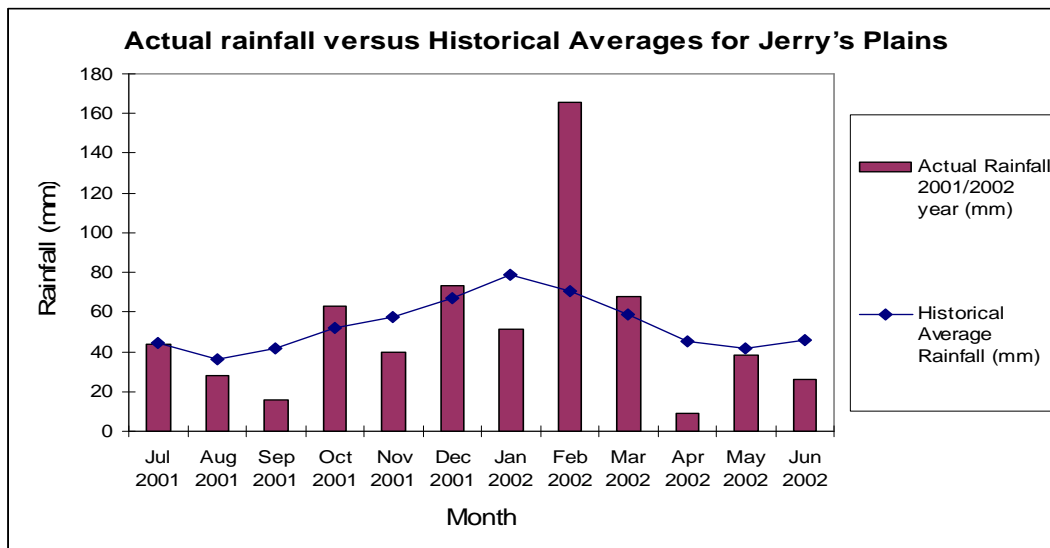
Graph 1 - Average Maximum Temperatures compared to Historical Averages



Graph 2 – Average Minimum Temperatures compared to Historical Averages

### 2.3.2 Rainfall

The annual rainfall for the 2001/2002 financial year was a total of 620.5 mm as detailed in Graph 3. Rainfall in the Muswellbrook district has a low reliability and is highly variable for any one month. Short periods of sustained heavy rainfall occur periodically in the Hunter Valley, either from the tail end of a cyclone passing down the east coast of Australia or from a stationary low pressure trough in this region. The intense convective storms usually occur in late summer, often producing short term runoff.



**Graph 3 – Comparison of Actual Rainfall with Historical Averages**

### 2.3.3 Evaporation

Mean pan evaporation in the Upper Hunter, based on available records, is in excess of mean rainfall in all months, the deficit being least during winter months. (Envirosciences, 1990)

## 2.4 PLANNING AND MANAGEMENT PLANS

Planning provisions in the Muswellbrook Local Government Area are used to protect the sensitive areas of the environment of the Shire from the potential effects of development.

Muswellbrook Council uses a number of planning documents to enforce this protection and ensure all proposals are thoroughly assessed and are in accordance with the planning instruments adopted. These planning documents include:

### 2.4.1 Local Environment Plan

The Muswellbrook Local Environment Plan 1985 (LEP) is presently used by Muswellbrook Council in the assessment of development applications. The LEP delineates zones for which particular planning provisions apply. Clauses 11, 16 and 17 of the Muswellbrook LEP 1985 relate to development in Zones 7(d) – Scenic Protection, 7(L1) – Alluvial Lands and 7(L2) – Urban Buffer Zone, which are all recognised as environmentally sensitive zones. In summary, the clauses ensure that adequate consideration is given to the following matters when assessing development applications:

- Retention of natural vegetation;
- Scenic protection of the landscape;
- Soil erosion potential;
- Aboriginal heritage;
- Drainage;
- Waste;
- Flooding;
- Bushfires;

- Impact on Water Quality;
- Visual Impacts;
- Reduction of agricultural lands
- Affect on future mining proposals

Muswellbrook Shire Council is currently undertaking a major review of the Muswellbrook LEP 1985 and the Rural Lands Strategy 1993. This will ensure that the LEP and Rural Lands Strategy reflect the growing needs of the Muswellbrook community, and additionally protect the environment and sensitive areas within the Shire. It is anticipated that this major review will be substantially completed by January/February 2003 with the advertising and referral/consultation processes having been exhausted. It is anticipated that by early 2003 the Draft Review will have been submitted to Council and Planning NSW for adoption.

At the same time as undertaking the review of the Muswellbrook LEP 1985, Council is seeking to review its Rural Lands Strategy 1993. In this regard, Planning NSW has placed a moratorium on Muswellbrook Shire Council for the consideration of any amendments to the LEP for rural areas until the adoption of a Strategy by both Council and the Department.

In conjunction with assessing development pursuant to the Muswellbrook LEP 1985 and the Environmental Planning and Assessment Act, 1979, Council additionally must refer to other planning documents in the assessment and determination of development applications. These planning instruments include Development Control Plans (DCP's), Codes, the Muswellbrook Shire Wide Heritage Study 1996, the Rural Lands Strategy 1993, Management Plans, the Synoptic Plan, and the Upper Hunter Cumulative Impact Study as discussed below. Any draft instruments must also be taken into consideration.

#### **2.4.2 Development Control Plans**

Muswellbrook Shire Council has adopted a number of Development Control Plans (DCP's) specific to the protection of the environment and with which all development within the Shire must comply. Council uses the DCP's in the assessment of development applications and conditions of consent issued by Council. Specific DCP's relating to the protection of the environment within the Muswellbrook Shire are:

- *Development Control Plan No. 9 – Erosion and Sediment Control – adopted 12<sup>th</sup> July 1999*

Council has adopted the uniform Policy and Code of Practice for Erosion and Sediment Control for the Central Coast, Hunter, Karuah-Great Lakes and Manning local government areas developed as a joint program of the Department Land and Water Conservation (DLWC), Hunter Catchment Management Trust (HCMT) and the Lower Hunter and Central Coast Regional Environmental Management Strategy (LHCCREMS).

The objectives of the policy are:

- To prevent land from being degraded by soil erosion or unsatisfactory land and water management practices;
- To protect streams and waterways from being degraded by erosion and sedimentation caused by unsatisfactory land and stormwater management;
- To promote and protect biodiversity.

- *Development Control Plan No. 10 – Contaminated Lands – adopted 12<sup>th</sup> July 1999*

Pursuant to the provisions of the Environmental Planning and Assessment (EP& A) Act 1979, Local Government Act 1993, Contaminated Land Management Act 1997, and the

Contaminated Land Management Regulation 1998, Council has a duty of care when considering development applications, to consider fully the possibility of land contamination and the implications it has for any proposed future use of the land.

In recognition of its duty of care, Muswellbrook Council has adopted a precautionary approach to its consideration of applications involving contamination or potentially contaminated land. The object of this approach is to enable any land contamination issues to be identified and dealt with at an early stage in the planning process. In order for this to occur, Council has developed a set of procedures to be followed for rezoning proposals and development applications. These procedures allow for a merit based consideration of land contamination issues, ie. in considering the implications of contamination, Council will have regard for the sensitivity of a proposed land use in addition to any technical standards or requirements published by the NSW Environment Protection Authority (EPA), the Australian and New Zealand Environment Conservation Council (ANZECC), the National Health and Medical Research Council (NHMRC) or any other relevant authority.

#### **2.4.3 Heritage - Plans**

Currently there are a number of heritage items listed under the Hunter Regional Environmental Plan (REP) 1989 that are within the boundaries of Muswellbrook Shire. The items are broken into three categories of significance, State, Regional and Local.

Under the REP, there are no items listed as State Significance, whilst there are 26 items of Regional Significance and 23 items of Local Significance. The REP also lists 32 items as requiring further investigation. Whilst the REP is used in the assessment of development applications, the Muswellbrook Shire Wide Heritage Study 1996 is also used to assess proposals as the Study provides more specific information as to what it is that makes the item to be of heritage significance, provides a more detailed analysis and was initiated as a review of the REP.

As a consequence of the Study, Council has been progressing towards formalising the document into the Muswellbrook LEP 1985 and to develop a supporting DCP. For further comments, refer to the section headed 'Non – Aboriginal Heritage'.

#### **2.4.4 Environment and Heritage Plan**

Muswellbrook Council has developed an Environment and Heritage Plan, which is incorporated into the Management Plan of Council. The aim of the Environment and Heritage Plan is to protect and improve the environment, through the challenges of reducing pollution levels, increasing community participation in environmental issues, establishing links between remnant native vegetation and establishing riparian zone plantings along the Hunter River.

#### **2.4.5 Muswellbrook Urban Stormwater Management Plan**

The NSW Environment Protection Authority (NSW EPA) issued a direction to all local government authorities in NSW under Section 12 of the *Protection of the Environment Administration Act 1991* to prepare catchment based urban stormwater management plans. The directive required the development of a stormwater management plan for the urban areas within the shire with a population of over 1000. Within the Muswellbrook LGA, this meant that the stormwater management plan would specifically relate to the main urban areas of Muswellbrook and Denman.

Council has completed the Urban Stormwater Management Plan, with the Plan being formally adopted by Council on the 9<sup>th</sup> July 2001. The Plan details a stormwater management program for implementation throughout Muswellbrook and Denman to improve the quality of stormwater runoff from the urban areas.

The recommendations in the Stormwater Management Plan are currently being implemented.

#### **2.4.6 Rivercare Plans**

Council has prepared Rivercare Plans for the entire length of the Hunter River between Aberdeen and Denman. The purpose of the plans is to provide a conceptual basis for the implementation of remedial works to rehabilitate the Hunter River within the Muswellbrook Shire. This plan will eventually see the planting of 10,000 trees and a weed management plan developed to ensure the survival of indigenous vegetation.

The Rivercare Plans are currently being implemented through Landcare groups and landholders in the Shire.

## **3. LAND**

### **3.0 MUSWELLBROOK LANDUSE HISTORY**

Prior to European settlement, two tribes of Aborigines were in possession of lands in the Muswellbrook Area.

European settlement within the area dates back to the discovery of the Upper Hunter by Chief Constable John Howe of Windsor in 1819 (Turner, 1995). By 1825, most of the land fronting the known parts of the Upper Hunter Valley was either granted or reserved and the establishment of great pastoral estates commenced.

‘Musclebrook’ as it was known then was strategically located in relation to the Hunter River and the road to the Liverpool Plains. It was gazetted as the town of ‘Musclebrook’ in 1833 and grew steadily as a cattle, horse and sheep centre. The name was officially changed in 1839 to “Muswellbrook”. The smaller settlements of Sandy Hollow and Denman were established around 1853.

Towards the end of the century, large scale dairying continued the development of the area. The mining of coal was first recorded in this area in the late nineteenth century at Kayuga.

Local Government commenced in 1906 as the Wybong Shire Council but the name was changed the following year to ‘Muswellbrook Shire Council’. It was during this time that the Shire’s current boundaries were defined. A series of amalgamations with adjacent regions continued until 1979, when the Shire of Denman and the Municipality of Muswellbrook amalgamated to form the present-day Muswellbrook Shire (Lambley, 1989)

The area steadily grew and the town of Muswellbrook developed as an established commercial centre with reticulated water (1915) and electricity (1923).

Since the first open cut coal mine was established in 1944 by Muswellbrook Coal Company, the growth of Muswellbrook has been influenced by the development of open cut coal mining in the area and the establishment of power generation at Liddell and Bayswater. The agricultural, equine and viticulture industries continue to provide diversity in the economy of the Shire, which now supports a population of 15,281 (ABS Census 2001).

### **3.1 GEOLOGY OF THE MUSWELLBROOK SHIRE**

For information about the geology and topography of Muswellbrook Shire, please consult the 1999/2000 State of the Environment Report.

## **3.2 STATE**

### **3.2.1 LANDUSE**

Current landuse within Muswellbrook varies from large industrial operations such as power stations and coal mining, to agricultural activities such as cattle grazing and viticulture, and the conservation zones of Wollemi and Goulburn River National Parks and nature reserves.

Table 2 details the land area each of the main landuse categories occupy within the Shire, and the percentage it represents of the 3401.55km<sup>2</sup> land area.

**Table 2: Landuse within the Muswellbrook Shire**

<b>Use</b>	<b>Area (Hectares)</b>	<b>% of Total Shire</b>
National Parks	145,550	43
Nature Reserves	3,500	1
Power Stations	13,000	3.7
Coal Mine Leases (including open cut, underground and project mine leases)	16,517	4.8
Prime Agricultural Land	20,690	6.1
Vacant and Grazing	140,333	41.1
Urban Areas (approx)	950	0.3
<b>Total Shire</b>	<b>340,540</b>	<b>100</b>

### 3.2.2 DEVELOPMENT DURING 2001/2002

#### 3.2.2.1 Development Applications

For the financial year of 2001/2002, 349 development applications were received.

The total number of applications determined (approved, refused, withdrawn or cancelled) during the financial year of 2001/2002 was 333, which is broken into the following:

- 43 applications from DA's lodged pre 30/6/2001
- 290 applications from DA's lodged between 1/7/2001 and 30/6/2002

Of the applications, the bulk were generally residential related developments such as dwellings, garages, patios, pools, additions, sheds, awnings, etc. A large number of applications were lodged in the rural areas for dwellings, machinery sheds and other agricultural related buildings. The bulk of subdivision applications also related to the rural areas, though towards the end of the financial year a number of residential subdivisions were lodged or progressed through compliance with conditions of consent. Further, a twenty-five (25) lot rural residential subdivision was completed at Muscle Creek with a number of the lots taken up immediately.

A number of mining related applications were lodged, such as ablution blocks, sheds, storage buildings, etc. Council has experienced continued interest in extractive industries (sand and gravel) through the lodgement of development applications or applications to amend existing development consents.

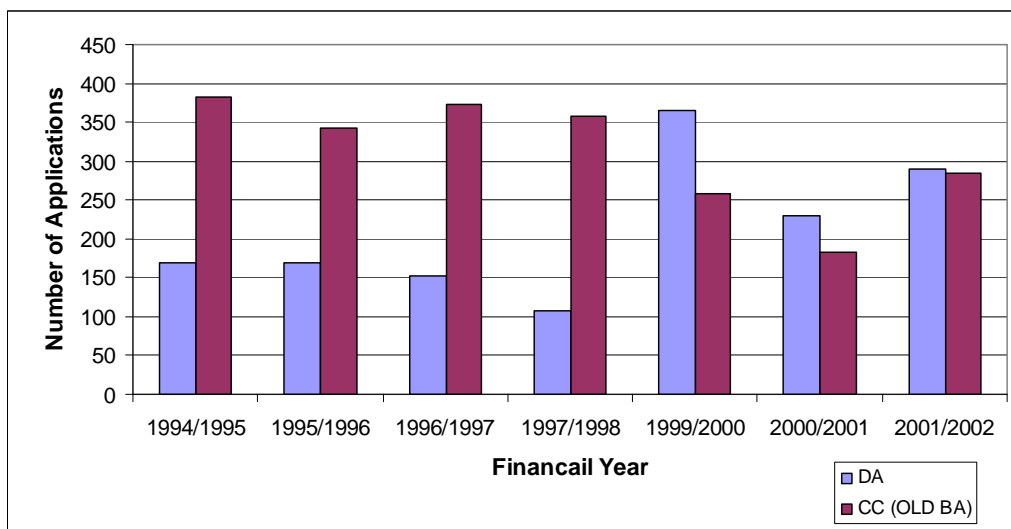
Council has received a continued flow of tourist related developments, consisting of bed and breakfasts, vineyard tasting rooms/cafes, and holiday cabins. These developments are predominantly occurring in rural areas surrounding Denman and Sandy Hollow. In addition, a number of developments associated with horse training establishments have been occurring in rural areas surrounding Sandy Hollow, and in the localities of Baerami Valley and Widden Valley.

A steady flow of development in the industrial areas was also experienced with a continuous uptake of undeveloped land at the Thomas Mitchell Line Road Estate or redevelopment of previously developed sites.

### 3.2.2.2 Construction Certificates

During the 2001/2002 financial year, 304 applications for construction certificates were lodged with Council, of which 284 were issued in the same financial year. There may have been some which were determined but were lodged prior to 1 July 2001, as well as some may have been lodged prior to 30 June 2002, but were not determined within the reporting period.

Graph 4 compares the number of development applications and construction certificates applied for in the 2001/2002 financial year with previous years:



**Graph 4: Comparison of Construction Certificates to Development Applications during the Reporting Period.**

### 3.2.2.3 Environmentally Significant Developments Assessed during 2001/2002

Several environmentally significant developments were considered by Council and other regulatory bodies during the 2001/2002 financial year, the most important of these being:

#### 1. Mt Arthur North Open Cut Coal Mine

Construction of the infrastructure for the commenced mine in 2001. The works have been substantially commenced, with test samples already having been extracted.

#### 2. Dartbrook Extended Underground Coal Mine

Dartbrook Extended was granted development consent by the NSW Planning Minister for the increase in the amount of coal produced each year and to mine a different seam to that originally mined. The approval also involves the development of a new access seam and the use of haul trucks for the haulage of coal to the coal handling and preparation plant for a period of 18 months. Construction of the infrastructure works have commenced.

#### 3. Sodium Chlorate Plant

Sterling Pulp Chemicals was granted development consent for the construction and operation of a sodium chlorate plant within the Macquarie Generation Industrial Zone by the NSW

Planning Minister. Since the approval, no progress has been made in terms of construction works or compliance with various conditions of consent.

#### **4. Proposed Mini Steel Mill**

A proposal to establish a mini steel mill on Macquarie Generation land was subject to a Planning Focus Meeting in early 2000. The proposal was also subject to a preliminary public consultation process. No further information has been made with the project to date in relation to whether it will proceed, details on the preparation of an EIS nor any likely lodgement date (the development would be of State Significance).

#### **5. Fly Ash Brick Plant**

A Planning Focus meeting was held in early 2002 regarding a proposal for a Fly Ash Brick Plant to operate at the Bayswater Power Station. The proposal would involve the construction and operation of a small brick plant where the fly ash by product of the Power Station would be used to produce building bricks, pavers and blocks.

The operation, would initially utilise a quarter of the fly ash output of the plant, however if successful would eventually expand to utilise all of the by product.

#### **6. Drayton Coal Extensions**

An application for the extension of Drayton Coal Mine has been lodged with Muswellbrook Shire Council (the determining authority).

#### **7. Muswellbrook Coal Extensions**

An application for the mining of the former Muswellbrook Coal No 1 opencut by Muswellbrook Coal Company has been lodged with Muswellbrook Shire Council (the determining authority).

### **3.2.3 EPA LICENSED PREMISES**

Under the Protection of the Environment Operations (POEO) Act 1997 premises are required to obtain an Environment Protection Licence from the Environment Protection Authority if their activities are above the thresholds outlined in Schedule 1 of the POEO Act. The POEO Act came into force on the 1<sup>st</sup> July 1999 and replaced a number of other now repealed legislation including the Noise Control Act, Clean Water Act, Air Control Act, Environmental Offences and Penalties Act, Pollution Control Act and the regulatory provisions of the Waste Minimisation and Management Act under which pollution control licences were previously issued.

**Table 3: Premises in the Muswellbrook Shire licensed by the EPA under the Protection of the Environment Operations Act 2000/2001**

<b>Licence Number</b>	<b>Premises Name</b>
4866	Collins Crushing – Mobile Plant
1245	Gates Pty Ltd
4731	Brambles Australia Ltd
5059	Denman Sewage Treatment Works
113	Mount Arthur Coal
656	Muswellbrook No.2 Open Cut Coal Mine
779	Bayswater Power Station

954	Boral Concrete
1323	Drayton Coal Mine
1593	Muswellbrook Sewage Treatment Works
1926	Pioneer Construction Materials Pty Ltd
2122	Hunter Valley Gas Turbine Station
4885	Dartbrook Coal Mine
5980	Muswellbrook Waste and Recycling Facility
6538	Bengalla Mine
11345	Muswellbrook District Hospital

### 3.2.4 POWER STATIONS

The Muswellbrook Shire is an important electricity generation and coal mining area within New South Wales. Macquarie Generation presently operates two large coal-fired power stations in the Shire, Bayswater and Liddell, which supply almost one quarter of the electricity produced for the National Electricity Market (NEM), comprising New South Wales, Victoria, Queensland, South Australia and the ACT.

#### 3.2.4.1 Liddell Power Station

Liddell Power Station (2000 megawatts capacity) was completed in 1974. Both drinking and process water supplies for the Station are extracted from the Hunter River. This water was used to service both Liddell and Bayswater power stations. Cooling water for the units, which is used to increase the thermal efficiency, is obtained from Lake Liddell which was constructed in 1967-8 for this purpose, before the advent of the Clean Waters Act 1970. During the reporting period Liddell Power Station produced 7,828 Gigawatt Hours.

The Station operates in accordance with EPA licence conditions which require continuous source monitoring of flue gases (sulphur and nitrogen dioxides, fluoride and particulates). Ambient air quality monitoring for the same parameters is also a requirement of the operating licence, with results from the monitoring program being formally reported to the EPA on a quarterly basis. Five ambient air monitors are maintained by Macquarie Generation and are located at Singleton Hill, Ravensworth, Lake Liddell, Mt Arthur North and Muswellbrook (Administration Centre).

#### 3.2.4.2 Bayswater Power Station

Bayswater Power Station was completed in the mid 1980's and has an output of 2640 megawatts. Bayswater operates four 660 megawatt generating units. Each turbine generates the equivalent power of sixteen 747 jet engines in full thrust. Electricity is produced using pulverised coal-fired boilers and steam-driver turbo-generators in a similar way as outlined above. The plant is automated, and few items require manual operation. During the reporting period Bayswater Power Station produced 16,766 Gigawatt Hours.

### 3.2.5 EXTRACTIVE INDUSTRIES

There are two major types of extractive industry in Muswellbrook Shire; sand/gravel extraction and coal mining.

#### 3.2.5.1 Sand / Gravel Extraction

Currently there are five gravel quarries operating within Muswellbrook Shire. These quarries are listed below:

**Table 4: Quarries operating in the Muswellbrook Shire 2001/2002**

Quarry	Type of Quarry
Hunter Valley Gravel (formally Brambles)	River sand and Gravel
Keevers	Ridge Gravel
N Barry	Ridge Gravel
Red Gravel	River sand and Gravel
Gates Willowdell	River sand and Gravel
Cawsey Park	River sand and Gravel
Council Quarry	Gravel

### 3.2.5.2 Coal Mining

Coal mining has been one of the most important industries in the Muswellbrook Shire and indeed much of the Hunter Valley almost since the beginning of European settlement in this area. There are currently five open-cut mines and one underground mine in Muswellbrook Shire. These are:

- Mt Arthur Coal – the integration of Bayswater No. 3 open cut and the Mt Arthur North Project
- Bengalla – open cut
- Dartbrook - underground
- Drayton – open cut
- Muswellbrook Coal – open cut
- Liddell Coal – open cut

An additional open cut coal mine (Mt Pleasant) and an underground mine (Sandy Creek) have development consent but have not commenced operations.

### 3.2.6 AGRICULTURE

Agriculture is the most prominent and diverse land use in the Shire. Agricultural activities range from intensive cultivation on the floodplain, to grazing on the valley slopes.

The potential of land for agriculture use is defined by a series of Land Classes created by the NSW Department of Agriculture. The amount of prime agricultural land of agricultural suitability Classes 1 and 2 in the Shire is small, as it is restricted to the floodplains and associated low ground of the Hunter and Goulburn Rivers. The total area of prime agricultural land is 20,690 hectares but other areas of the Shire (Class 3 agricultural suitability) away from the rivers can be highly productive. The most productive land is largely used for milk production and for lucerne and pasture hay. Other agricultural activities on the alluvial flats include vegetable and market gardening and beef fattening. Agriculture in the rest of the Shire is restricted by poor soil, lack of water and soil erosion potential. This land is used mainly for cattle and sheep grazing. Horse breeding and viticulture is carried out on smaller developments on the better soils. Fish farming (aquaculture) is another agricultural development which is evident in the Shire.

The Australian Bureau of Statistics undertook an Agricultural Commodity Census during 1996/1997 which detailed the total area, production and value of various agricultural

commodities in the Muswellbrook Shire area. The census concluded that for 1996 / 1997 the total value of agriculture for the Muswellbrook statistical area was over \$32 million.

### 3.3 PRESSURE

#### 3.3.1 POWER STATIONS

##### 3.3.1.1 Ash Generation and Disposal

During the coal combustion process in power stations, certain elements remain inert. Solid particles remain in the furnace (heavy bottom ash) and flues (fly ash) of the power station. The bottom ash is deposited of at Pikes Gully. The fly ash is mixed with water to form a slurry which is then deposited of at the old Ravensworth mine void.

Macquarie Generation divert some of the ash which is a waste product of the generation of electricity by way of selling it for further use in cement manufacturing and road construction.

##### 3.3.1.2 Other Pressures from Power Stations

The Liddell and Bayswater Power Stations additionally place pressure on other aspects of the environment, including air, noise and water. The specific pressures of these have been detailed in the Air, Noise and Water sections of this report.

#### 3.3.2 EXTRACTIVE INDUSTRIES

Mining and quarrying activities place pressure on the environment mainly in that they disturb the ground surface, leaving it vulnerable to erosion by wind and water, creating dust problems and water contamination issues. There are also social issues to be overcome in relation to these activities, as they often conflict with the everyday lives of those around them. Noise is a major contributor, along with vibration (from blasting and machinery), dust and traffic problems associated with transporting product.

Table 5 details the mines currently extracting coal, their location in regards to the township of Muswellbrook, the date the mine commenced operation and the production figures for the 2001/2002 financial year.

**Table 5: Coal Mine production figures 2001/2002**

Mine	Location	Type	Commencement	Raw Production 2001/2002 (Mt)
Mount Arthur Coal	11km SW of MbK	Open cut	1995	5.4
Bengalla	3km W of MbK	Open Cut	1997	6.3
Dartbrook	11km NW of MbK	Underground	1994	3.4
Drayton	9km SE of MbK	Open cut	1983	5
Muswellbrook Coal	1km NE of MbK	Open cut	1979	1.4
Liddell	13kms S of	Open Cut	1946	3

Colliery	Mbk			
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Muswellbrook Shire has the last major unallocated open cut coal reserves left in NSW. As older, more costly open cut and underground operations close in the Lower Hunter Valley and Central Coast areas, the emphasis on coal production has begun to shift to the Muswellbrook area. This is evident in the number of new coal mine proposals, and the identification of unallocated coal reserves in the surrounding area. The following table identifies coal mines proposals for the Muswellbrook area which have been, or currently are for determination by the Minister.

**Table 6: Proposed coal mining developments in the Muswellbrook Shire**

Mine	Location	Type	Status
Mt Pleasant	2km NW of Mbk	Open Cut	Development consent granted, construction not commenced
Sandy Creek	1km NE of Mbk	Underground	Development Consent granted, construction not commenced
Saddlers Creek	SE of Mbk	Potential Open Cut	Exploration stage
Rosehill	W of Mbk	Potential open cut	Exploration stage
Anvill Hill	W of Mbk	Potential open cut	Exploration stage

### 3.3.3 AGRICULTURE

Agriculture places major pressures on the environment through many sources. Broad acre farming uses chemicals such as herbicides and pesticides that may have a cumulative and harmful effect upon both aquatic and terrestrial flora and fauna, the structure of the soil is disturbed and the soil hydrology is also disrupted. Removing native vegetation and replacing it with annual crops reduces the biodiversity of the region and can contribute to the problem of soil salinity.

Dryland salinity is determined by a number of factors in the local catchment such as geology, soil type, farming practices and vegetation cover. Regions identified by the Department of Land and Water Conservation as being affected by dryland salinity are:

- Muscle Creek catchment;
- Wybong area;
- Yarrawa;
- Baerami Creek south of Denman;
- Giants Creek; and
- Lake Liddell catchment.

Cattle and sheep farming is also an important environmental pressure. Hard hoofed animals can speed up erosion of river banks and hill sides, affecting water quality. Intensive operations such as cattle feed-lots and poultry farms can create problems with effluent disposal and groundwater contamination.

Grape growing for wine is an important pressure on land in the Muswellbrook area and the Hunter Valley in general. The main environmental concerns regarding vineyards are the application of herbicides and pesticides, and the disposal of waste water. A typical winery

uses three to four litres of water to produce one litre of wine. The important components of winery waste water include:

- Heavy metals and salts;
- Organic acids and carbonates;
- Proteins; and
- Ethanol, yeast and bacteria slurries.

### **3.3.5 EROSION**

Soil erosion is a natural process resulting in loss of soil from land through the effects of wind, water or gravity. Soil erosion is accelerated by human activities such as tree clearing and the introduction of hoofed animals, which disturb the land surface and the existing vegetation cover. There are several types of erosion, including:

- Sheet erosion occurs when topsoil is removed from the ground surface usually as a result of overland flow of rainwater where vegetation is not of a sufficient density to prevent the soil being washed away.
- Gully and rill erosion is usually associated with the drainage system where land clearing has led to higher surface runoff quantity and velocity.
- Mass Movement is a general term for soil erosion where large quantities of soil move suddenly, usually as a result of gravity rather than water movement. Clearing trees and other vegetation from steep slopes can exacerbate this type of erosion.
- Stream bank erosion is a natural process that occurs as a river channel shifts with the river bed. Clearing of riparian vegetation can speed up this process and it can threaten arable farmland.

## **3.4 RESPONSE**

### **3.4.1 UPPER HUNTER CUMULATIVE IMPACT STUDY AND ACTION STRATEGY**

The Upper Hunter Cumulative Impact Study and Action Strategy (UHCIS) was produced in 1997 by the then Department of Urban Affairs and Planning, now known as Planning NSW. The aims of the Strategy included:

- To establish the effects of cumulative impacts of various existing and major proposed land uses and activities;
- To establish a regional framework for the assessment of the environmental impacts of individual development proposals and activities;
- To provide a basis for coordinated environmental monitoring and enhanced environmental management practices; and
- To assist future strategic land use and development planning and regional levels.

Muswellbrook Shire is involved specifically in 18 of the 39 actions contained in the study. The major actions include:

- **Action 2:** Examination of specific cumulative environmental reports of four new coal mines;
- **Action 4:** Consideration of Upper Hunter Cumulative Impact Study and State of the Rivers in assessing development applications
- **Action 5:** Preparation of Urban and Rural Settlements Strategy
- **Action 6:** Development of Synoptic Plan
- **Action 8:** Consideration of groundwater vulnerability when preparing LEPs
- **Actions 11 and 12:** review development consent conditions for coal mines
- **Action 17:** Develop blasting guidelines
- **Action 19:** Load based licensing
- **Action 24:** Stormwater Management
- **Action 29:** Community Consultation
- **Action 33:** State of the Environment Reporting

### **3.4.2 SYNOPTIC PLAN – INTEGRATED LANDSCAPES FOR MINESITE REHABILITATION**

As a recommendation of the Upper Hunter Cumulative Impact Study, the Department of Mineral Resources prepared the “Synoptic Plan – Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley of NSW”. This document was launched at the Singleton Coal Discussion Day in October 1999. Information regarding the history of the Synoptic Plan is contained in the 1997/98 SoE Report.

The purpose of the study is to provide a basis for development of a long term integrated strategy for the rehabilitation of mines. This initiative will hopefully encourage adjacent landowners, government and the broader community to contribute in planning and land management terms to a region-wide landscape strategy.

The Synoptic Plan provides an overview of:

- Current practices and trends in mine rehabilitation.
- Regional initiatives in vegetation management.
- Emerging environmental issues and their implications on mine rehabilitation.
- A comparative analysis on mine rehabilitation plans in 1998 and 2020.
- Principles for an integrated approach towards landscape management for the coalfield.

The study is confined to an area of 260 900 hectares comprising the coalfield of the Upper Hunter Valley extending from south west of Singleton to north of Muswellbrook. Mine holdings cover approximately 23.4% of the study area.

### **3.4.3 NATIVE VEGETATION CONSERVATION ACT**

The Native Vegetation Conservation Act, came into force on the 1 January 1998 and provides framework for government and community to work together to achieve sustainable native vegetation management. The Act is administered by DLWC, and its main features are:

- *Regional Vegetation Management Plans*  
The RVMP's are developed by Regional Vegetation Committees and will provide a comprehensive strategy for managing native vegetation, by:
  - Identifying areas where native vegetation can be cleared without application;
  - Identify areas where an application to clear will be necessary;
  - Allow clearing exemptions to be developed in accordance with regional requirements;
  - Highlight areas where the condition of native vegetation should be approved;
  - Recommend areas that should be revegetated.
- *Property Agreement*  
A Property Agreement is a voluntary agreement between a landholder and the Department of Land and Water and Conservation outlining the management of native vegetation on an individual property.
- *Clearing Native Vegetation*  
In areas with an approved RVMP, clearing that is not consistent with the plan will not require development consent. In areas without a RVMP, native vegetation can be cleared if the clearing is consistent with the exemptions in the Act and other clearing restrictions do not apply. Where exemptions do not apply, clearing can only be carried out after an application has been made to the DLWC and development has been granted.

The Native Vegetation Conservation Act provides for the management of native vegetation still evident within our Shire with the objective of conserving native vegetation where appropriate. The Act is a big step towards the protection of vegetation in areas not conserved (such as National Parks etc).

### **3.4.4 CATCHMENT MANAGEMENT PLAN**

A Catchment Management Plan is currently being prepared by the Hunter Catchment Management Trust with the assistance of the Department of Land and Water Conservation. This plan will become the overarching catchment planning document to facilitate a coordinated approach to catchment management in the Hunter Catchment.

### **3.4.5 UPPER HUNTER REMNANT VEGETATION PROJECT**

The Hunter Remnant Vegetation Project, an initiative of the Hunter Catchment Management Trust, with the support of NSW NPWS and NSW DLWC, was established in mid 1996 to

determine the composition, condition and distribution of native vegetation cover throughout the study area, which covers approximately 3150km<sup>2</sup> of the mid to Upper Hunter Valley, including the areas and surrounding towns of Singleton, Denman, Muswellbrook, Aberdeen and Scone.

### **3.4.6 VEGETATION CONTRIBUTION SCHEME**

The Hunter Catchment Management Trust (HCMT) has developed a Vegetation Contribution Scheme whereby landholders (either individuals or groups) may apply for a contribution towards vegetation projects on properties within the Hunter catchment.

The purpose of the scheme is to assist landholders who wish to establish native vegetation on their properties. The scheme provides incentives for the establishment of vegetation which will provide multiple catchment-wide benefits such as reduced erosion, increased habitat for biodiversity, improved water quality, improved farm productivity and natural pest control.

Projects eligible for a contribution under the scheme are:

- Planting of seedlings;
- Fencing to protect establishment of direct seeding and natural regeneration;
- Fencing to protect remnant native bushland.

Preference for funding under the scheme is given to projects which:

- Provide catchment wide benefits;
- Are not confined to tree species - a diversity of trees, understorey and groundcover species including native grasses and herbs;
- Form part of an overall property plan and / or natural resource management plan or strategy (eg Rivercare Plan).

The scheme therefore aims to increase landholder responsibility and action in the management of their properties in an environmentally responsible manner, through the fencing off of stream and native vegetation, and the planting of native species.

### **3.4.7 LANDCARE**

Landcare is a movement of volunteers who are dedicated to restoring and maintaining our environment for future generations. In the Muswellbrook Shire there are currently four active Landcare Groups (Muscle Creek, Dartbrook Kayuga, McCully's Gap and Yarrowa), all of which are working to address a variety of issues. These groups have a total core membership of approximately 70. Over the last twelve months these groups have worked with other community groups on occasions to achieve their desired outcomes. These groups include service groups such as APEX and Lions, Scouts, Girl Guides (Brownies) and the Rural Fire Service. Landcare activities have also involved partnerships with schools (eg Muswellbrook Primary have propagated plants for Landcare activities), local businesses large and small, Muswellbrook Shire Council, the Department of Land and Water Conservation, Green Corps (a trainee program of the Australian Trust for Conservation Volunteers) and Work for the Dole.

### **3.4.8 COMMERCIAL FORESTRY TREE TRIALS**

Muswellbrook Shire Council is currently supporting two commercial forestry trials on mine overburden areas at Mount Arthur Coal and Drayton Mine. The trials are being undertaken to determine the most effective species, irrigation rates, densities etc of commercial forestry plantations. It is envisaged that commercial forests may become a viable landuse and industry to supplement and replace coal mining as it declines.

The Mount Arthur Coal trial is examining the use of treated effluent applied at varying rates and the effect it has on growth rates of different species of trees. The effectiveness of compost is also being examined.

The Drayton trial is examining the use of saline mine water and soil amendments on a number of different species. Such soil amendments include biosolids, topsoil, compost, fertiliser and overburden (no amendment).

Results of the trials will enable further forests to be planted, with the aim of rehabilitating mine sites using tree species as opposed to sowing rehabilitation areas with pasture species. An update on the findings of the trials and further progress of the establishment of commercial forestry plantations in the Upper Hunter will be given in the next State of the Environment Report.

### **3.4.9 CONTAMINATED LAND MANAGEMENT POLICY**

Muswellbrook Council adopted a Contaminated Lands Policy (DCP No. 10) on the 12<sup>th</sup> July 1999. The policy provides a legislative basis for identifying lands potentially contaminated, and details the procedural processes for identifying, evaluating and remediating contaminated land. The Contaminated Lands Policy, and other documented guidelines referred to in the Policy are mandatory references for consultants / applicants assessing contamination levels and undertaking remediation works on land within the Muswellbrook Shire.

The Contaminated Lands Policy, together with Council's Contaminated Sites Register (which has 75 premises identified as contaminated / potentially contaminated), provide the basis for ensure contaminated sites are identified and appropriate actions are undertaken to remediate the contamination. All development applications for lands contaminated / potentially contaminated, must abide by the Contaminated Lands Policy.

### **3.4.10 EROSION AND SEDIMENT CONTROL POLICY**

On the 12<sup>th</sup> July 1999 Council adopted a Erosion and Sediment Control Regional Policy and Code of Practice (DCP No. 9). It provides for uniform control and regulation for sediment and erosion control for the Hunter, Central Coast, Karuah – Great Lakes and Manning local government areas. The objectives of the policy and code are:

- To prevent land from being degraded by soil erosion or unsatisfactory land and water management practices;
- To protect streams and waterways from being degraded by erosion and sedimentation caused by unsatisfactory land and stormwater management practices;
- To promote and protect biodiversity.

### **3.4.11 LEP REVIEW**

Council formed a Sub Committee to oversee the review of the Muswellbrook LEP 1985. The reason for undertaking the review is that the LEP has been in existence for over 15 years, it has upwards of 80 amendments, has restrictive practices/clauses and does not address the development issues currently facing Council in regards to the mining, tourism, commercial, residential and rural sectors.

The Review Committee identified the specific areas of concern:

- (i) too many zones, particularly rural zones which do not reflect the original intentions or objectives of Council
- (ii) minimum rural lot sizes and associated restriction of intensive agricultural land developments
- (iii) building establishments in rural areas
- (iv) zone tables being too prescriptive and restricting future developments

The following issues were identified to form the basis of the review:

- (i) the assessment of current amendments to the LEP to determine zoning strategies for future developments
- (ii) the assessment of the number of zones in the Shire including a less formal descriptive zone table for such zones
- (iii) the elimination of zones with the LEP with development being considered by an individual merits basis
- (iv) more use of sterilised coal related land for industrial developments for example
- (v) more flexibility in the planing assessment process rather than the present prescriptive process

The Committee noted that the Rural Lands Strategy 1993 was not formally adopted as a Development Control Plan and therefore could not be used as a regulatory tool in formulating development assessment and control under the LEP. The Committee further recommended to undertake a review of the Rural Lands Strategy 1993 with specific reference to:

- (i) assessment of small lot rural subdivisions involving rural residential and rural retreat allotments and the provision of services to these developments
- (ii) assessment and proper identification of alluvial land
- (iii) assessment of minimum rural lot development ranging from less than 40 hectares on high yield to greater than 40 hectares for poor quality land
- (iv) clear definition for existing lots and associated building entitlement status

The proper review of the Rural Lands Strategy 1993 will allow Council to use the document in its consideration of future rural land developments such as subdivisions and various land use planning. This will be consistent with the objectives of Planning NSW in its support of Council's future direction in the control and development rural lands.

In terms of rezonings/amendments, Planning NSW has restricted any further fragmentation of Rural Lands in the Shire until the review of the Rural Lands Strategy has been completed. Planning NSW advised that until the Rural Lands Strategy is in place, Council has no basis from which to assess rezonings/amendments in rural areas of the Shire. Accordingly, a moratorium has been placed on rezonings/amendments that relate to the fragmentation of rural land pending the completion of the Rural Lands Study.

#### **3.4.12 EXTRACTIVE INDUSTRIES**

Audits have been undertaken of many of the quarry sites in Muswellbrook which also helps to educate the operators about sound environmental practice.

Each coal mine is required by the conditions of their development consent to employ staff to manage environmental issues at the site, such as complaints from the community and general environmental monitoring and reporting.

Each of the mines in the Shire is the subject of an individual Community Consultative Committee which aims to address any issues that may concern the community or nearby residents, and helps keep the community informed with regard to the activities of each individual mine.

## **4. AIR**

### **4.1 WHAT IS AIR QUALITY?**

Air quality is the status of the air quality of a particular area, and can be described with various parameters. The parameters used to describe the quality of air, may include Ozone depletion, the status of the greenhouse effect, dust deposition, and the particulate matter in the air (PM<sub>10</sub> & PM<sub>2.5</sub>), just to name a few.

According to NSW EPA (1997) air quality can relate to various different scales including the local, regional or wider scale (global). A range of pollutants affect air quality, although pollutants of concern include, but are not limited to, the following:

- Oxides of Nitrogen
- Reactive Organic Compounds
- Particles
- Lead
- Carbon monoxide
- Sulfur dioxide

A range of natural and anthropogenic sources produce the above pollutants, including motor vehicles, industrial activities and some domestic and commercial activities. Once pollutants are in the atmosphere they are transported both within regions and between regions by wind and air currents.

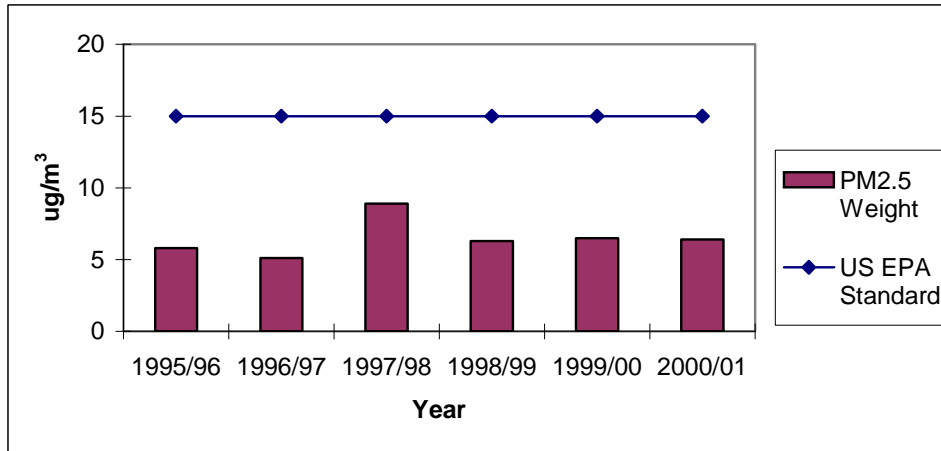
### **4.2 STATE**

#### **4.2.1 AIR QUALITY MONITORING**

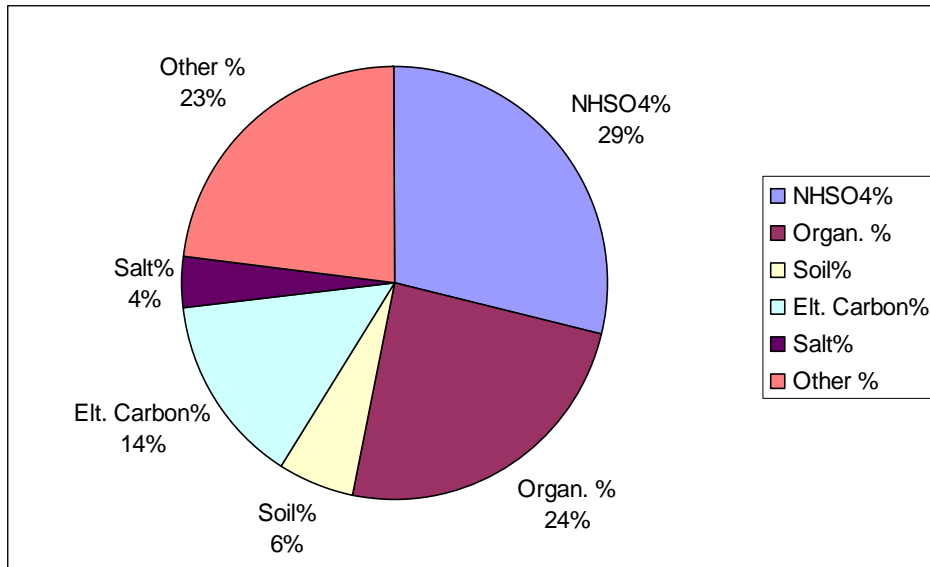
The air in Muswellbrook is tested for particulate matter for a 24 hour period, twice weekly. The sampling program is part of the Aerosol sampling program headed by the Australian Nuclear Science and Technology Organisation (ANSTO). The air sampling unit is positioned behind the water treatment plant in Scott Street Muswellbrook.

The study, funded by Muswellbrook Shire Council, is designed to determine the elemental composition of fine particulates with diameters less than 2.5 µm. Analysis of the hundreds of filter papers received from around the country every month is performed on accelerators at ANSTO, where a filter paper is characterised by its weight and elemental composition for up to 35 different elements, including carbon, silicon, iron, sulphur and lead. The data is presented as total particulate matter per cubic metre.

Graph 5 illustrates a comparison between the results obtained in this reporting year and in previous years, since the monitoring program started in 1995. Also included in the figure is an indication of the US EPA guideline for maximum recommended levels of this size particle. The Graph indicates that particulate matter in Muswellbrook's air was well under the US EPA's recommended goal. The elevated levels recorded in December 1997 were the result of a period of bushfires in the Hunter and therefore not indicative of the air quality produced by activities within the Shire. The mean particle weight for this year (2001/2002) has decreased from that of last year.



**Graph 5: Comparison of PM<sub>2.5</sub> Results 1995 – 2001**



**Graph 6: Breakdown of Particulate Matter (PM<sub>2.5</sub>) during the reporting Period**

The breakdown of the PM<sub>2.5</sub> particulates in the air over the 2001/2002 financial year can be identified in Graph 6, which illustrate that Ammonium Sulfate (NHSO<sub>4</sub>) is the most represented particulate, followed by organic matter, elemental carbon, and soils and salts. Please note that other includes trace elements of potassium, iron, zinc and lead.

Ammonium Sulfate (NHSO<sub>4</sub>) is the measurement of sulfur and hydrogen in the air. Ammonium Sulfate originates from the conversion of sulfur dioxide gas (SO<sub>2</sub>), from coal burning, industry and motor vehicles, to sulphuric acid (H<sub>2</sub>SO<sub>4</sub>), which is then neutralised by ammonia present in the atmosphere. Air quality issues such as “Acid Rain” result when there is incomplete neutralisation of this acidic aerosol.

Organic matter is an estimate of any organic compound detected. Organics are those compounds generally containing carbon (C), hydrogen (H) and Oxygen (O). Organics are

measured by ANSTO through the measurements of the hydrogen content with the removal of hydrogen associated with ammonium compounds.

Elemental Carbon concentration gives an indication of the amount of soot that is present in the air, and is usually produced by motor vehicles and burning biomass (bushfires and combustion fires).

Soils in the atmosphere occur from natural blown dust, agriculture and industries such as mining and quarrying. The fine particle soil concentration (<2.5um diameter) is found from the sum of different oxides found in soils including silicon oxide, aluminium oxides, iron oxides, calcium oxides and titanium oxides. The average percentage of soils in the 2001/2002 period is only 5% of all particulates evaluated over the period.

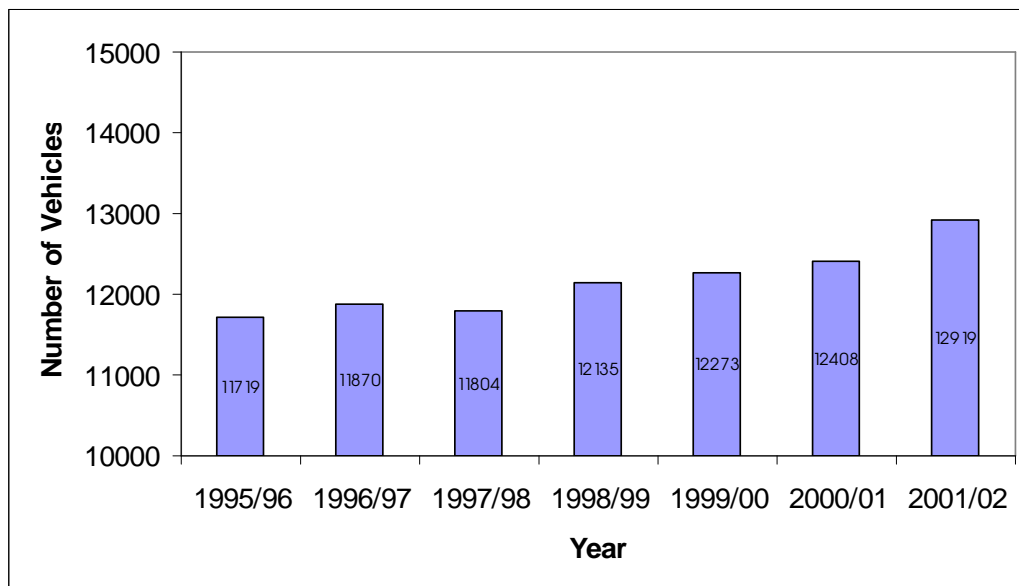
#### 4.2.2 TRANSPORT AND ACCESSIBILITY

During 2000, the RTA reviewed and amended the reporting mechanism for registered vehicles by vehicle type and fuel type. The following table reflects the new classification system used by the RTA from 2000 onwards.

**Table 7: Breakdown of No. of Vehicles Registered in Muswellbrook LGA as at 30 June 2002 by Vehicle Type and Fuel Type**

Vehicle Type	Fuel Type							Total
	Diesel	LPG	Unleaded Petrol	Petrol and LPG	Leaded Petrol	Unknown	Others	
Passenger Vehicles	17	8	4,710	23	753	138	0	5,649
Off Road Passenger Vehicles	359	1	609	3	1	0	2	975
Small Buses	16	1	18	0	42	0	0	77
Buses	50	0	1	0	1	0	0	52
Mobile Homes	14	0	0	2	3	0	0	19
Motorcycles	0	0	291	0	91	4	0	386
Light Trucks	1,104	18	881	21	374	54	1	2,453
Heavy Vehicles	310	0	4	0	12	12	0	338
Prime Movers	54	0	0	0	0	1	0	55
Plant	92	0	1	1	2	4	0	100
Trailers	0	0	0	0	0	0	2,814	2,814
Other Vehicles	0	0	1	0	0	0	0	1
<b>Total</b>	<b>2,016</b>	<b>28</b>	<b>6,516</b>	<b>50</b>	<b>1,279</b>	<b>213</b>	<b>2,817</b>	<b>12,919</b>

Source: RTA



**Graph 7: Comparison of number of vehicles registered over past financial years**

Graph 7 indicates a trend of increasing vehicular demand and use within the Shire. This trend can be attributed to the limited public transportation opportunities that are experienced within the Shire, as well as the population demographic. Therefore the main form of transport within the Shire is provided by private vehicles.

## 4.3 PRESSURE

### 4.3.1 POWER STATIONS

Air quality is an important issue with regard to coal-fired power stations as impurities in the coal that are not fully combustible are emitted into the atmosphere, the most important of which is sulphur dioxide (SO<sub>2</sub>). Health effects of SO<sub>2</sub> include respiratory tract damage, provoking wheezing and exacerbating asthma and chronic bronchitis. It can also increase susceptibility to respiratory tract infections.

Overseas experience has indicated that SO<sub>2</sub> and oxides of nitrogen (NO<sub>x</sub>) emissions from power stations can also be associated with other air quality issues such as sulphate haze and acid rain. Australian research has indicated that the relatively low sulphur content of coal used in Hunter Valley power stations produces less SO<sub>2</sub> and NO<sub>x</sub> emissions and therefore less problems than those experienced overseas.

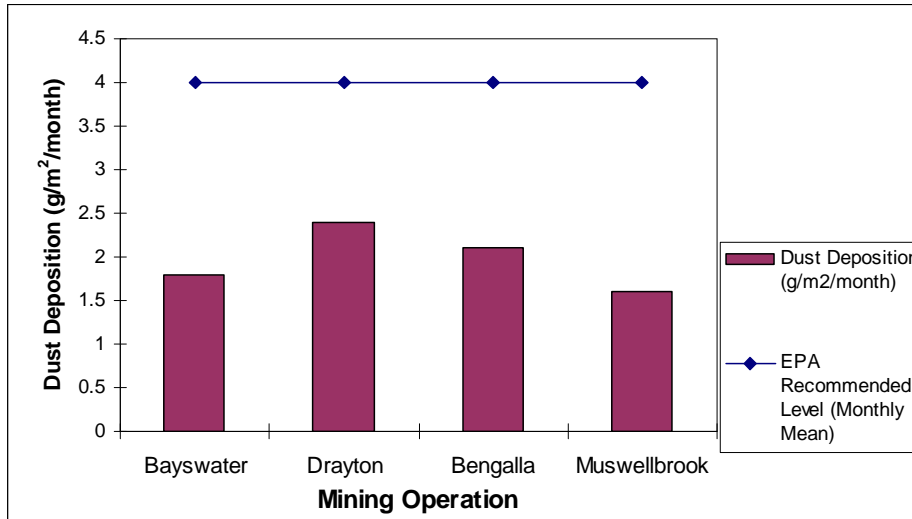
### 4.3.2 COAL MINES

The major pollutant emitted by coal mining activity is particulate matter such as dust from stock piles and machinery. Other pollutants include:

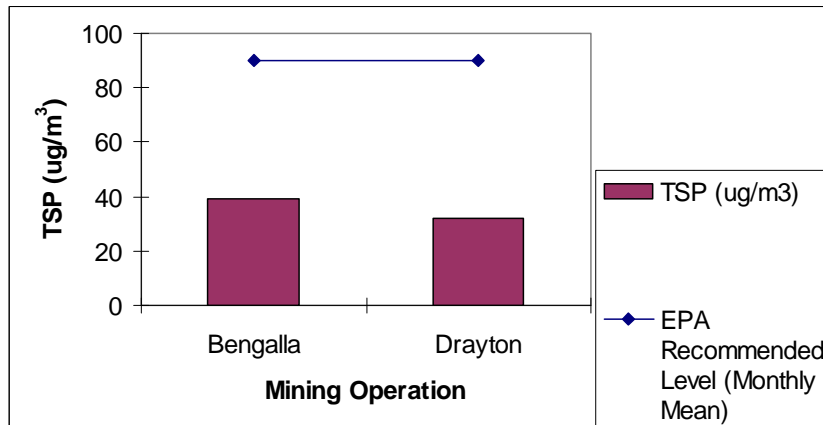
- Emissions from accidental or spontaneous combustion of coal-reject material; and
- Emissions from diesel-powered machinery.

Dust and air quality problems create difficult issues between coal mines and their close neighbours. Residents often protest against dust generation, with concerns about their health, especially if members of their family suffer from asthma or other respiratory difficulties.

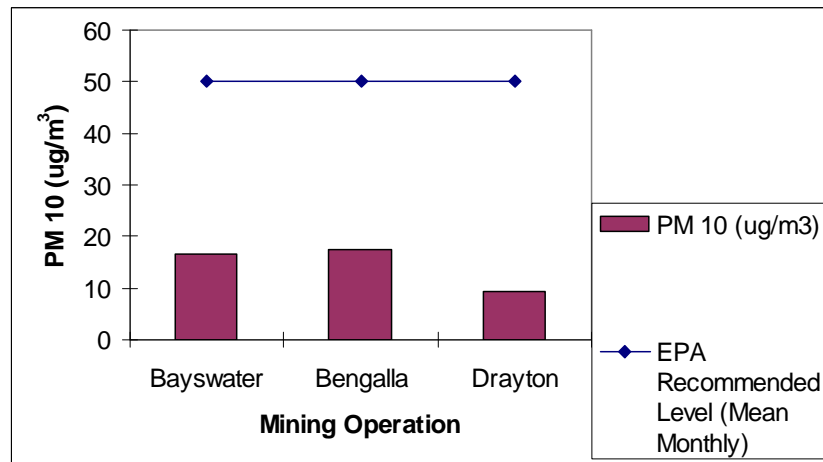
Rural households rely on rainwater for domestic water use, and this can be contaminated by dust fallout on their roof.



**Graph 8: Annual Average Dust Deposition Results for Mining Operations in Muswellbrook LGA for 2000/2001**



**Graph 9: Annual Average High Volume Air Sampling Results for Mining Operations in Muswellbrook LGA for 2000/2001**



**Graph 10: Annual Average PM10 results for Mining Operations in Muswellbrook LGA for 2000/2001**

## **4.4 RESPONSE**

### **4.4.1 POWER STATIONS**

Fabric filters have been installed on the stacks within the Liddell and Bayswater power stations to trap 99.9 percent of airborne emissions. Along with this stack emission, source monitoring takes place to measure particulate matter, sulphur dioxide, nitrogen oxides and fluorides.

Monitors are located in a number of areas beyond the perimeter of the station to measure ambient air levels of sulphur dioxide and fluoride. Stations are included at Muswellbrook and Singleton. Weather stations are also located at Mount Arthur and Liddell to record wind and rainfall data.

Bottom ash is collected at the bottom of the boiler and is disposed of at Pykes Gully. Fly ash is collected by large fabric filters which ensure that airborne emissions are no more than 0.01 grams per cubic metre. Fly ash is disposed of in the old Ravensworth open cut mining void.

### **4.4.2 COAL MINES AND EXTRACTIVE INDUSTRIES**

#### **4.4.2.1 Coal mines**

The coal mining operations in the Shire implement dust minimisation measures to mitigate the impact of airborne particles as a result of mining operations. Dust suppression measures include:

- Installation of stockpile sprays to prevent the possibility of windblown coal dust and to maintain the moisture control of the stockpiled material;
- Dampening of trafficked areas;
- Topsoil stripping being restricted to two strips ahead of the pre-strip to minimise the area of exposed ground;
- Drills being fitted with dust suppression equipment.
- Progressive rehabilitation of disturbed areas

As part of their conditions of consent, coal mining companies must undertake regular dust monitoring to ensure that the levels of dust emitted as a result of coal mining operations, are within the criteria set by the EPA.

Spontaneous combustion is, besides dust, the other main cause of air pollution within mining operations. Due to the coal mining seams of the Upper Hunter having a high sulphur content, spontaneous combustion is a common problem for many of the coal mining sites in Muswellbrook.

Coal mining companies have implemented Spontaneous Combustion Management Plans for their mining lease areas, which indicates the importance of “spon com” management. Spontaneous combustion is able to be kept to a minimum on operating open cut coal mines if managed carefully. Management involves dumping 5m lifts to aid compaction and cover carbonaceous material to ensure the material is not exposed to air.

#### **4.4.2.2 Quarries**

Council carries out environmental audits of sand and gravel quarries on a regular basis. This is a good way for Council to monitor these operations, but it also helps in the education process for operators. The greater the awareness of environmental issues among operators of potentially harmful activities, the greater the potential that problems will be rectified before harm is caused to the environment.

#### **4.4.3 ANSTO**

Council continues to fund the ANSTO air sampling program. The program is providing scientifically sound data on the quality of the air within Muswellbrook and an indication of the possible sources of particles which are analysed through the program.

The main use of the data received from the air sampling unit is to determine the possible impacts of coal mining developments (both existing and proposed) on the air quality of Muswellbrook. The program has been operating since 1995, with continued funding from Muswellbrook Shire Council

#### **4.4.4 CITIES FOR CLIMATE PROTECTION**

The Cities for Climate Protection (CCP) Program, a joint initiative of the Australia Greenhouse Office and the International Council for Local Environmental Initiatives, aims to encourage Councils to facilitate and encourage a reduction in greenhouse gases. The program is a world-wide initiative in which over 370 Councils throughout the world have joined. The program involved an initial formal commitment to the program by Council and subsequent achievement of the five “Milestones”, which are:

1. Establish an inventory of greenhouse gas emissions within Council and the general community and forecast emissions;
2. Set an emissions reduction goal for the Shire;
3. Develop and adopt a Local Greenhouse Action Plan to achieve the reduction goal;
4. Implement the Local Greenhouse Action Plan;
5. Monitor and report on greenhouse gas emissions and implementation of actions and measures.

Muswellbrook Shire joined the Cities for Climate Protection Program late 2000 and is currently completing the requirements to progress to Milestone 3.

#### **4.4.5 COMMERCIAL FOREST PLANTATIONS**

Muswellbrook Council is funding two commercial forestry trials in the Upper Hunter. These trials, and the development of further commercial forestry plantations in the Shire, will aid in improving the air quality of the Muswellbrook Shire through acting as sink of greenhouse gases. These commercial forestry trials are therefore not only valuable as an alternative commercial industry in the future, but are additionally an important technique in reducing greenhouse gas emissions.

#### **4.4.6 UPPER HUNTER COMMERCIAL FORESTS STEERING COMMITTEE**

The Upper Hunter Commercial Forests Steering Committee aims to achieve 30,000ha of commercial forests in the Upper Hunter within 5 years. The Committee, which is comprised of the Mayors of both Muswellbrook and Singleton Councils, NSW State Forests, NSW DLWC, NSW Minerals Council, DMR, coal mining personnel and community representatives, is an all of government approach to the strategic planning of commercial forestry in the Upper Hunter. Whist, as stated previously in this report, commercial forestry may be a future viable industry for the Upper Hunter, commercial forests also have great worth as sinks for greenhouse gases and carbon credits.

## 5. WATER

### 5.1 WHAT IS WATER QUALITY?

According to the Public Health Unit “Water is a community’s prime resource. Where water quality is good, and its quantity is adequate, it will enhance public health and sustain a community, in a wider social sense. Where the water quality is poor, and its supply is inadequate, it will affect human health and undermine a community’s ultimate sustainability – economically, socially, politically and environmentally.” Therefore it is essential that water quality and water quantity be of a standard at which the wider community, including urban, rural and industrial users are satisfied that the water can be safely used for their purposes.

#### 5.1.1 HUNTER RIVER CATCHMENT

Muswellbrook Shire is part of the Hunter Valley catchment, which covers an area of 22 400 km<sup>2</sup>, with the majority of water flow originating in the Barrington Tops area. A number of large towns are located in the Hunter Valley, including Newcastle, Maitland and Cessnock, all of which lie downstream of Muswellbrook. Upstream of Muswellbrook Shire, and within the Shire itself, lie Denman (pop>1500), Merriwa (pop>1200), Scone (pop>6000), Murrurundi (pop>1500) and Muswellbrook (pop>11000).

As discussed in previous sections, the Hunter Valley is predominantly rural, with intensive agricultural production on the alluvial floodplains, which can have an adverse effect upon water quality if not managed effectively. Extensive coal deposits under or near the alluvial floodplains means that major coal mining activities are undertaken, and the proximity of good quality coal makes the power generation industry a strong one in the Valley, with two coal-fired power stations generating the majority of electricity for New South Wales.

Water quality is regarded as a critical issue in water management in the Hunter Valley by the community. Poor water quality has the potential to severely restrict human activities in the Hunter Catchment, both in terms of human health and economic costs due to loss of production and increased costs of water treatment.

European land uses have increased nutrient loads exported to the river system, via both point and diffuse sources.

## 5.2 STATE

### 5.2.1 OVERVIEW

Geology, climate, riparian vegetation cover, groundwater quality, stream flow and landuse all influence the quality of water in rivers and streams. The condition of the water in the Muswellbrook Shire and of Shires within the same catchment is a direct reflection of the overall quality of the Hunter catchment. The Department of Land and Water Conservation’s *State of the Rivers and Estuaries Report 2000* is an extensive study into the region that has used the following *indicators* to determine the *state* of water quality in the Shire:

1. phosphorus and nitrogen concentrations, turbidity, salinity, pathogen presence (faecal coliform concentration) measured against Australian & New Zealand Environment & Conservation Council (ANZECC) guidelines

2. abundance and diversity of macroinvertebrate communities
3. confirmed blue-green algal blooms – extent, location, duration, intensity, toxicity etc.

Significant impacts identified in the condition (state) of the rivers and estuaries include:

- the Hunter catchment is in a degraded state compared to other catchments by changes to river channel structure, loss of riparian vegetation and growth of weed species
- nearly all original floodplain vegetation has been cleared
- streamflow has been affected due to regulation
- the demand in unregulated streams has increased the frequency of low and zero flow periods
- most salt, nutrients and bacteria are delivered to the rivers during high run-off events
- groundwater levels are rising in some areas
- blue-green algal blooms have occurred periodically in many of the storages of the Hunter catchment

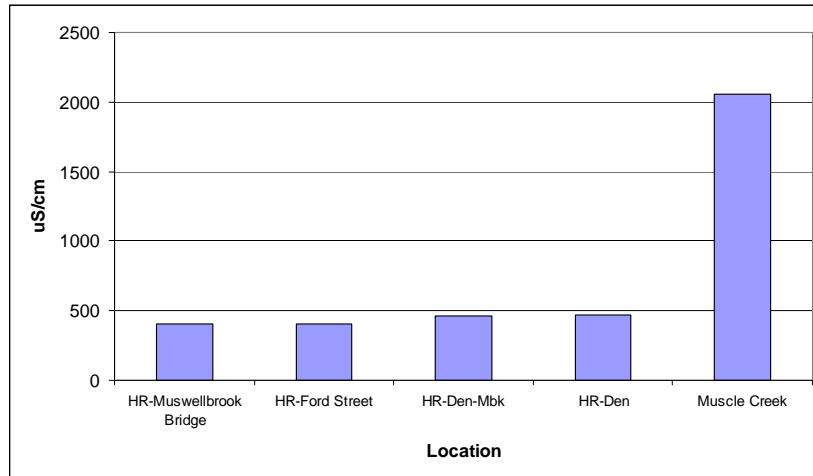
In addition, to the work done by the Department of Land and Water Conservation was an Independent Inquiry into the Hunter River system. The Inquiry was held over 18 months and was set out to examine how river health is being managed. According to Crawford (2002), The Healthy Rivers Commission was established as part of the NSW Government's water reforms, which aim to improve the health of the state's waterways. The Commission conducts independent public inquiries to identify appropriate goals and strategies to improve the health of rivers and lakes. The 8 key recommendations of the Inquiry were based on the following issues:

- Flood Mitigation
- River Corridors
- Sustainable Land Management
- Regional Planning
- Newcastle Port/Estuary Planning
- Planning for Mining
- Integrated River Health Management
- Implementation.

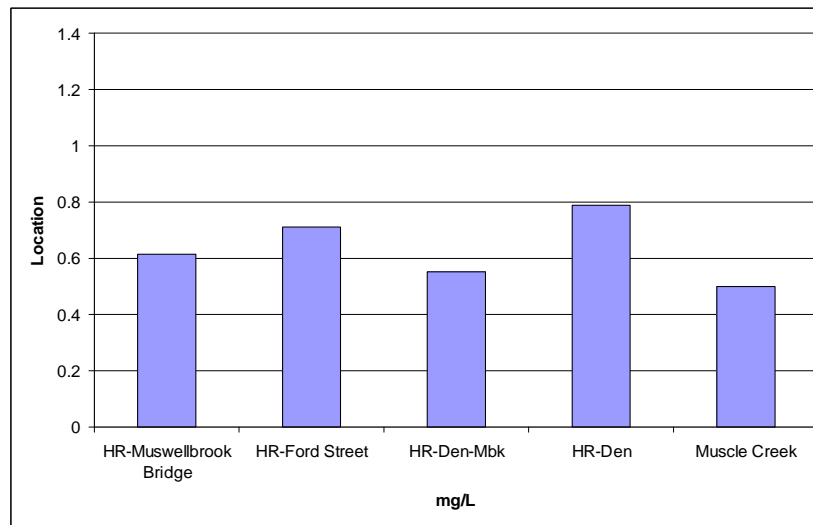
Further information regarding the Inquiry and its key recommendations can be found on the Healthy Rivers Commission website at <http://www.hrc.nsw.gov.au>.

### **5.2.2 MONTHLY WATER QUALITY MONITORING – HUNTER RIVER AND MUSCLE CREEK**

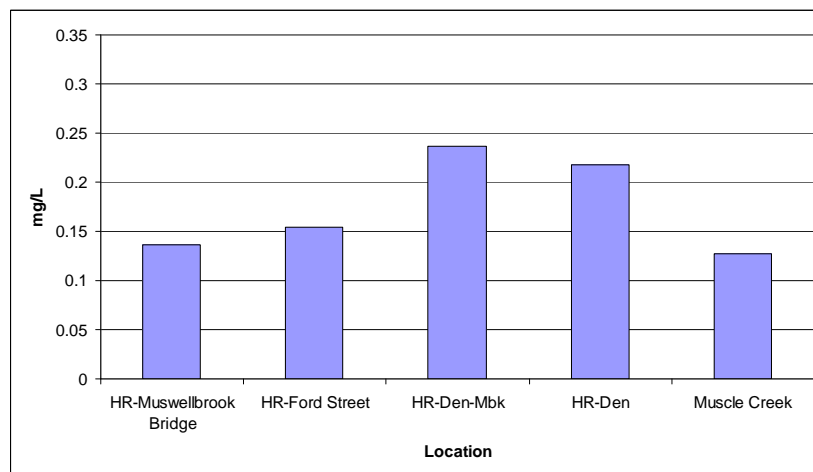
Water quality monitoring of the Hunter River and Muscle Creek is carried out monthly by Muswellbrook Shire Council. The annual average results for the 2001/2002 year are detailed in the graphs below:



**Graph 11: Annual Average Electrical Conductivity (Salinity) ( $\mu\text{S}/\text{cm}$ )**



**Graph 12: Annual Average Phosphorous (mg/L)**



**Graph 13: Annual Average Nitrate (mg/L)**

## **5.3 PRESSURE**

### **5.3.1 AGRICULTURE**

Agricultural activities contribute high levels of nitrogen and phosphorus to the river system in run-off. Major agricultural discharges of water from irrigation areas come in the form of:

- surface drainage water, which is tailwater or rainwater run-off from irrigated land;
- sub-surface drainage water drawn from the ground via either tile drains or shallow groundwater pumps to maintain the watertable at a desirable depth.

### **5.3.2 POWER STATIONS**

Drainage effluent from Bayswater Power Station has minimal impact on existing water quality in the catchment. Diversion of regulated flow from the Hunter River via Lake Liddell for cooling water makeup enhances the quality of the water stored in Lake Liddell. Desalination of condenser circulating water ensures that dissolved salts are not returned to the Hunter River and the station therefore has limited detrimental effects on salinity levels in the Hunter River.

The quality of the water in the tributaries downstream of the ash disposal areas is monitored and appropriate actions are taken should it be found that the storage areas are causing a deterioration in water quality. This is done by grouting or blanketing to make the facility “water tight” or by collecting seepage by means of wells or trenches and returning it to the ash disposal system.

### **5.3.3 COAL MINING**

Water pollution from coal mining may arise from a number of specified sources. Drainage water from mine workings and associated operations may contain excessive quantities of environmentally unacceptable substances including mineral salts, acid, suspended solids and organic material. Surface and sub-surface drainage systems are modified by mining, and long-term control of potential pollutants rests primarily in the containment and disposal of hazardous substances, and the re-establishment of effective drainage systems and stable soil profiles.

Runoff water from roads, coal-handling, storage and working areas around the coal mines is frequently of similar quality to mine drainage water, but may also contain organic contaminants such as soil, grease and fuel residues from work areas. Organic effluent from amenity blocks and bathhouses may cause pollution of receiving waters.

### **5.3.4 STORMWATER**

Stormwater runoff transports pollutants from each catchment to its collecting waterway through natural drainage lines such as gullies and creeks and via stormwater infrastructure such as gutters, channels and drains. Stormwater structures play an important role in reducing the effects of flooding, and improving public health and safety, but they also provide an efficient and all too convenient carriageway for pollutants to enter directly into the river. The activities from which stormwater pollutants may originate include:

- Clearing of native vegetation in the catchment reduces the potential for rainfall to infiltrate the ground surface, thereby increasing runoff;
- Sealing of the ground surface for driveways and roads increases runoff;
- Earthworks exposes soil to the eroding effects of heavy rainfall, and increases sediment loads in runoff;
- Wet weather discharges from over-loaded sewers increases bacteria and nutrient levels;
- Application of fertilisers, pesticides and herbicides can reach stormwater;

- Contaminated runoff from commercial and industrial premises is flushed into the stormwater system;
- Hosing leaf litter and grass clippings into the drains can clog pipes and increase nutrient loads and BOD (Biochemical Oxygen Demand) levels;
- Washing cars on the street or near stormwater drains contaminates stormwater with high nutrient loads from detergents and introduces grease and oil into the system; and
- Allowing pet faeces to enter stormwater drains also increase the nutrient load and contaminates stormwater with faecal coliforms.

## **5.4 RESPONSE**

### **5.4.1 WATER QUALITY ACTIVITIES AND PROGRAMS**

Muswellbrook Shire Council and relevant government departments, organisations and committees have carried out a number of activities and programs, which have helped to minimise pressures on the water and its quality within the LGA. The following activities and programs have been implemented to sustain the ecology of the water resources within the Muswellbrook Shire and the wider Hunter Valley Catchment they include:

- Councils Water Quality Monitoring, including drinking water, effluent and river water monitoring programs
- The Denman Effluent Reuse Program
- The Muswellbrook – Mount Arthur Coal Effluent Reuse Program
- Hunter Salinity Trading Scheme
- Trade waste Audit
- Septic Tank Inspections
- Stormwater Management Plan
- Rivercare

### **5.4.2 WATER QUALITY MONITORING – DRINKING WATER**

In conjunction with the NSW Health Unit, Council has for a considerable time period been undertaking bacterial, pesticide and chemical analysis of potable water samples in river waters abstracted for drinking purposes from selected sites around the Shire. Daily water analyses are undertaken by Councils Water & Waste Works for six major water quality parameters, and weekly analyses from the Hunter River and Muscle Creek.

### **5.4.3 TREATED EFFLUENT – WATER QUALITY MONITORING**

Council undertakes an analysis of sewage entering the sewage treatment works, as well as the quality of the sewage through the various treatment processes. The water is tested for BOD, pH and Suspended Solids.

Muswellbrook Shire Council achieves a 100% reuse of waste water produced by the two sewage treatment plants. All effluent produced at the Denman plant is utilised by the Denman Golf Course for irrigation. This has many benefits to the environment and to the community, including a reduction in the need for fertiliser on the golf course, elimination of the need to

buy water for irrigation, prevention of effluent being disposed of to local waterways, and reducing the costs to Council of having to pay to dispose of effluent to the river.

Effluent produced at the Muswellbrook plant is reused by both the Muswellbrook golf course (15%) and Mount Arthur Coal (85%). The effluent used by Mount Arthur Coal is stored and further treated in constructed wetlands on the mine site before being used for such activities as dust suppression, coal processing and in the tree lot irrigation trial on the site (discussed in the “response” section to follow).

#### **5.4.4 MONTHLY WATER QUALITY MONITORING – HUNTER RIVER AND MUSCLE CREEK**

Monthly water quality sampling is undertaken by Council under a program established in 1998 by the Upper Hunter Water Quality Advisory Committee. The Committee, which is comprised of community, Council and government representatives from Muswellbrook Shire, Scone Shire, Singleton Shire, Merriwa Shire Councils, Department of Land & Water Conservation, Hunter Catchment Management Trust and Environment Protection Authority; developed the program which has been running successfully for over 3 years.

Five samples are taken every month and analysed for:

- pH;
- Phosphate;
- Electrical conductivity;
- Hardness;
- Coliforms;
- Nitrates; and
- Temperature

Results are reported in the local news paper indicating the health of the river in relation to the various uses, such as recreational, drinking, irrigation, stock watering etc. Results for the 2001/2002 year for Electrical Conductivity, Phosphorous and Nitrates are detailed above in Section 5.2.

#### **5.4.5 UPPER HUNTER COMMUNITY WATER QUALITY MONITORING PROGRAM**

Muswellbrook Shire Council, together with support from Department Land and Water Conservation, Murrurundi and Scone Shire Councils, Denman and District Development Association, and the Murrurundi and Scone Landcare Groups, received funding of \$31000 for the implementation of a water quality monitoring program in the Upper Hunter. The monitoring will compliment and add to the existing monitoring network currently in existence in the Hunter River.

The program is being implemented through a coordinated approach between the organisations named above, including the combined provision of \$66,600 worth of in-kind support.

Sampling commenced in July 2001, with monitoring results being disseminated through the community and water quality advertisements being placed in the local papers.

#### **5.4.6 DENMAN REUSE PROGRAM**

The Denman Sewerage Treatment Plant used to be a point source of pollution that entered into the Hunter River. Since 1996/97 Council has entered into a partnership with the Denman Golf Course, and all effluent produced at the Sewerage Treatment Works is reused and recycled to water the golf course. The system works with the treated effluent being pumped from the Sewerage treatment works to a holding pond on the Denman recreational land, where it is stored until, it is required for use on the golf course. The use of the effluent on the course has the amount of fertilisers required to be added to the course, and has eliminated the buying of water for irrigation.

The reuse system has numerous benefits, including:

- the removal of effluent entering natural watercourses
- the reuse and recycling of the effluent water on the golf course
- reducing the amount of clean water and fertilisers used by the golf course
- reduction in EPA licensing fees in the coming years

#### **5.4.7 MOUNT ARTHUR REUSE PROJECT**

Council and Mount Arthur Coal entered into a partnership in 1997 to prevent effluent entering into local watercourses including Ramrod Creek and the Hunter River; while at the same time providing Mount Arthur Coal with much needed water for dust suppression and coal processing.

The partnership involved setting up a pump station at Muswellbrook Sewerage Treatment Works and implementing a water pipe system from the sewerage treatment works to the Mount Arthur Coal mine site. The effluent from the treatment works is then pumped overland and into the constructed wetlands on the mine site where it can be used in mining operations day to day activities.

#### **5.4.8 HUNTER RIVER SALINITY TRADING SCHEME**

The EPA recognised that the coal mines were adding to the salinity of the Hunter River, and the Hunter River Salinity Trading Scheme and new licensing arrangements were made in January 1995.

The aim of the Scheme is to reduce the salinity levels in the Hunter and improve the quality of irrigation water particularly during periods of low flow. Coal mines with licenses to discharge are only able to discharge during high or flood flow conditions, which only occur 10% of the time. The amount of salt each mine is able to discharge is dependent on the number of credits held by the mine, and the salinity of the river at the time of discharge. Under any release event, the target EC levels at Denman (600 microsiemens) and Singleton (900 microsiemens) must be achieved after the discharge event.

The EPA are currently reviewing the scheme, and a number of workshops / discussions have been held with surrounding landholders to gauge the effectiveness of the scheme and determine changes that are required to be made in order for the scheme to work for all involved parties.

#### **5.4.9 URBAN STORMWATER MANAGEMENT PLAN**

The Muswellbrook Shire Council Stormwater Management Plan was developed under the direction of the NSW Environmental Protection Authority (EPA). The stormwater plan includes the two main urban catchments in the Muswellbrook LGA which are Muswellbrook and Denman. The plan seeks to develop and implement strategies that will improve the quality of stormwater runoff from urban areas which will lead to improved water quality of streams and rivers in the Muswellbrook LGA and of the Hunter River downstream.

#### **5.4.10 RIVERCARE PROGRAM IN THE MUSWELLBROOK SHIRE**

Council, together with technical assistance from the Department of Land and Water Conservation, has commissioned the development of two Rivercare plans for the Hunter River, one covering Muswellbrook to Aberdeen and the other covering Muswellbrook to Denman. The Rivercare Plans identify the strategies required to restore, rehabilitate and maintain the environment of the Hunter River over the next 5 years. The Rivercare plans are currently being implemented through Landcare groups and landowners.

#### **5.4.11 ON SITE SEWAGE MANAGEMENT SYSTEMS**

Council has continued with its established On-Site Sewage Management System audit program, with over 400 systems having been audited during the reporting period. The initial registration of systems identified over 1600 systems which will require auditing under the program.

Council has additionally approved the installation of 29 new wastewater treatment plants throughout the shire, comprising 24 aerated systems and 5 standard septic systems.

#### **5.4.12 TRADE WASTE AUDIT**

Council has employed a Trade Waste Officer to undertake a trade waste audit of all commercial / industrial premises which have trade wastes. The audit will establish the level of trade waste compliance and once completed will initiate wastewater source control measures; ie getting businesses to treat their own wastewater before they discharge it to sewer so that the business is responsible for keeping the waste out of the sewer. Approximately 100 premises have been identified in the audit program during the reporting period.

#### **5.4.13 DRAYTON SALINE IRRIGATION TRIAL**

Commercial forestry on mine spoils in the Upper Hunter Valley has not been considered viable due to low rainfall, high evaporation, the low water capacity and poor nutrient quality of the spoil. However, the financial incentive of carbon credits and the need for an alternative land use to coal mining has led to the investigation of establishing commercial forestry plantations on mine sites under irrigated conditions and using nutrient amendments such as biosolids, fertiliser and compost.

The trial is looking to determine the feasibility of irrigating a Eucalypt plantation with saline water. The project is funded by the Muswellbrook Shire Council because of their interest in finding an alternative and profitable land use to coal mining. The trial includes four species, chosen for their relative salt tolerance and good timber qualities, a range of nutrient amendments and the comparison of irrigated and non-irrigated conditions. It is hoped that the results from the trial will be helpful in determining if saline irrigation is a viable option for large scale commercial plantations on other mine sites throughout the Upper Hunter Valley.

#### **5.4.14 MOUNT ARTHUR COAL EFFLUENT REUSE FORESTRY TRIAL**

Historically, rehabilitating mined land in the Hunter Valley concentrated solely on minimising the loss of agricultural and pastoral productivity, and the prevention of erosion and stream pollution. There is, however, the opportunity to develop the rehabilitated land to produce a valuable commodity such as timber, while utilising waste products to provide the necessary nutrients and organic matter for optimal plant growth.

The CSIRO designed a trial to be implemented by a PhD student as a research project. The major objectives of the project are to:

1. Examine the response of a eucalypt plantation grown in mine spoil, the application of effluent irrigation and composted biosolids and to determine the suitability of this land use as a rehabilitation practice on mine sites in the Hunter Valley;
2. Estimate the greenhouse gas mitigation effect of such plantations;
3. Maximise the trial's value as a research and development site and as a demonstration site, enabling results to be generally applied to rehabilitation of other mines in the region; and
4. Make recommendations to Muswellbrook Shire Council and Mount Arthur Coal regarding the use of effluent and biosolids for mine site rehabilitation and plantation growth, and recommend future species evaluation and silvicultural strategies.

#### **5.4.15 STREAMWATCH**

Streamwatch is a schools and community water quality education and action program. Streamwatch groups carry out investigations and water quality monitoring including physical, chemical and biological parameters. During the 2000/2001 financial year, Muswellbrook High School, Muswellbrook Public School and Muswellbrook South Public School participated in the Streamwatch program.

#### **5.4.16 MURDER UNDER THE MICROSCOPE**

Murder under the Microscope is an annual on line eco-game where students participate through intensive study of water quality issues, to identify victims, villains and the crime site of an environmental crime. Over 1100 schools nation-wide competed in the 2001 Murder under the Microscope competition. Muswellbrook High School, Muswellbrook Public School and St James Primary School participated in the competition.

#### **5.4.17 WATER BUG SURVEYS**

The Hunter Catchment Management Trust, in addition to the Streamwatch initiative, also coordinates a water bug survey program with school students. The species of insects found are used as a indication of the overall health of the waterway. The surveys provide greater community awareness of the ecology of the streams and the ecological impact of catchment activities. During the 2000/2001 financial year, Muswellbrook High School participated in the water bug surveys during Autumn 2001.

## 6. BIODIVERSITY

### 6.1 WHAT IS BIODIVERSITY????

Biodiversity is defined as “*The variety of life forms, the different plants, animals and micro-organisms, the genes they contain, and the ecosystems they form. It is usually considered at three levels: genetic diversity, species diversity and ecosystem diversity*” (NSW NPWS, 1999).

These three levels of biodiversity can be summarised below:

#### 1. Genetic Diversity

Genetic diversity refers to the variety of genetic information contained in all individual plants, animals and micro-organisms.

#### 2. Species Diversity

This refers to the variety of species on Earth. Species diversity is usually a measure of the number of species (richness) and their relative abundances for a given area at a given point in time.

#### 3. Ecosystem Diversity

Ecosystem diversity refers to the variety of habitats, biotic communities and ecological processes. An ecosystem consists of plant, animal, fungal and micro-organism communities and the associated non-living environment interacting as an ecological unit.

Ecosystem diversity has two inter-related components: the diversity of communities of species; and the diversity of interactions between community members (processes).

Source: NSW Biodiversity Strategy (NSW NPWS 1999).

## 6.2 STATE

### 6.2.1 HUNTER REMNANT VEGETATION PROJECT

The following is a review of the aims and goals of the Hunter Remnant Vegetation Project, and the progress of the study to date. The study is being undertaken by Mr. Travis Peake.

#### Background

The Hunter Remnant Vegetation Project (HRVP) commenced in September 1996 with the aim being:

*To collate scientifically sound information on the state of vegetation management and conservation in the upper Hunter catchment and use this information to encourage and support appropriate land management practices in the future.*

The project is primarily funded and coordinated by the Hunter Catchment Management Trust, with additional primary funding from the Natural Heritage Trust, NSW National Parks and Wildlife Service (Muswellbrook District Office) and the Department of Land and Water Conservation (DLWC) provide some funding and in-kind support.

**The objectives of the project are:**

1. To develop and implement a public awareness and consultation program regarding the project's activity and findings;
2. To determine the distribution and ecological significance of remnant native vegetation in the Hunter Valley floor and identify potential corridors which may link them;
3. To encourage participation in the survey, and continuing conservation and appropriate management of remnants by government agencies, local government, community groups and individual landholders;
4. To work with landholders to develop strategies for the appropriate management of remnants; and
5. To develop resource information, based on data obtained, to assist land managers in the conservation and management of remnant vegetation.

The study area of the project currently covers approximately 3,200 km<sup>2</sup> of the mid to upper Hunter catchment. It stretches south from the Murrurundi / Scone shire boundary, south-west to Denman, and south-east to Branxton. In Muswellbrook Shire the study area extends south from Scone Shire, west to Wybong, and east to McCully's Gap, Grasstree and Lake Liddell. Approximately 30% of the Shire will be mapped by the project.

**Project Progress**

Mapping of the project area has been completed and digitising of this information is expected to be completed shortly. The date of completion of the final report is currently not known. It is anticipated that maps of remnant vegetation will be provided to Councils at the completion of the project.

**Initial Findings**

While the process of digitising and reporting has not yet been completed for the Project, some initial findings can be mentioned. These include:

- Much of the tree cover of the area has been removed (primarily for agricultural purposes) since Europeans first settled the area from the 1820s onwards. There is some disagreement over what the vegetation of the valley floor was like in pre-European times, however it appears that much more of the area was covered with trees and a sparse understorey (probably a woodland) than is presently there. Recent broad-scale surveys have indicated that up to 99% of the tree cover of the valley floor has been removed or significantly altered. Large numbers of trees are affected by dieback, with problems being particularly evident in isolated, scattered trees and those nearer to riparian zones and floodplains. The Hunter Trust has a number of scientific tree trials designed to determine which species are more dieback-resistant.
- Over 1200 plant species have been recorded, of which around 25% are non-native (introduced) species. The flora of the valley floor is remarkably diverse, and includes numerous species that occur at the limit of their known distribution. It is expected that

the total number of plant species in remnant vegetation of the valley floor will ultimately be about 15-20% of all plant species recorded in New South Wales.

- At least five threatened plant species are expected to occur in the Muswellbrook valley floor area.
- While surveys results are not finalised, a number of areas within the Muswellbrook study area are considered to be significant because of the vegetation they contain. Some of these remnants are located on land that is used for agricultural purposes, military areas, roadsides, riparian areas and some areas designated for open cut mining operations.
- A number of opportunities are likely to exist for the creation of vegetation corridors in locations that will have an important ecological function. Such areas primarily exist on land utilised for agriculture (mainly grazing) and open-cut mining.
- Many landholders are eager to learn about the benefits, uses and appropriate management of remnant vegetation, however are deterred by the limited support available in the area, both in terms of advice and financial support. Council's role in native vegetation management and biodiversity conservation to date has not utilised all possible opportunities.

## 6.2.2 THREATENED AND ENDANGERED SPECIES

The *Threatened Species Conservation Act* (1995) provides for the conservation and recovery of threatened species and makes provision for the management of threats to species under the Act. The Act also introduces extensive community input into management strategies for threatened species conservation.

The Act delineates two categories of threatened species under which specific mechanisms for their protection have been implemented. The categories are:

### 1. Endangered (Schedule 1) – including:

- endangered species;
- endangered populations;
- endangered ecological communities;
- species presumed extinct;

### 2. Vulnerable (Schedule 2) - vulnerable species

Within the Muswellbrook LGA there are currently:

- 12 flora species listed as Vulnerable under Schedule 2 TSC Act;
- 1 flora species listed as Endangered under Schedule 1TSC Act;
- 7 flora species listed as Protected under Schedule 13 (Protected Native flora) TSC Act;
- 12 fauna species listed as vulnerable under Schedule 2 TSC Act;
- 3 fauna species listed as endangered under Schedule 1TSC Act;

## 6.3 PRESSURE

### 6.3.1 PRESSURES ON BIODIVERSITY

There are numerous pressures on the biodiversity, and the following part of the report relates to the pressures on biodiversity within the Muswellbrook Shire Local Government Area. According to NSW NPWS (1999):

*“There are a number of threats to our biodiversity. Some of these result from clearance of native vegetation, pollution, population growth, settlement patterns, excessive resource consumption, fire and the introduction of exotic species.....Loss of biodiversity presents not only a threat to our natural systems, but also has social and economic implications through the impact on industries such as agriculture, forestry, fishing and tourism, and the communities which depend on these industries for their economic and social well-being ”.*

Within the Muswellbrook Shire, the following activities threaten our biodiversity:

- Population growth and settlement
- Habitat change and fragmentation
- Urbanisation
- Development
- Mining
- Feral Animals
- Domestic animals
- Fires

## **6.4 RESPONSE**

### **6.4.1 COMPANION ANIMALS ACT 1998**

The Companion animals legislation came into force on 1 July 1999. This legislation aids in the control of cats and dogs and help ensure that people have their pets registered, and desexed if appropriate.

### **6.4.2 NSW BIODIVERSITY STRATEGY**

The NSW Government released the NSW Biodiversity Strategy on 9 March 1999. It provides a framework for coordinating and integrating government and community efforts to protect and State’s native biodiversity, ensuring that available resources are efficiently and effectively applied.

The strategy highlights the need for a balanced approach to conservation measures for areas both within and outside the reserve system.

### **6.4.3 RECOVERY PLANS / THREAT ABATEMENT PLANS**

Under the Threatened Species Conservation Act, a Species Recovery Plan must be prepared for species listed under Schedule 1 of the Act. There are a number of recovery plans currently being prepared by NSW NPWS for species which are known to occur within the Muswellbrook LGA. The progress of the Recovery Plans will be reported on in future State of the Environment reports.

### **6.4.4 NATIVE VEGETATION CONSERVATION ACT**

The Native Vegetation Conservation Act, came into force on the 1 January 1998 and provides framework for government and community to work together to achieve sustainable native vegetation management. The Act is administered by DLWC, and its main features are:

- *Regional Vegetation Management Plans*  
The RVMP’s are developed by Regional Vegetation Committees and will provide a comprehensive strategy for managing native vegetation, by:

- Identifying areas where native vegetation can be cleared without application;
  - Identify areas where an application to clear will be necessary;
  - Allow clearing exemptions to be developed in accordance with regional requirements;
  - Highlight areas where the condition of native vegetation should be approved;
  - Recommend areas that should be revegetated.
- *Property Agreement*  
A Property Agreement is a voluntary agreement between a landholder and the Department of Land and Water and Conservation outlining the management of native vegetation on an individual property.
  - *Clearing Native Vegetation*  
In areas with an approved RVMP, clearing that is not consistent with the plan will not require development consent. In areas without a RVMP, native vegetation can be cleared if the clearing is consistent with the exemptions in the Act and other clearing restrictions do not apply. Where exemptions do not apply, clearing can only be carried out after an application has been made to the DLWC and development has been granted.

The Native Vegetation Conservation Act provides for the management of native vegetation still evident within our Shire with the objective of conserving native vegetation where appropriate. The Act is a big step towards to the protection of vegetation in areas not conserved (such as National Parks etc).

#### **6.4.5 HUNTER REMNANT VEGETATION PROJECT**

As stated in Section 6.2.1 the Hunter Remnant Vegetation Project has identified the presence of a number of flora species which are rare or threatened. As a result of the findings of the project, areas with significant biodiversity and regional importance may be identified for conservation purposes. A further report on the outcomes of the project will be updated in future comprehensive SoE reports.

#### **6.4.6 SYNOPTIC PLAN**

The Synoptic Plan, is a strategic planning instrument for the future rehabilitation of mine sites within the upper Hunter. The Plan, in the long term, will aid in the protection of biodiversity through the development corridor and linkages for wildlife through previously mined areas which will connect up with natural landscapes. This will aid in the movement of species between habitats and should result in an increase in species diversity within the area.

#### **6.4.7 MUSWELLBROOK TREE PLANTING PROGRAM**

Muswellbrook Shire Council has undertaken a tree planting program throughout 2001/2002 which has resulted in the planting of approximately 320 trees within the parks and gardens of the Muswellbrook Shire. These plants will not only provide aesthetic value to the community, but will additionally provide habitat for birds and other animals.

## 7. WASTE

### 7.1 INTRODUCTION

The average rate of domestic refuse in NSW is about 1.1 tonnes per person per year. This does not include wastes from commercial and industrial premises, service industries or building activities. As the amount of waste being produced in cities and towns increases, the management of waste is becoming increasingly important. There is also a greater realisation of the need to handle and dispose of waste carefully as the environmental implications of poor management practices are becoming apparent.

The topics covered in this section of the report will be broken into solid waste generation and recycling and the activities of the sewage treatment plants in the Shire.

### 7.2 STATE

#### 7.2.1 SOLID WASTE GENERATION AND COLLECTION

Muswellbrook Shire Council is responsible for the collection and disposal of waste within the Shire. Within Muswellbrook Shire Council LGA, there is one Landfill in operation and one Transfer Station.

##### 7.2.1.1 Muswellbrook Landfill

The Muswellbrook landfill is located 2.5km from the centre of Muswellbrook, on the Coal Road. The landfill is located within an unused open cut coal mine void. The Muswellbrook landfill is owned by Muswellbrook Shire Council (MSC) and is operated under contract by JR Richards Pty Ltd. The landfill is licensed by the NSW Environment Protection Authority (EPA) under the Protection of the Environment Operations Act.

##### 7.2.1.2 Transfer Station

Due to the large area of the Muswellbrook LGA, a transfer station has been positioned and established in a location northwest of the town of Denman on the Rosemount Road. The transfer station has been provided for residents who live in the Denman township and the rural areas that surround Denman. The transfer station is manned and open seven days a week from 10am –2pm (excluding Christmas Day and Boxing Day).

**Table 8: Waste Produced in Muswellbrook Shire**

Type of Material	Amount (Tonnes)
Green Waste	2351.12
Glass	119.10
Plastics	69.22
Paper	262.72
Aluminium	2.63
Steel	8.54
<b>Total Recycled</b>	<b>2813.33</b>
Mixed Domestic (landfilled)	11225.58
<b>Waste Diverted from Landfill</b>	<b>25%</b>

## **7.2.2 SEWAGE TREATMENT PLANTS**

Within the Muswellbrook LGA there are two sewerage treatment plants; the Muswellbrook Treatment Plant and the Denman Treatment Plant. These plants are operated by Muswellbrook Shire Council, approved by the Department of Public Works and licensed by the Environment Protection Authority.

### **7.2.2.1 Muswellbrook Sewage Treatment Works**

The Muswellbrook sewage treatment works services an area of approximately 2196ha, with a population of approximately 12 300 residents. Waste from a total of 3704 single and 147 multiple residential dwellings and 268 non-residential premises are treated by the Muswellbrook Treatment Plant.

In past years the treated effluent would then progress through a mini-wetland system to Ramrod Creek, and then eight kilometres to the Hunter River. Since April 1997 the effluent has been 100% recycled with 15% of the total effluent being used on the Muswellbrook Golf Course (the effluent is filtered and chlorinated before being pumped for reuse). The remaining 85% of the effluent is pumped to Mount Arthur Coal where the effluent progresses through a managed wetland before it is used in their day to day operations, including dust suppression on haul roads and use in the coal preparation and handling plant.

### **7.2.2.2 Denman Treatment Plant**

The Denman sewage treatment works services an area of approximately 653.6 ha, with a community of approximately 1437 residents. A total of 491 single and 24 multiple residential and 48 non-residential premises are connected to the Denman Treatment Plant.

The treated effluent is then pumped to a holding dam on the Denman Recreation area where it is used to irrigate the Denman golf course and sporting fields.

## **7.3 PRESSURE**

### **7.3.1 WASTE GENERATION**

Waste generation is the largest pressure on the environment, with all outputs from activities carried out contributing to the landfill. Waste generating activities require modification to reduce the resources being used, reusing all materials that are able to be, and recycling all material in one way or another before the product is labelled futile and enters landfill.

Reducing resource consumption is essential to minimising wastes produced by society. It is essential that a reduction in the rate, at which natural resources are being depleted, to manufacture products, is gained to minimise the impacts on the environment, not only through using the resource but also dealing with the waste after the products are used. Product design and packaging is required to be changed to ensure that resource consumption is minimised, in turn reducing the waste created.

### **7.3.2 INCORRECT DISPOSAL OF WASTES**

Incorrect disposal of wastes is another large pressure on the environment, and it is difficult to monitor and access. Illegal dumping of wastes not only leads to the littering of the area affected but may also lead to pollution of waterways and contamination of land. Due to the large area that the Shire covers it is difficult to police illegal dumping or the incorrect disposal

of wastes, and Council usually deals with incorrect disposal events in response to complaints received.

## **7.4 RESPONSE**

### **7.4.1 CLEAN UP AUSTRALIA DAY**

Clean up Australia Day 2002 was very successful in Muswellbrook Shire, with approximately 300 volunteers participating in the Clean-up throughout the Shire at a number of locations within Muswellbrook, Denman and Wybong. The clean up also targeted the removal of dumped car bodies within the Muswellbrook Common and at the bottom of Denman Lookout.

### **7.4.2 COMPOST PRODUCTION**

In a quest to reach the 60% reduction of wastes entering landfill, Muswellbrook Council has been working on the production of compost, for commercial sale to business and community members. The compost is a result of combining sewage biosolids from the Muswellbrook Sewage Treatment Plant, and green waste collected at the Muswellbrook landfill.

The total amount of green waste processed at Council's waste depot equalled 4400m<sup>3</sup>. This was mixed with approximately 31.2 tonnes of heated biosolid material. The composted product was applied to mine rehabilitation areas and used as a soil conditioner. The application of biosolid and composted material can have a beneficial effect in the re-establishment of ecosystems as biosolids can be made up of up to 6% organic matter.

### **7.4.3 WATER REUSE SCHEMES – BAYSWATER AND DENMAN**

During the 2001/2002 financial year Council has prevented effluent being discharged into the Hunter River from both Denman and Muswellbrook sewerage treatment plants through the use of effluent reuse schemes as previously discussed in this report.

### **7.4.4 ENVIRONMENTAL MONITORING AT THE WASTE DEPOT**

Council undertakes numerous environmental monitoring at the landfill to ensure the landfill is operating in an environmentally sensitive manner. Such monitoring includes the monitoring of groundwater from three bores within the landfill DA area, monitoring of the leachate sump for leachate generated at the landfill through the filtration of water through the disposed waste (the water becomes contaminated by the waste and is thus termed leachate), and the monitoring of methane gas, which is typically emitted at landfill sites as a result of the degradation of waste.

### **7.4.5 PAPER RECYCLING**

Council's Administration Centre still participates in a paper recycling scheme. The scheme ensures that all paper that is used in the Administration Building is reused in cases where it is able to be, and recycled after it is used.

The program was introduced in March 1998, and with the introduction of the program, the cost of waste disposal for the centre has been reduced. The program has been working very efficiently and successfully with approximately three-quarters of the waste produced by the centre being diverted from entering landfill, and now is recycled into quality paper products.

## **8. NOISE**

### **8.1 INTRODUCTION**

Noise can be defined as ‘undesirable sound’ and when it intrudes on activities is considered to be noise pollution. Noise can have a number of undesirable effects depending upon its intensity, frequency, duration and the time of day when it occurs. It can be annoying, interfere with relaxation and with sleep, reduce enjoyment of activities and conversation, and prevent people from carrying out tasks satisfactorily. Noise can impact adversely on health by causing tension, headaches and fatigue and permanent hearing loss over time.

The results of an Australian wide survey by the Australian Environment Council showed the following noise sources, ranked in descending order as the most annoying:

- barking dogs
- Machinery
- Roosters/chickens
- Mine Blasts
- Other

The pressure of noise on community members is increasing as the population and subsequent development increase in our environment. According to the EPA (1997) “noise pollution can be defined as unwanted or offensive sounds that unreasonably intrudes into our daily activities.”

The EPA (1997) explains there are a number of factors which are contributing to the problem of high levels of noise which include:

1. the increase in population, especially where it leads to increasing urbanisation and urban consolidation
2. the increase in volumes of road, rail and air traffic; and
3. an increase in industrial developments.

Effective control of noise on the environment is a difficult issue for the community and regulatory agencies due to the subjective nature of the definition of offensive noise and the difficulty of assessing noise monitoring results and the actual source of the noise.

### **8.2 STATE**

#### **8.2.1 NOISE COMPLAINTS**

Noise levels within the Muswellbrook Shire are a significant concern to Council particularly with regard to ‘background creep’ which can occur in areas where heavy industry such as coal mining is located. The sensitivity of residents to noise, particularly from industrial sources, is increasing as the number of mines increase and their proximity to residents becomes closer.

The number of noise specific complaints received by Council has increased since the previous reporting period. During the 2001/2002 financial year, 87 noise complaints were received by Council. The increase in noise complaints may be due to the higher density of housing that has resulted from increases in rental property demand. Barking dogs was the most complained about noise problem indicating typical problems associated with higher density residential developments

It should be noted that the total number of noise complaints received by Council is actually higher than the numbers outlined in the report indicate. This is due to not all complaints being recorded in the complaints register due to the complainants not wanting to lodge an official complaint.

### **7.2.2 INDUSTRIAL NOISE**

A number of complaints received by Council relates to mining operations and associated operations and facilities. The complaints received were usually associated with episodic and infrequent noise events that resulted in disturbing residents from sleep at night, or distracted residents concentration during the day.

The majority of the EPA received noise complaints relate to noise generation from mining operations or industrial activities within the Shire, where the EPA is the regulatory authority for the noise aspect of the operation / activity, that was in question. These noise complaints were generally for noise from everyday mining operations and blasting events.

Council has received no noise complaints from Industrial activities and only three relating mining operations, specifically mine blasting, this may be associated with the strategic positioning of the industrial estate within the Shire.

### **7.2.3 RESIDENTIAL NOISE**

As communities become more urbanised and industries expand, noise can increasingly intrude on our lifestyles and have an adverse impact on the environment.

It should be noted that not all noise complaints can be suitably recorded and acted upon because the complainant often does not like to leave their names and contact numbers. In a majority of cases the matter involves the seeking of information on time restrictions on certain activities.

### **7.2.4 TRANSPORT NOISE**

Transportation noise is another major source of noise within the Shire. These major sources include the New England Highway and the Great Northern Railway. The majority of the noise complaints received regarding transport are related to coal train noises.

The traffic on both the New England Highway and the Great Northern Railway effect the township due to the routes which runs right through the centre of Muswellbrook's Urban Area.

## **7.3 PRESSURE**

### **7.3.1 EFFECTS ON INCREASING INDUSTRIAL ACTIVITIES**

As the number and size of the industrial developments throughout the shire increase, in particular the number and operational capacity of coal mining developments, the number of people affected by noise may increase.

### **7.3.2 INCREASE IN POPULATION**

As the population of the area increases, and urbanisation increases as a result, residential areas encroach into noisy areas such as central business districts and industrial areas. Also, with increased population there is an increase in traffic and transportation of products. The end result of an increase in population is an increase in noise created and therefore an increase in noise complaints received.

## **7.4 RESPONSE**

### **7.4.1 COUNCILS GENERAL RESPONSE TO NOISE COMPLAINTS**

Council has a service request system in place which provides residents in the LGA with a response to a noise complaint, after Council Officers have carried out the procedure process. The procedure process usually involves carrying out the following:

- Taking down the full details of the service request from the resident, including the Event Location, details of the person who called (name, address, phone number), and Reasons for calling (event details).
- The service request is then passed along to the appropriate officer (Environment Officer or Ranger usually).
- The Officer investigates the complaints and contacts the person who was responsible for the event (noise episode), and advises the person of correct procedures and associated legislation relating to the activity carried out.
- When the issue is resolved the Officer calls the person who submitted the service request or complaint, to provide outcomes of the procedure.
- The service request is then signed off and dated, and logged into the computer system and filing system.
- Conditions of Development Approval for coal mines include that the mine provide a complaint mechanism whereby they provide 24-hour environmental telephone hotline service to receive complaints. This has substantially reduced the number of coal mining related noise complaints received by Council.

### **7.4.2 ENVIRONMENTAL NOISE CONTROL MANUAL (ENCM)**

The EPA released the Environmental Noise Control Manual (ENCM) in 1985. The manual is comprised of noise control policies and procedures which recognise the potential for noise pollution to occur, our subjective and emotional response to it and the diversity of agencies able to achieve control. The manual was the first of its type for the control of noise within communities, including noise associated with specific sources, such as motor sport, public address systems, sporting activities, shooting ranges etc.

The manual aimed to facilitate the most effective use of the control resources available, and encouraged practicable and equitable solutions to noise problems.

The ENCM is currently being replaced by the “Environmental Management Series”. The previous Road traffic noise and industrial noise sections of the ENCM have already been replaced with the ‘NSW Industrial Noise Policy’ and the ‘Environmental Criteria for Road Traffic Noise’.

Council still uses and refers the community to the limits imposed on the operation of certain articles during specific hours as detailed in the ENCM. There are times during which restrictions apply to the operation of certain articles (for example: amplified sound equipment,

domestic air conditioners, lawnmowers, motor vehicles etc) if noise emitted from the article can be heard in a room of another dwelling.

#### **7.4.3 NSW INDUSTRIAL NOISE POLICY**

The NSW Industrial Noise Policy replaces chapters 19, 20, 21 and 82 of the Environmental Noise Control Manual (except for the sleep disturbance section in chapter 19). The Policy seeks to promote environmental well-being through preventing and minimising noise by providing a framework and process for deriving noise limit conditions for consents and licences.

The Policy came into force in January 2000. The assessment of potential noise impacts from industrial facilities and activities are required to be undertaken in accordance with the Policy.

#### **7.4.4 ENVIRONMENTAL CRITERIA FOR ROAD TRAFFIC NOISE**

The Environmental Criteria for Road Traffic Noise replaced chapter 157 of the Environmental Noise Control Manual and was released by the EPA in June 1999. The environmental criteria for road traffic noise aims to institute a more comprehensive and effective approach to managing road traffic noise.

#### **7.4.5 PUBLIC ENTERTAINMENT LICENCES**

During the 2001/2002 financial period 12 annual public entertainment licences were issued by Muswellbrook Council to places of public entertainment within the Shire. The annual licences provide conditions relating to the noise levels acceptable for functions in relation to particular days and times. Council reviews licences and facilities on an annual basis.

#### **7.4.6 NOISE MONITORING**

All mining operations within the Muswellbrook Shire Council carry out their own noise monitoring. Council receives results of this monitoring on a monthly basis for some mines and for others the noise results are provided in the Mining Companies' annual environmental management report. Industry is being made more aware of its responsibility in the noise control requirements and appropriate conditions are being placed on development consents to address the problems. The conditions imposed on the operations/activities attempt wherever possible to, reduce noise levels at the source, regulate the times of occurrence and install barriers between the noise source and the receiving environment.

## 9. ABORIGINAL HERITAGE

### 8.1 ABORIGINAL HERITAGE AND CULTURE

A detailed account of the heritage and culture of the Aboriginal people in the Muswellbrook Shire can be found in the 1999/2000 State of the Environment Report.

### 8.2 STATE

#### 8.2.1 ABORIGINAL SITES AND RELICS

There are currently 1105 known Aboriginal site features within the Muswellbrook LGA. These sites, detailed below, are recorded on the NSW National Parks and Wildlife Service's Aboriginal Sites Register. The sites include:

**Table 9: Aboriginal Sites and Relics**

<i>Site Feature</i>	<i>Number of Sites</i>
Aboriginal Resource and Gathering	0
Aboriginal Ceremony and Dreaming	1
Art (Pigment or Engraved)	11
Artefact	1061
Burial	3
Ceremonial Ring (Stone or Earth)	1
Conflict	0
Earth Mound	1
Fish Trap	0
Grinding Groove	6
Habitation Structure	0
Hearth	0
Non-Human Bone or Organic Material	0
Ochre Quarry	1
Potential Archaeology Deposit (PAD)	0
Shell	1
Stone Arrangement	2
Stone Quarry	3
Modified Tree (Carved or Sacred)	14
Water Hole	0
<b>Total Number of Features</b>	<b>1105</b>

## **8.3 PRESSURE**

### **8.3.1 IMPACTS ON ABORIGINAL HERITAGE AND CULTURE IN THE MUSWELLBROOK SHIRE**

The major impacts on Aboriginal sites, heritage and culture in the Muswellbrook Shire are: -

#### **1. Proposed Land Clearing for Agricultural Purposes**

The clearing of land for agricultural purposes would have a destruction rate of approximately 98% for Aboriginal sites and relics.

#### **2. Open Cut Coal Mines**

Within any one area proposed for an open cut coal mine in the Muswellbrook Shire, you have a destruction rate of approximately 98% for Aboriginal sites and relics.

#### **3. Proposed Housing Subdivisions**

Within any one area proposed for a housing subdivision, you have the destruction rate of approximately 90% for Aboriginal sites and relics.

#### **4. Proposed Sand and Gravel Extraction**

Areas proposed for sand and gravel extraction along rivers and creeks would have a destruction rate of 90% for Aboriginal sites and relics.

Other minor impacts on Aboriginal sites and relics are: -

- ◆ Proposed roads
- ◆ Proposed telecommunications cable laying and towers
- ◆ Proposed Shire Developments
- ◆ Proposed electrical towers and poles
- ◆ Proposed underground coal mines.

## **8.4 RESPONSE**

### **8.4.1 VOLUNTARY CONSERVATION AGREEMENTS**

Whilst there are currently no conservation agreements in place within the Muswellbrook Shire, management of the Mt Arthur Coal Open Cut coal mine are currently in negotiations with NSW NPWS for the establishment of two proposed conservation agreements. These will be the first areas designated as Aboriginal conservation areas within the Shire. The management of these areas will be undertaken in conjunction with NSW NPWS and local Aboriginal people.

#### **8.4.2 SECTION 90 – NATIONAL PARKS AND WILDLIFE ACT**

Aboriginal sites in New South Wales are protected under Section 90 of the National Parks & Wildlife Service Act 1974. This protection covers all sites, regardless of who owns the land and makes it an offence to knowingly damage, destroy or deface an Aboriginal Site or Aboriginal Place without prior written consent of the Director of the National Parks & Wildlife Service of NSW.

#### **8.4.3 DEVELOPMENT ASSESSMENT**

Development Applications involving local Aboriginal interest are referred to the National Parks and Wildlife Service for consideration and comment. Any applications that involve the destruction or removal of Aboriginal artefacts are dealt with through the Integrated Development Approval process under the Environmental Planning and Assessment Act, 1979.

## 10. NON ABORIGINAL HERITAGE

### 9.1 ABORIGINAL HERITAGE IN THE MUSWELLBROOK SHIRE

Muswellbrook Shire has a long history of European settlement, during which substantial changes have been made and are continuing to be made to both townscapes and rural landscapes.

The Conservation of Heritage items in the Muswellbrook Shire Local Government Area is essential to preserving the history of the region.

### 9.2 STATE

#### 9.2.1 THE STATE OF NON-ABORIGINAL HERITAGE

Within Muswellbrook Shire Council's Local Government Area different authorities have recognised many cultural items of environmental heritage as being worthy of statutory protection and other conservation action by public bodies. The *Register of the National Estate* lists 39 (possibly 40) historic sites as well as one indigenous site and 3 (possibly 4) natural sites. The *Register of the National Trust of NSW (NSW)* lists 57 'items' (including 3 urban conservation areas, 2 landscape conservation areas and 4 cemeteries). The Royal Australian Institute of Architects' *Register of Twentieth Century Buildings of Significance* lists 31 items within the Shire.

The *Hunter REP (Heritage) 1986* (which prevails over the *Muswellbrook LEP 1985*) gives statutory protection to 26 regionally significant, 23 locally significant items of environmental heritage (all of which are of European cultural significance) and two urban Conservation Areas. This REP lists also 32 other items, which were listed as requiring further investigation' (it is not known whether these items were included in a 1995 review of this REP). The NSW Heritage Council has listed one item under s130 of the *Heritage Act 1977* and 7 items which have Permanent Conservation Orders over them as being 'of state significance'. The State, Regional and Local items of heritage significance within the Muswellbrook Shire are detailed in Appendix 2.

The Shire contains parts of two National Parks, the Wollemi and the Goulburn National Parks, which contain items of cultural as well as aboriginal and natural items of heritage significance.

**Table 10 – Historic Listed Heritage Sites**

Historic Site	Location
Baerami Homestead,	300 Baerami Creek Rd, Baerami,
Balmoral,	310 Denman Rd, Muswellbrook,
Barber Shop (former),	7 Sydney St, Muswellbrook,
Birrallee,	33 Brentwood St, Muswellbrook,
Brighton Villa,	12 Hunters Tce, Muswellbrook,
Denman Courthouse (former),	Palace St, Denman,
Eatons Hotel Group,	164-188 Bridge St, Muswellbrook,
Eatons Hotel,	180-188 Bridge St, Muswellbrook,

Hennor and Garden,	3 Lorne St, Muswellbrook,
House - St Vincent De Paul Shop,	174-176 Bridge St, Muswellbrook
House and Former Shop,	164-166 Bridge St, Muswellbrook,
House,	178 Bridge St, Muswellbrook,
Hunter River Road Bridge,	Kayuga Rd, Muswellbrook,
Loxton House,	142-144 Bridge St, Muswellbrook,
Merton Cottage,	4883 Jerrys Plains Rd, Denman,
Overdene,	79 Bengalla Rd, Muswellbrook,
Pickering and Outbuildings,	221 Mangoola Rd, Denman,
Police Station,	William St, Muswellbrook,
Presbyterian Church (original building),	Hill St, Muswellbrook,
Presbyterian Manse (former),	106 Hill St, Muswellbrook,
Railway Cottage and Adjacent Fig Tree,	27 Brook St, Muswellbrook,
Railway Hotel,	10-14 Market St, Muswellbrook,
Railway Station,	Market St, Muswellbrook,
Royal Hotel (former),	1 Sydney St, Muswellbrook,
Shop (former),	172 Bridge St, Muswellbrook,
Skellatar,	Tindale St, Muswellbrook,
St Albans Anglican Church & Grounds,	Brook St, Muswellbrook,
St Albans Precinct,	Brook St, Muswellbrook,
St Albans Rectory,	Brook St, Muswellbrook,
St Albans Sunday School,	15 HuntersTce, Muswellbrook,
St James Catholic Church,	4 Brook St, Muswellbrook,
St Johns Presbyterian Church Precinct,	Hill St, Muswellbrook,
St Johns Presbyterian Church,	Hill St, Muswellbrook,
St Matthias Anglican Church,	23-25 Palace St, Denman,
Weidmann Cottage (former),	132-134 Bridge St, Muswellbrook,

**Table 11 – Natural Listed Historic Sites**

<b>Natural Site</b>	<b>Location</b>
Goulburn River National Park,	Kerrabee Rd, Sandy Hollow,
Manobalai Nature Reserve (1978 boundary),	Dry Creek Rd, Wybong,
Wollemi National Park (1980 boundary) ,	The Putty Rd, Singleton,

The *Hunter REP (Heritage) 1986* (which prevails over the *Muswellbrook LEP 1985*) gives statutory protection to 26 regionally significant, 23 locally significant items of environmental heritage (all of which are of European cultural significance) and two urban Conservation Areas. This REP lists also 32 other items, which were listed as requiring further investigation' (it is not known whether these items were included in a 1995 review of this REP). The NSW Heritage Council has listed one item under s130 of the *Heritage Act 1977* and 7 items which have Permanent Conservation Orders over them as being 'of state significance'. The State, Regional and Local items of heritage significance within the Muswellbrook Shire are detailed in Appendix 2.

Of the abovementioned items, three have been approved for demolition due to condition/safety or for redevelopment purposes.

The Shire contains parts of two National Parks, the Wollemi and the Goulburn National Parks, which contain items of cultural as well as aboriginal and natural items of heritage significance.

## **9.3 PRESSURE**

### **9.3.1 PRESSURES ON HERITAGE**

Many identified items of heritage value are under threat from neglect, inappropriate alterations or unsympathetic development in their vicinity. Development pressures on items of environmental heritage and on heritage conservation areas include those from:

- Mining – including blasting / vibration, dust deposition and visual impacts;
- Traffic (such as on the New England Highway which passes through Muswellbrook);
- Subdivision;
- Urban change and infill;
- Development – such as the upgrading / renovation of heritage buildings; and
- Market/Commercial interests.

## **9.4 RESPONSE**

### **9.4.1 HERITAGE PLANS**

Council is preparing a draft Heritage Local Environmental Plan and a Heritage Development Control Plan with the assistance of the Heritage Office, Council's Heritage Advisor and Council's Heritage Committee (which incorporates Councillors, staff, community representatives and members of the Muswellbrook Historical Society). To form the basis of the draft LEP amendment and draft DCP a detailed heritage study by EJE architects (Muswellbrook Shire Wide Heritage Study 1996) is being used subject to alterations by the Heritage Committee.

Progress to date since Council resolved to undertake the draft LEP amendment and draft DCP includes refinement of the items and descriptions thereof, conservation areas, listing of items for further investigation and items of potential archaeological interest, detailing of how development is to be assessed in terms of the items and the Environmental Planning and Assessment Act, 1979, and the protection/maintenance of heritage items.

Council has resolved to proceed with the draft Heritage amendment to the LEP and the development of a Heritage DCP, with a notification of the resolution being forwarded to Planning NSW. In addition, consultations with Government Agencies have also been initiated. It is anticipated that by June/July 2003 the draft LEP and draft DCP will have been adopted.

### **9.4.2 IMPLEMENTATION OF THE HERITAGE STUDY**

In terms of the above, Council uses the Hunter REP 1989 and Section 79(c) for assessment purposes under the Environmental Planning and Assessment Act, 1979. As Council has a draft Heritage LEP and DCP, items included in the draft lists are to be considered under Section 79(c)(a)(ii) when determining a development application.

With regard to developments where heritage matters are apparent but the site is not listed in the Study, those matters are still to be considered and addressed in Section 79(c)(b) 'Heritage' of the Environmental Planning and Assessment Act, 1979, as stipulated by Planning NSW.

### **9.4.3 APPOINTMENT OF HERITAGE ADVISOR**

Council continues to engage a Heritage Advisor to advise on matters to do with the drafting of the draft Heritage amendment to the Muswellbrook LEP 1985 and the draft Heritage Development Control Plan. The Heritage Advisor also provides comments in relation to development applications, enquiries and proposals. The Advisor visits Council once every two months for on-site inspection, attendance at and providing advice to the Heritage Committee.

During the past twelve (12) months improvements have been made in raising the public awareness of the Heritage Advisor and the advisory service. Increases in pre-development enquiries have occurred as a result of the raised awareness, which reduces complications down the track when considering development applications involving heritage items/matters.

## **11. LIMITATIONS**

Opinions and recommendations contained in this report are based upon data provided by employees or representatives of Muswellbrook Shire Council and the information gained from contacts with relevant government authorities and other organisations.

This report addressed the current State of the Environment in Muswellbrook Shire as at June 2002, based on relevant in-house information which was available at that time.

This supplementary State of the Environment Report has been prepared for the purpose described solely in the Local Government Act 1993 (NSW) for the Minister for Local Government and no responsibility is accepted for use of any part of this report in any other context or for any other purpose.

For detailed maps pertaining to the State of the Environment in the Muswellbrook Shire, please refer to the 1999/2000 Comprehensive State of the Environment Report.