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Roads and
Traffic
Authority,
NSW



Commonwealth
Department of
Transport and
Regional Services

TARCUTTA TRUCK CHANGEOVER FACILITY

Environmental,
Social and
Economic Study

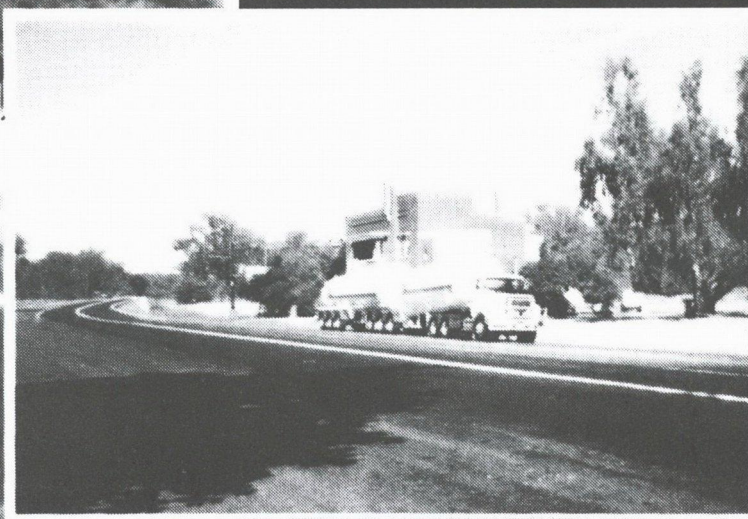


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PREPARATION, REVIEW AND AUTHORISATION

Project Name: Tarcutta Truck Changeover Facility
Environmental, Social and Economic Report

Project No.: 31832.001

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Signature: 

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Date: 24/02/99

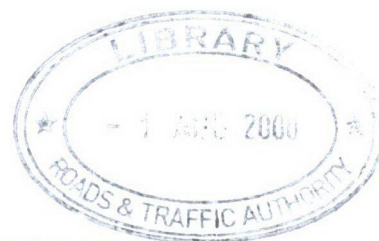
Reviewed by: Jan Parsons

Signature: 

Position: Environmental Manager, Australia

Date: 24/02/99

This report was prepared in accordance with the scope of services set out in the contract between SMEC Australia Pty Ltd (SMEC) and the Client. To the best of SMEC's knowledge the proposal presented herein reflects the Client's intentions when the report was printed. In preparing this report, SMEC relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations referenced herein. Except as otherwise stated in this report, SMEC has not undertaken further verification regarding the accuracy or completeness of these information sources.





EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Background

Tarcutta, a small rural village, is one of the last remaining towns through which the Hume Highway passes. It is strategically positioned approximately halfway between Melbourne and Sydney in both time and distance. The Roads and Traffic Authority (RTA) advised that there are currently no plans to bypass Tarcutta as part of the upgrade to the Hume Highway.

As the Hume Highway is the most heavily used freight route in Australia (Value Management Study 1996), there is a significant demand for rest areas and areas for the exchange of heavy vehicles. There is a regulatory requirement that truck drivers stop for a minimum of 30 minutes every five hours. Tarcutta is approximately five hours from both Melbourne and Sydney. The demand for truck parking in the village greatly exceeds the number of available parking bays. This results in trucks being parked in residential streets or parked at other sections of the highway which do not contain ancillary facilities such as eating houses and amenities. In addition, the present arrangement does not provide for adequate parking for B-doubles (two semi-trailers towed by a single truck) or any other larger vehicles.

As a consequence of these constraints and the outcomes of the Value Management Study (VMS) the RTA engaged SMEC Australia to conduct an environmental assessment and comparison of three options. These are:

- the "Do Nothing" option;
- the Town Centre option; and
- the Northside option.

The Proposal

The Do Nothing option involves maintaining the existing arrangements. This consists of 20 truck parking bays located adjacent to the Hume Highway within the town of Tarcutta. The current situation is one of:

- insufficient parking bays;
- high volumes of truck movement within residential areas, particularly at the early hours of the morning, leading to congestion and noise problems;
- unsafe manoeuvring; and
- the risk of trucks with hazardous loads parking and/or manoeuvring within residential areas.

The Northside option covers a land area of approximately seven hectares. All amenities and facilities will have to be provided on the site due to the distance from the town centre. The conceptual plan provides for:

- a 2,000 square metre shop, restaurant and amenities area, 1,000 square metres of awning area and a 200,000 litre storage for fuel;
- approximately 70 car parking spaces for light vehicles, caravans etc;
- approximately 157 B-double truck parking spaces;

- a 350 m² amenities and shelter building; and
- the upgrading and use of an existing dam for pollution control and detention basin.

The design of the Town Centre option assumes that the town's existing cafés and service station will provide restaurant and fuel facilities. The site is 4.3 hectares in area and will accommodate:

- parking for 52 semi-trailers and 72 B-doubles;
- a total of 16 shower/toilet cubicles (assumes one cubicle per ten spaces) disbursed evenly over the site;
- approximately 80 m² of constructed shelter;
- an accessway from the facility to the cafés on Hume Highway; and
- a pollution control pond constructed within 50 metres of Tarcutta Creek.

The site has capacity for future expansion accommodating an additional 35 B-doubles (a total extra area of 1.1 hectares).

Consultation

The local community, trucking industry and government agencies were consulted during the preparation of this report. Consultation involved two workshops with representatives from the community, transport industry and Local, State and Commonwealth Government. Individual interviews were held with directly affected residents and businesses. Newsletters were distributed to all households in and around Tarcutta and a media release was placed in the Wagga Wagga Daily Advertiser to advise the wider community of the study.

Government agencies were also consulted by letter.

Environmental Assessment

Environmental issues associated with the development of each of the options were identified from consultation with government agencies, the value management study, public consultation undertaken by the RTA and from a workshop conducted on 30 April 1998.

The economic viability of the town and the funding of either option were identified as the dominant issues.

The findings of the study are summarised in the following pages.

i Legislative Requirements

Amendments to Wagga Wagga Council Local Environmental Plan 1991 are required to accommodate the facility at either new option.

The Department of Land and Water Conservation (DLWC) has undertaken preliminary investigations and determined that native title has not been extinguished at either site and may continue to exist. An application will need to be submitted to

the Native Titles Tribunal to determine whether there is any native title interest in either site.

ii Biological and Physical Environment

Soils. The Northside option's soils have a very high erodibility and will require special consideration during design and construction. Despite the relatively low slope gradients, there is a high to very high erosion risk at the site.

Hydrology, Groundwater and Water Quality. The Town Centre option is partly located in the 1 in 100 year flood inundation zone. During major flood events this site would be expected to experience flooding. The site western boundary is only 50 metres from Tarcutta Creek.

The main risk to groundwater quality from a truck changeover facility would be an on-site chemical spill during facility operation. Risks are similar for either new option. The Do Nothing option poses greater risk as there are no spill containment facilities.

The buffer between the western boundary of the Town Centre option and Tarcutta Creek is only 50 metres. There is greater potential for impact from site run-off without control. Controls are possible at either new site although may be easier to construct on the Northside option.

As for groundwaters, the Do Nothing option has no controls over run-off from truck parking and may pose the greatest potential for downstream affects.

Flora and Fauna. Neither option will have significant effects on terrestrial flora and fauna.

Visual Assessment. Owing to the open and partly elevated nature of the Northside option, it is anticipated that changes to this landscape would be more apparent. An aspect of significance of the Tarcutta townscape is the abrupt transition between the town and the surrounding expansive pastoral land. The development of the Northside option would detract from an appreciation of this transition and compromise an important part of the traditional setting of the township.

Visual mitigation measures will be difficult to implement under the Northside option. Mitigation measures will be easier to implement under the Town Centre option.

iii Human Environment

Archaeology and European Heritage. Neither new proposal will significantly affect any heritage items or archaeological resources.

Noise. Noise barriers and other noise mitigation measures are required for both new options.

Air Quality. Air quality will not exceed EPA requirements for any option.

Access. Modification to the existing highway design is required for both new options. However, the extent of works is greater for the Northside option.

Dangerous Goods. Assuming the same level of facility provision is provided at both the Northside option and the Town Centre option, there are fewer likely impacts at

the Northside option. The Do Nothing option poses the most risk as it is largely uncontrolled.

Social Impacts. The major constraint to the development of the Northside option is the social impact associated with economic decline and the loss of social capital. These issues are significant, as it is not possible to mitigate against factors such as loss of investment in business, higher incidence of social isolation, decline in community services, relocation costs and depletion of social capital.

Another major limitation of the Northside option is the lack of alternative food choices for drivers. The likelihood is that the Northside option will be developed by a single company. Without competition, the company, rather than the drivers, dictate the menus. Consideration will need to be given to providing alternative healthy menus.

The major constraint to the development of the Town Centre option is the issue of residential amenity. Due to the number of residences in proximity there is greater likelihood of impacts from noise and lighting. In addition, a number of properties will need to be acquired as well as the potential need to relocate existing sporting facilities.

Economic Impact. The Northside option would create significant retail and restaurant competition outside the town area and would threaten the viability of many of the existing town businesses that rely on truck and passing trade. The operators of the existing businesses are unlikely to move their businesses to the new facility, even if this were possible, as it would involve significant additional new investment and a loss of the original investment in their current operations.

The other major limitation to the Northside option is the question of whether its development is economically feasible. A similar constraint applies to the Town Centre option although its total cost is lower. There is also a need to ensure that the beneficiaries of the project pay for both its capital and maintenance costs. Achieving this may be difficult for the Town Centre option as it is existing businesses that benefit.

Comparative Study

The purpose of the study is to identify the opportunities and constraints of each site and compare all options. Both options are feasible but the Northside option has the potential to have a detrimental impact on the economic development of the town (in turn affecting community cohesion and social capital) and the visual quality of the area. The Town Centre option has the greater propensity to impact on residential amenity and the environment. In terms of road safety both options are feasible. It is easier to mitigate against the impacts from the Town Centre option than the Northside option.

The greatest constraint for both these options is the funding of the facility. The feasibility of developing the Northside option needs to be determined. Identification of funding sources for the Town Centre option is required together with an estimate of the proportion of funding that can be made available through sponsorship, levies, contributions from the private sector and the government (both Federal and State). This information is required before the preferred option can be determined.



PART A

Environmental, Social and Economic Assessment

1 INTRODUCTION

1.1 BACKGROUND

The Hume Highway (State Highway No 2) links Sydney and Melbourne, and forms part of the National Highway System. The Federal Government has the long-term objective of upgrading the Hume Highway to a consistent dual carriageway standard between Sydney and Melbourne. To date this upgrade has resulted in a number of towns being bypassed. This highway forms a vital commercial, recreational and freight link between the two cities.

Tarcutta, a small rural village, is one of the last remaining towns through which the Hume Highway passes. It is strategically positioned approximately halfway between Melbourne and Sydney in both time and distance. *Figure 1.1* shows the location of Tarcutta in relation to Wagga Wagga. The Roads and Traffic Authority (RTA) advised that there are currently no plans to bypass Tarcutta as part of the upgrade to the Hume Highway.

As the Hume Highway is the most heavily used freight route in Australia (Value Management Study 1996) there is a significant demand for rest areas and areas for the exchange of heavy vehicles. There is a regulatory requirement that truck drivers stop for a minimum of 30 minutes every five hours. Tarcutta is approximately five hours from both Melbourne and Sydney and it provides a strategic position for a facility, which will accommodate the needs of the transport industry. The demand for parking in the village greatly exceeds the number of available parking bays. This results in a number of trucks being parked illegally in residential streets or on the highway kerbside. To further exacerbate the situation other sections of the highway do not contain ancillary facilities such as eating houses and amenities. In addition the present arrangement does not provide for adequate parking for B-doubles or any other larger vehicles.

The current situation within Tarcutta is one of:

- insufficient parking bays;
- high volumes of truck movement within residential areas, particularly in the early hours of the morning, leading to congestion and noise problems;
- unsafe manoeuvring; and
- the risk of hazardous loads within residential areas.

In response to these issues the Director, Land Transport Policy Division, directed the RTA's Director, southern region, to develop a truck interchange facility at Tarcutta. To facilitate this objective the RTA commissioned the Department of Public Works and Services, Strategic Management Branch (SMB) to undertake a Value Management Study (VMS). This work was undertaken on behalf of the Federal Department of Transport and Regional Development (DoTRD). The objective of that study was to determine the type of facility that would be required to accommodate the needs of the transport industry. The VMS was held on the 16 and 17 May 1996.

To provide background information to the VMS, traffic counts were undertaken by the RTA over a two-week period in April 1996. In addition Taverner Research

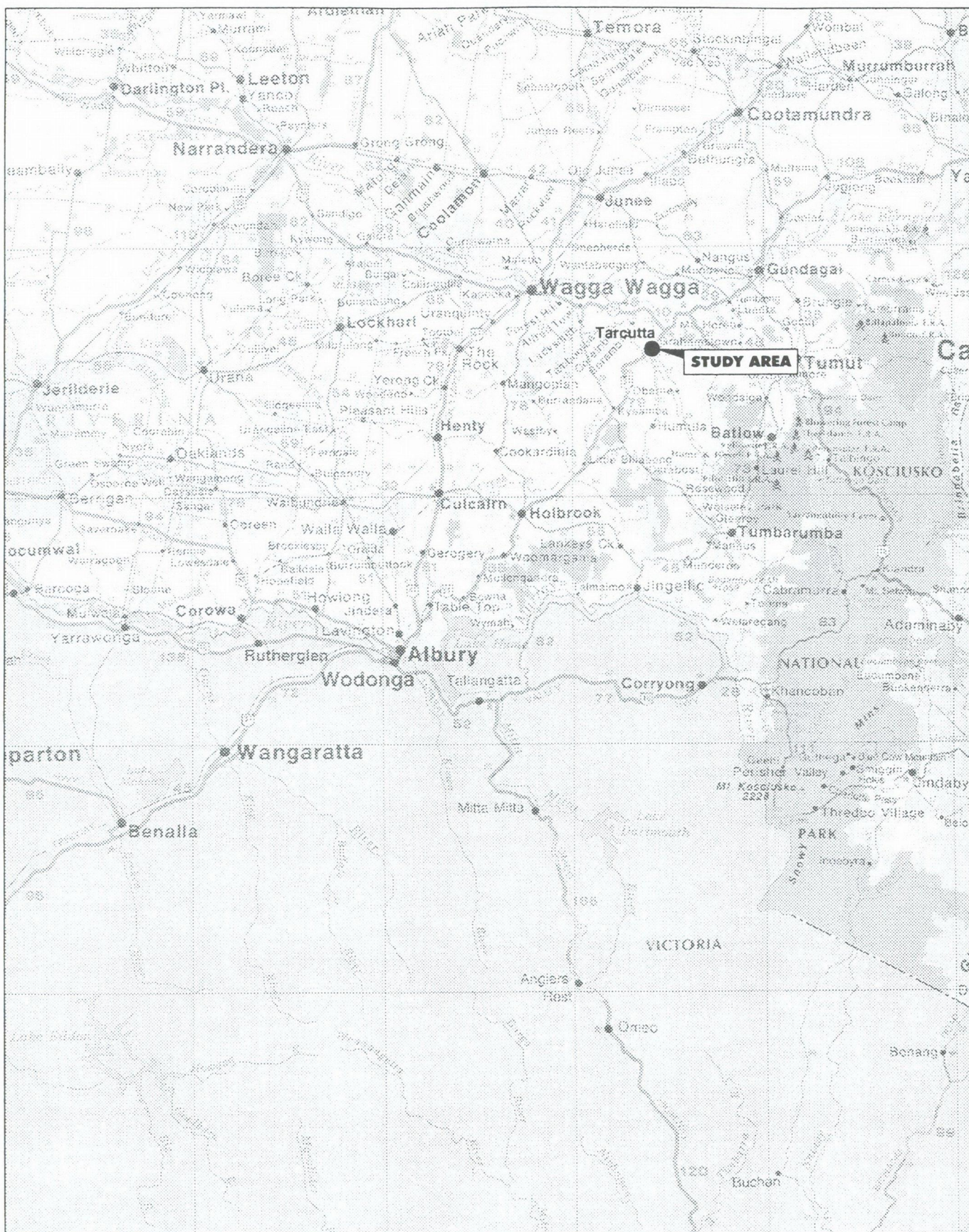


Figure 1.1 TOWN LOCATION

Company carried out a survey involving truck drivers and transport company representatives. Two hundred truck drivers and fifty transport company representatives were surveyed. The findings of this study are summarised in Chapter 4 and form the basis for the transport industry perspective in this study.

Five different locations for the truck changeover facility were considered by the VMS. Two options were recommended: the Town Centre option and the Northside option. *Plates 1-9* show the sites from various viewpoints and *Figure 1.3* indicates the direction that the plates were taken. The aims and objectives for the future facility that arose out of the VMS study are listed in *Appendix A*.

1.2 PURPOSE OF THE STUDY

The Roads and Traffic Authority (RTA) Wagga Wagga commissioned SMEC Australia Pty Ltd to conduct an environmental and comparative study for the project known as State Highway No 2, Hume Highway, Proposed Tarcutta Truck Changeover Facility.

The purpose of this study is to analyse the environmental, economic, physical and social implications of the two options selected from the VMS. A comparative study is also required to identify and consider the advantages and disadvantages of the "Do Nothing", the Town Centre and the Northside options. This information will be used to assist the RTA in the selection of a preferred option.

The objectives of the brief are to:

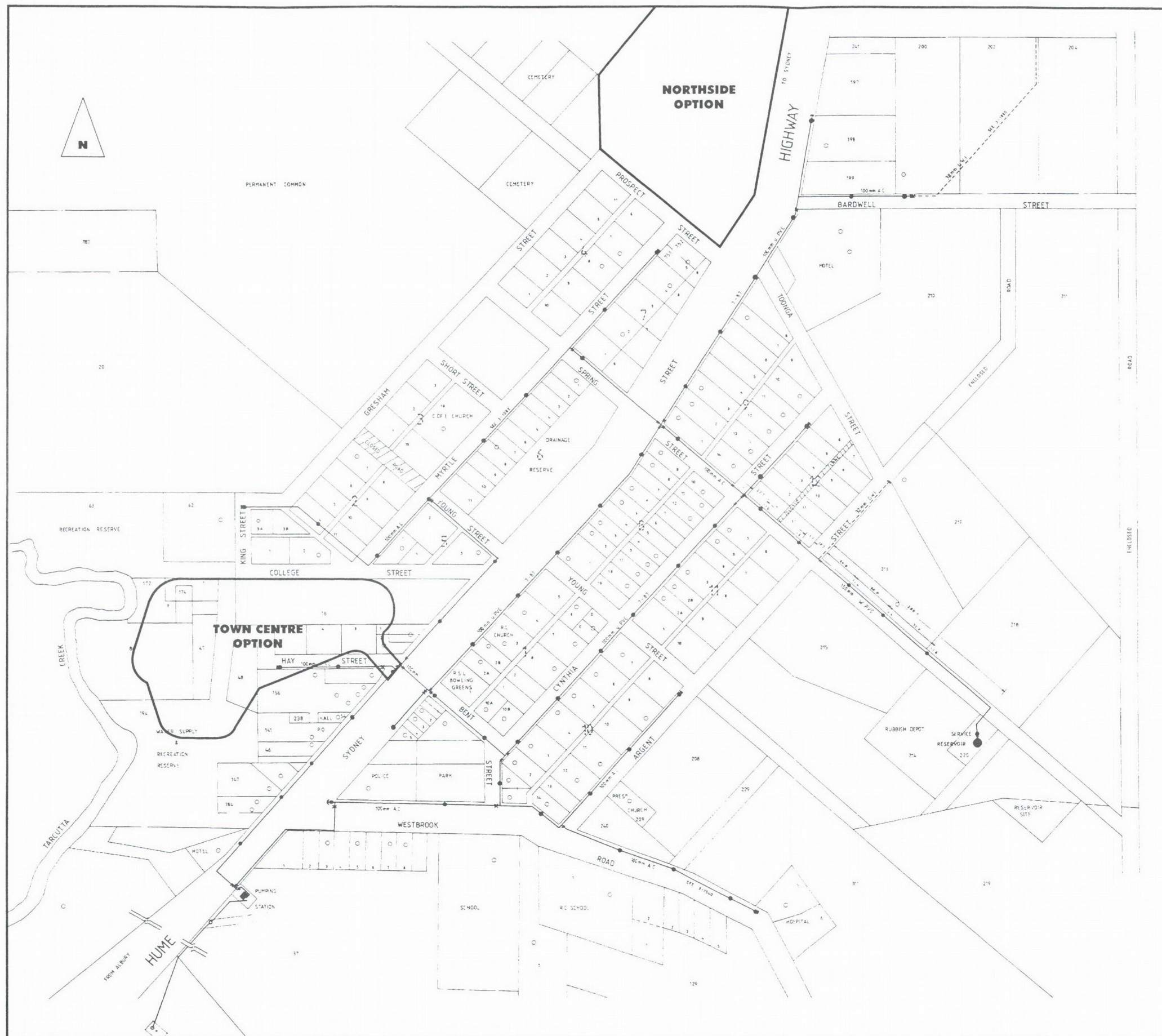
- "prepare an environmental study which investigates the environmental attributes and constraints of both options;
- prepare a comparative study between each option to assist in the selection of the preferred option; and
- undertake community consultation to satisfactorily identify and analyse community concerns."

1.3 STUDY AREA

i Tarcutta

Tarcutta is a small rural village located approximately halfway between Sydney and Melbourne. It is also positioned approximately 55 kilometres south-east of Wagga Wagga. The town is bisected by the Hume Highway with small convenience-type goods and service facilities located on the western side of the highway. On the eastern side a service road provides access to a shopping strip and residential properties. Separating the highway and the service road is a parking area that currently accommodates truck parking and amenities. *Figure 1.2* shows the layout of the town and *Plate 10* shows the existing parking facilities within the town

The town provides a community focal point for the villagers and the surrounding rural population. Its total population is 300 people. Within the heart of the town are recreational facilities including tennis, cricket and touch football grounds. In addition the town contains two schools and a retirement village with supporting medical facilities.



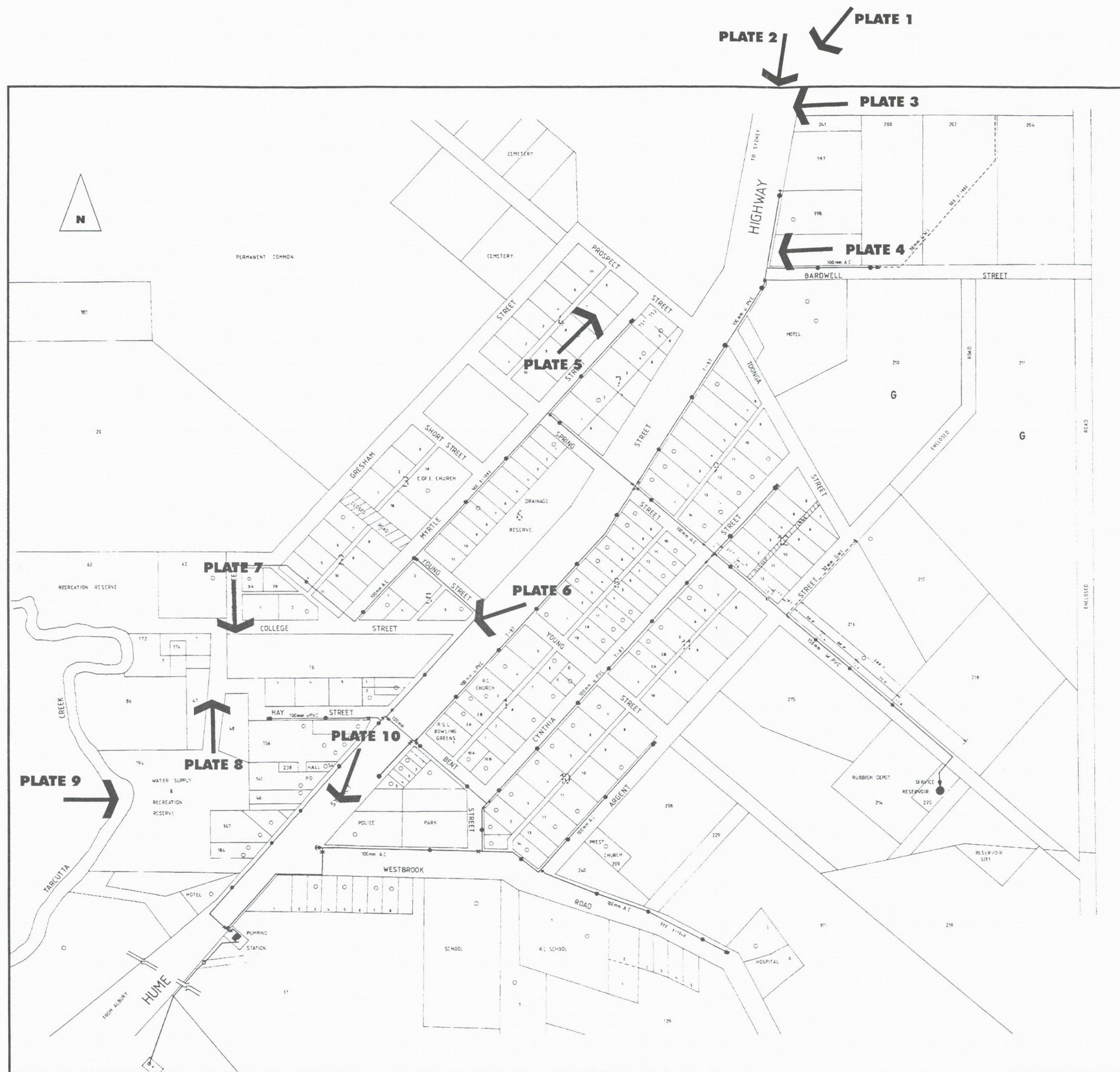




Plate 1
VIEW OF THE NORTHSIDE OPTION FROM THE HUME HIGHWAY LOOKING SOUTH



Plate 2
RELATIONSHIP OF THE NORTHSIDE OPTION TO THE HUME HIGHWAY



Plate 3
VIEW OF THE NORTHSIDE OPTION FROM THE HUME HIGHWAY LOOKING WEST



Plate 4

VIEW OF THE RIDGELINE FROM HUME HIGHWAY LOOKING WEST



Plate 5

VIEW ACROSS THE NORTHSIDE OPTION FROM PROSPECT STREET



Plate 6

VIEW OF THE TOWN CENTRE SITE FROM THE CORNER OF HUME HIGHWAY AND COLLEGE STREET



Plate 7

VIEW OF THE TOWN CENTRE SITE FROM THE NORTH



Plate 8

VIEW OF THE TOWN CENTRE SITE LOOKING NORTH

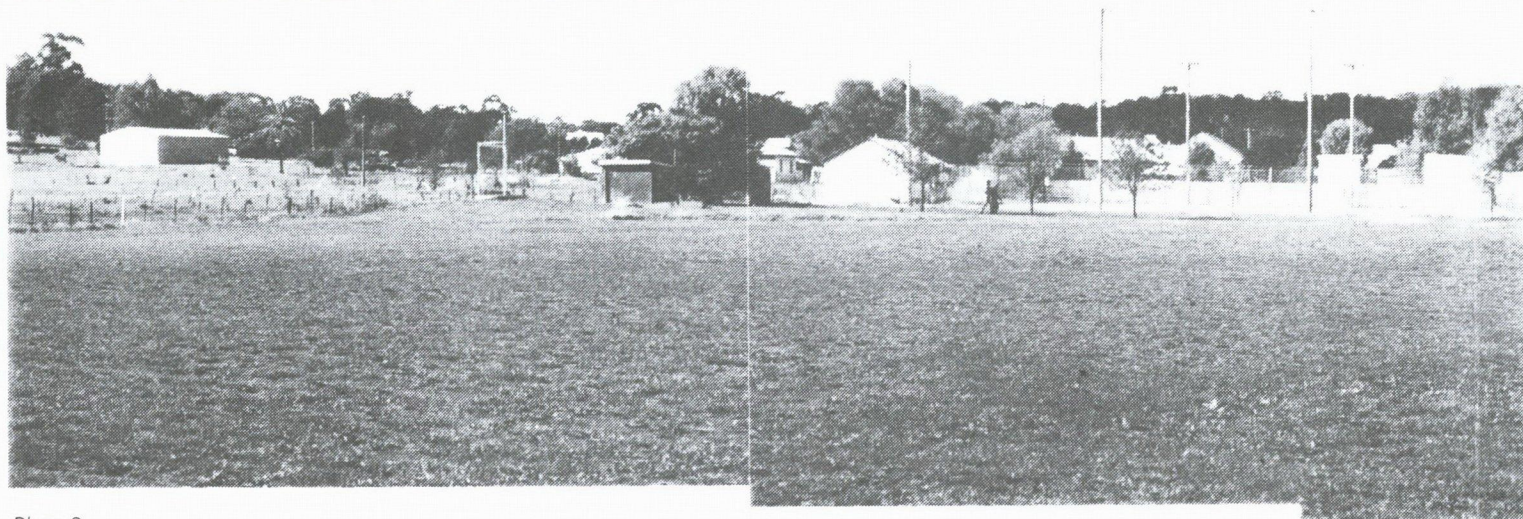


Plate 9

VIEW OF THE TOWN CENTRE SITE LOOKING NORTH-EAST

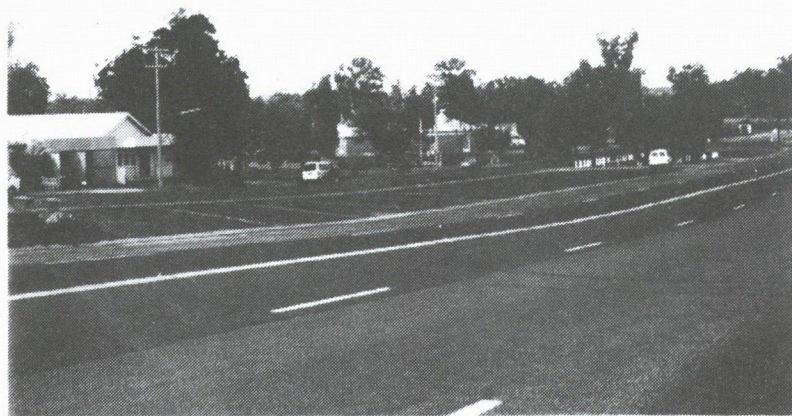


Plate 10

VIEW OF EXISTING TRUCK PARKING BAYS

The urban area of the town is predominantly single storey residential. The majority of residential land is located on the eastern side of the highway. On the western side of the highway a large proportion of lots remain vacant.

The town has developed a historical relationship with the trucking industry since the floods in 1957. At this time the town hosted approximately 300 truck drivers who were stranded as a result of the floods.

A truck drivers' memorial has been constructed in Paddy Osborne Park to commemorate all the truck drivers in Australia who have lost their lives on the road. Servicing the transport industry is an important and long-term function of the town.

ii Northside Option

This site is located at the northern edge of the town on the western side of the Hume Highway. Prospect Road forms the southern boundary of the site. To the south of Prospect Road is a residential precinct of Tarcutta, which also contains church lands. Adjacent to the south-west corner is the town cemetery, while to the western and northern boundaries are the grazing land of the town common and private property respectively.

The land forms part of the town common, which is vested in the crown. Trustees of the town common administer the site and utilise the land for grazing purposes. The total area required for the Northside option is seven hectares.

The site is approximately 400 metres east of Tarcutta Creek and the land drains towards the creek. An ephemeral creek crosses the site towards its northern boundary. This commences to the east of the highway and drains a mix of residential and rural land. It crosses the highway through a culvert and flows through a constructed dam at the western boundary of the site.

Several large, but isolated, eucalypts occur on the site but there is little native understorey. An area of revegetated land occurs in the cemetery that supports a more diverse flora and fauna.

iii Town Centre Option

This option is positioned behind the existing commercial strip on the western side of the Hume Highway. It is bounded by College Street to the north, Tarcutta Creek approximately 50 metres to the west and recreational land to the south. To the east of the site are two cafes, a post office and a general store.

This option contains some private land (approximately nine properties) and land vested in the Crown. Wagga Wagga City Council administers the crown land. A portion of crown land is used for grazing purposes and the remainder is utilised for recreation. An existing road reserve also forms part of this site.

The total area required is 4.3 hectares with potential for future expansion of an extra 1.1 hectares.

The site is cleared up to the riparian vegetation along Tarcutta Creek and is currently grazed by beef cattle and horses. It is predominantly vegetated by introduced pastures. A small wetland is situated in the centre of the site. The site slopes from the Hume Highway in the east to Tarcutta Creek in the west.

1.4 STUDY METHODOLOGY

To complete this study it was necessary to review existing literature made available by Wagga Wagga City Council, the Department of Land and Water Conservation (DLWC) and the RTA. A site visit was undertaken to collect soil samples, undertake visual analysis of the sites, identify flora and fauna on the sites, undertake an archaeological survey and identify the proposed access onto the sites.

A consultation program was designed to promote ownership of the study and involve the local community, transport industry and government agencies in all stages of the project. Findings of the consultation process are incorporated within the report. Further details of the consultation process are provided in Chapter 4.

Drawing on the information obtained through the review of literature, the consultation process and site inspections, the opportunities and constraints for each option were identified. From this analysis a simple multi-criteria analysis was undertaken to compare both options.

1.5 STRUCTURE OF THE REPORT

The report has two parts. Part A contains the environmental, social and economic assessment of both options. Part B compares the options with the Do Nothing option.

Part A contains nine chapters:

- A brief introduction forms Chapter 1.
- Details of the two conceptual site options are presented in Chapter 2.
- Chapter 3 contains a review of planning instruments to highlight the issues relevant to the options and determine potential constraints. A land use survey is documented, together with any potential constraints regarding the impact on surrounding land use from either of the options.
- The consultation strategy is defined in Chapter 4 together with a summary of results.
- Chapter 5 provides a detailed assessment of the biological and physical characteristics of both sites. The existing physical environment is described together with hydrological characteristics, visual quality, agricultural capability and ecological characteristics.
- Chapter 6 provides a description of the Aboriginal and European heritage items associated with the area and the subject sites. Noise and air quality impacts are assessed and mitigation measures identified. This chapter also contains an assessment of the access arrangements for each site shown in the conceptual layouts provided by the RTA. An assessment of the potential impact from dangerous goods accidents is also presented.
- The demographic, social and economic impact of the new options were assessed and various mitigation measures identified in Chapter 7.
- An outline environmental management plan for the truck changeover facility is described in Chapter 8.
- Chapter 9 identifies the opportunities and constraints of both options.

Detailed technical information relating to the findings of the report is provided in the Appendices.

Part B contains one chapter.

Chapter 10 provides decision-makers with an objective analysis of the three options.

2 THE PROPOSAL

2.1 INTRODUCTION

The RTA prepared concept plans for each option to be used as part of the environmental assessment. These concept plans were formulated from the findings of the VMS. Servicing and other design requirements were identified in the early stages of the study. This section of the report describes these concept plans together with the additional requirements identified at the start of the study.

The description of each option forms the basis for the environmental and comparative studies. During the assessment process a number of modifications were identified to the original concept design. These are described in Chapter 9.

2.2 NORTHSIDE OPTION

This option covers a land area of approximately seven hectares. All amenities and facilities will have to be provided on the site due to the distance from the town centre. *Figure 2.1* shows the layout of the Northside option. The conceptual plan provides for the following:

- a 2,000 m² shop, restaurant and amenities area, 1,000 m² of awning area and a 200,000 litre storage for fuel;
- approximately 70 car parking spaces for light vehicles, caravans etc;
- approximately 157 B-double truck parking spaces;
- a 350 m² amenities and shelter building; and
- the upgrading and use of the existing dam for pollution control and detention basin.

The pavements will be constructed of a base course of 300 millimetre crushed rock/blue metal with a wearing course of 50 mm asphaltic concrete. Approximately 20 % of the facility will require revegetation and landscaping.

To light the facility it is assumed that forty 250 watt sodium discharge lamps spaced at 30 metres apart are required.

The town sewer extends to the Halfway Motel on the eastern side of the Hume Highway. A small pumping station would be required on the site to pump the facility sewerage to the village system.

The proposed access to the site is along a two-lane two-way section of the highway. There are presently two traffic lanes (including a climbing lane) approaching the proposed site from the north. The climbing lane presently ends at the crest to the north of the proposed site. The design provides for a continuation of the two lanes; the right lane is marked for trucks turning into the parking area.

2.3 TOWN CENTRE OPTION

The design of this option assumes that the town's existing cafés and service station will provide restaurant and fuel services for the truck changeover facility. *Figure 2.2* shows the layout of the Town Centre option. The site is 4.3 hectares in area and will accommodate:

- parking for 52 semi-trailers and 72 B-doubles;
- a total of sixteen shower/toilet cubicles (assumes one cubicle per ten spaces) disbursed evenly over the site;
- approximately 80 m² of constructed shelter;
- an accessway from the facility to the cafés on Hume Highway; and
- a pollution control pond constructed within 50 metres of Tarcutta Creek.

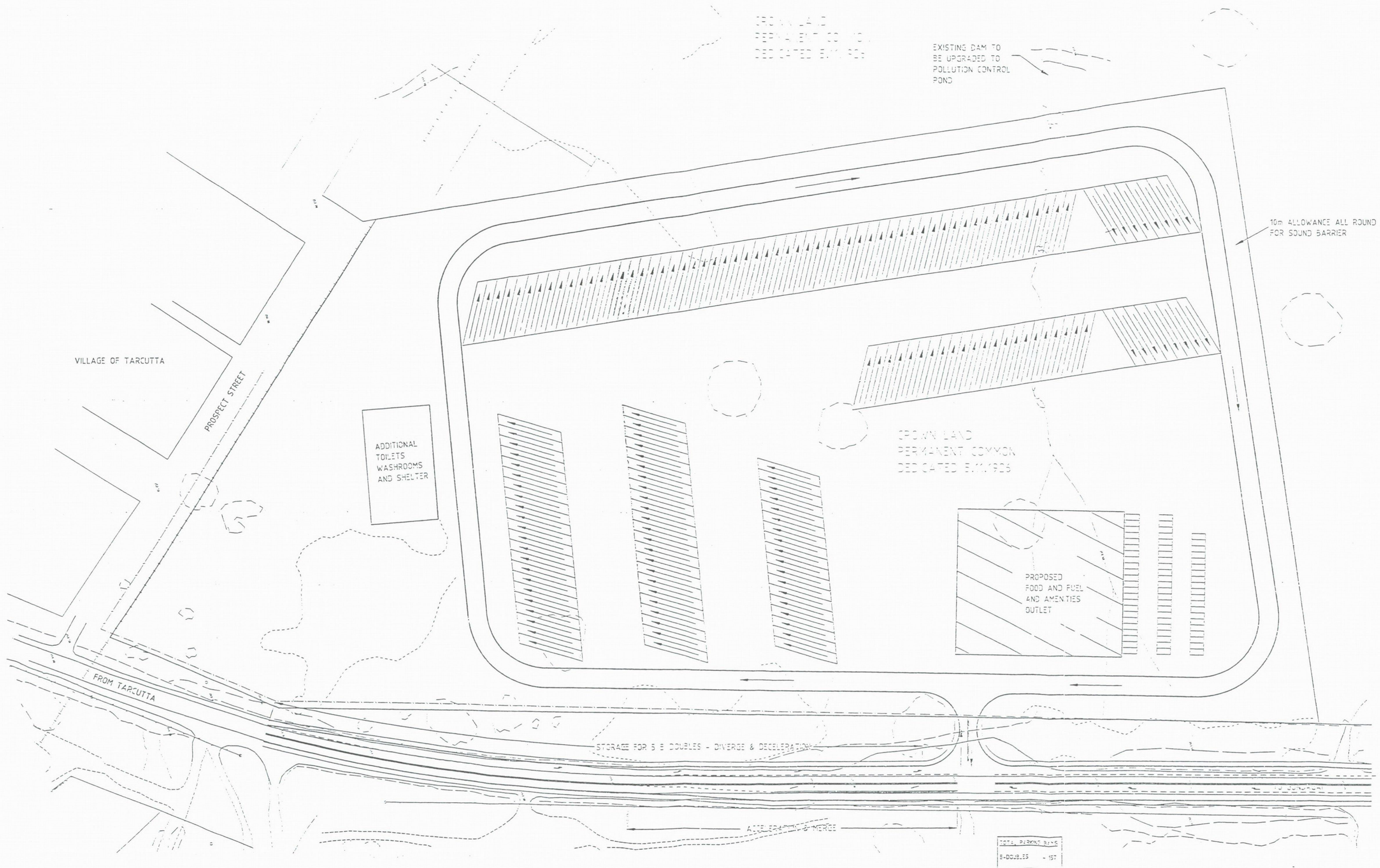
The site has capacity for future expansion for accommodating an additional 35 B-doubles (a total extra area of 1.1 hectares).

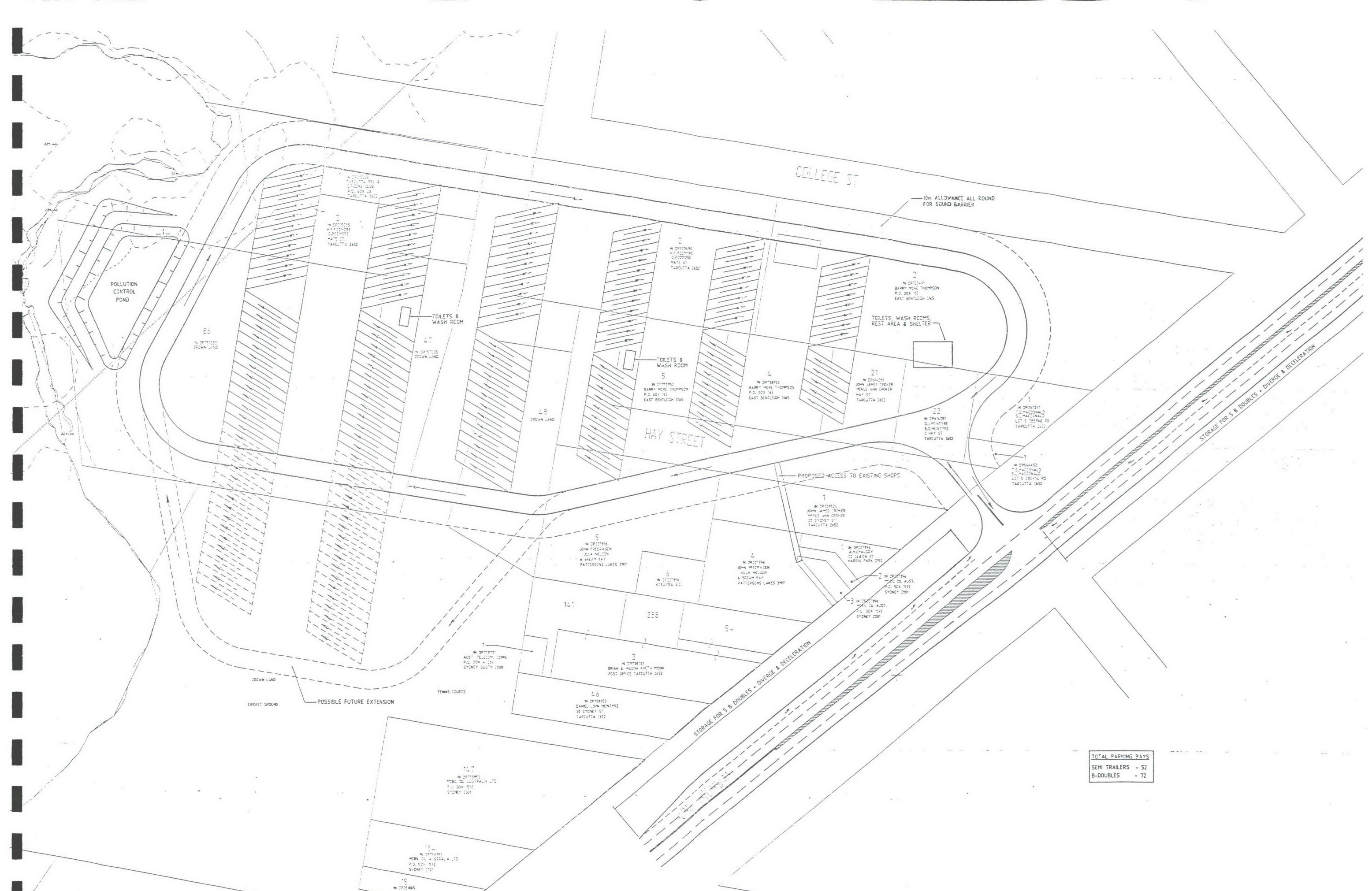
Pavements will be constructed to the same standard as the Northside option. Approximately 34, 250 watt sodium discharge lamps spaced at approximately 30 metres will be required around the site. As with the Northside option approximately 20 % of the site would be revegetated and landscaped.

Augmentation of existing services within the site would be required. Telephone and electricity would be connected to shelter and amenities blocks. New 100 mm water mains to connect the amenities blocks to the water supply are required. Existing and new sewer pits need to be adjusted to the new levels to accommodate sewer lines for the amenities blocks.

If the site is expanded in the future the existing sewage pumping station would be relocated together with a rising main and gravity sewer. A small pumping station may need to be constructed for the site.

The concept plan shows the existing highway located on the western side of the reserve. The proposed design of the access locates the widened highway approximately in the centre of the 60 metre wide reserve. On this basis, it would be necessary to construct extensive roadworks to connect the new highway through the intersection to the existing highway at Tarcutta Creek Bridge approaches and reconstruct the existing median facilities such as parking and the toilet block.





3 PLANNING CONTEXT

3.1 INTRODUCTION

An assessment of the capability of both sites to accommodate the proposed facility requires an understanding of the opportunities and constraints for each site. A wide range of potential planning scenarios could be developed for either option depending upon the eventual layout, design and level of facilities. The purpose of this chapter is to describe the statutory and environmental assessment process applying to each site.

3.2 ENVIRONMENTAL PLANNING INSTRUMENTS

A range of environmental planning instruments applies to the proposed development. The most relevant of these are outlined below.

3.2.1 Wagga Wagga Rural Local Environmental Plan 1991 (LEP 1991)

Wagga Wagga Rural LEP 1991, gazetted in 1991, is a comprehensive planning tool that applies to the village of Tarcutta. As its foundation the LEP has a set of planning objectives designed to provide a broad planning framework in the LGA. The broad objectives are to:

- encourage the proper management, development and conservation of natural and man-made resources within the area to which this plan applies;
- maintain the opportunity for public involvement and participation; and
- reduce the incidence of damage to localities subject to flooding by restricting development in the floodplain and floodways.

The LEP divides the Council area into a number of zones. Each zone also has a set of objectives and specific planning controls applying to development. The zoning of each site is shown on *Figure 3.1* and outlined below.

i Northside Option

a Zoning and Objectives

This site is zoned 1 Rural under LEP 1991. This zone is designed primarily to facilitate rural activities. The relevant objectives of this zone are as follows:

- to promote the proper management and utilisation of resources by protecting, enhancing and conserving:
 - agricultural land in a manner which sustains its efficient and effective agricultural production potential;
 - soil stability by controlling and locating development in accordance with soils capability;
 - trees and vegetation in environmentally sensitive localities;
 - water resources;
 - localities of significance for nature conservation;
 - places and buildings of archaeological or heritage significance;
- to prevent the unjustified development of prime crop and pasture land; and

- to provide land for future urban development, for future rural residential development and for future development for other non agricultural purposes, in accordance with the need for that development.

b Permissibility of Proposed Development

Under this zone any use is permissible with development consent except for residential flat buildings or shops. Uses such as agriculture and forestry are permitted and do not require the consent of Council. Most of the components of the Northside option would be permissible with the consent of the Council, but the proposed 2000m² shop, restaurant and amenities could potentially be prohibited within the zone. Legal advice indicates that it may be possible to argue that the shop is a use which is ancillary to the refreshment room use of the proposed development. For this argument to be supported by Council it would be necessary for the shop to be of a suitable scale so that it could not be said to be an independent use. If this is not possible then the site will require rezoning to permit shop use.

While the proposed development on the Northside option is permissible with consent, it will be necessary to be consistent with the objectives of LEP 1991 and the zone. Chapter 5 demonstrates that the proposed development would be consistent with the objectives of the zone. Advice from Wagga Wagga City Council has confirmed that the proposed use would be consistent with the objectives of the zone.

ii Town Centre Option

a Zoning and Objectives

This site is zoned 2 Village under LEP 1991. This is a general zone designed to facilitate general urban development. The objective of this zone is to promote development in existing towns and villages in a manner, which is compatible with their urban function.

b Permissibility

Under this zone, any use is permitted with development consent except extractive industries, intensive livestock keeping establishments, mines and offensive or hazardous industries. Dwellings are permitted without consent. The proposed development would be permitted at this location with the consent of Council. The proposed use would be consistent with the zone objectives, as one of the historic urban functions of Tarcutta is to support the trucking industry.

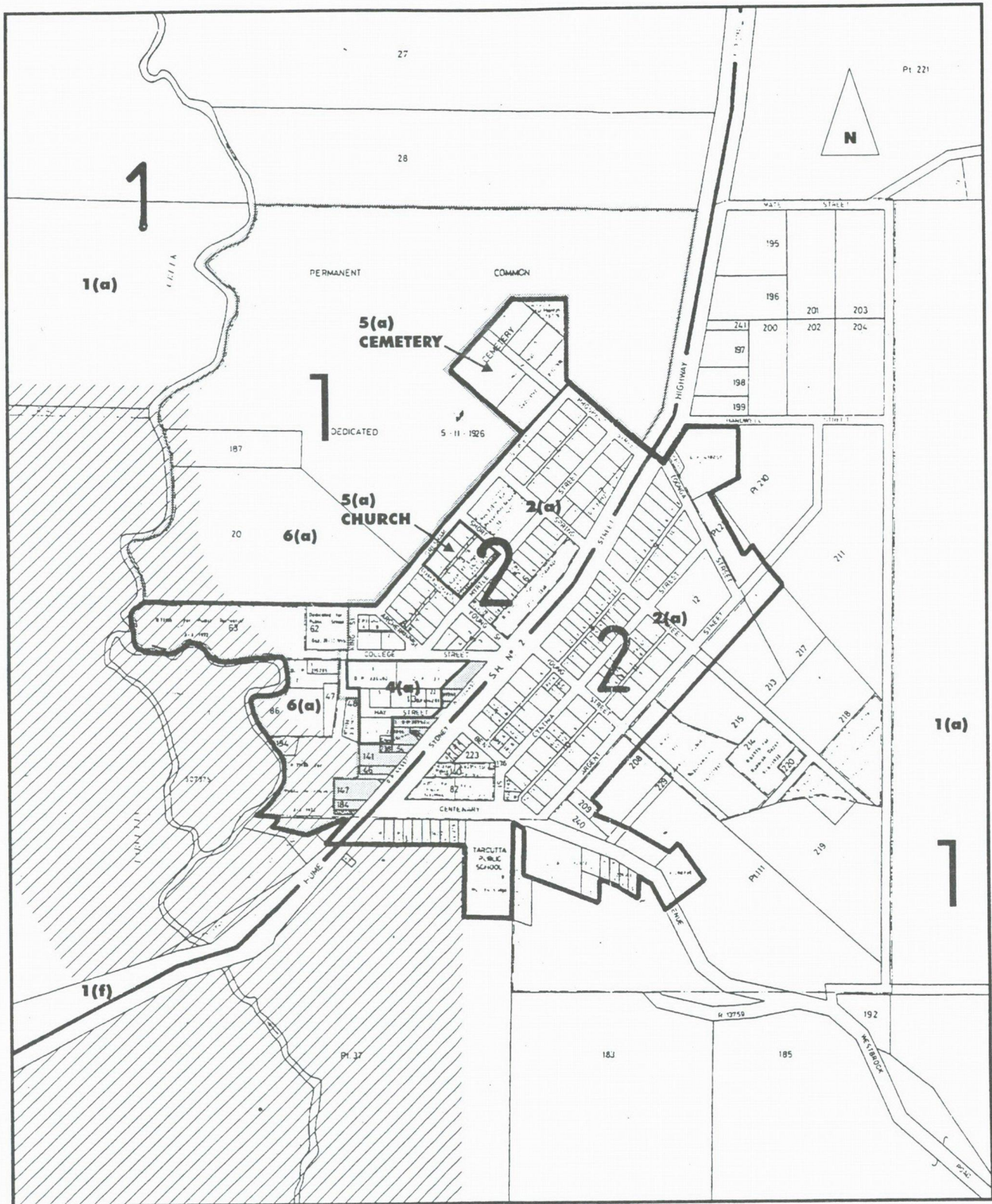
In addition to the zoning controls, there are a number of general clauses applying to both or either of the Northside and Town Centre options. These clauses are outlined below.

iii Other Considerations

a Rural Land

Clause 10 of LEP 1991 applies to the Northside option and requires that the following issues be considered for development within a rural zone:

- the potential impact on prime crop and pasture land;



DRAFT RDLP 1988

LEP 1991

- 1(a)** General Rural
- 1(f)** Arterial Road Frontage
- 2(a)** General Residential
- 3(a)** General Business
- 4(a)** Industrial General
- 5(a)** Special Uses
- 6(a)** Public Recreation
- Flood prone land

- 1** Rural
- 2** Village

Figure 3.1 **ZONING**

- vegetation, land capability and water resources;
- valuable deposits of known minerals, coal, petroleum, sand, gravel or other extractive materials;
- archaeological or heritage significance;
- cost of public amenities and services; and
- future expansion of settlements in the locality.

These issues are considered within the report.

b Development Along an Arterial Road

For development along an arterial road clause 20 of LEP 1991 requires Council to consider whether:

- an alternative access from a secondary road can be provided; and
- the safety and efficiency of the arterial road will be adversely affected.

One of the key objectives of providing the facility at either option is to improve the safety and efficiency of the National Highway System. Alternative access from a secondary road would not be acceptable for either option. Both options would satisfy this clause of LEP 1991.

c Development Within a Flood Plain

Clause 22 of LEP 1991 indicates that development consent will be required for work within a flood plain. In considering an application Council must assess whether the development will:

- impede the flow of flood waters;
- imperil the safety of persons in the vicinity of that land;
- exacerbate the adverse effects of floodwaters; or
- have an adverse impact on the water table.

A qualitative assessment was undertaken as part of this study to assess these factors. Information obtained so far, indicates that, neither option will significantly affect flooding or groundwater.

d Environmental Heritage

Clause 24 requires that a person shall not: damage or despoil a relic or place or any part of that relic or place; excavate for the purpose of exposing or removing that relic; or erect a building on land on which that relic is situated or which comprises that place, without the consent of Council. Recommendations of the Aboriginal archaeological assessment will have to be taken into account prior to undertaking any works on either site.

Clause 25 requires that Council determine whether development in the vicinity of an environmental heritage item will have an adverse impact on the historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance of an item. This report identifies a number of design measures to ensure that the curtilage of various European heritage items is protected.

3.2.2 State Environmental Planning Policies (SEPPs)

There are two SEPPs that apply to this development.

i SEPP 11 – Traffic Generating Development

SEPP 11, Traffic Generating Development, requires Council to consult with the RTA on development applications listed in Schedule 1 and 2 of the policy. Both options would be assessed under Schedule 2 of the policy and approval would be required from the RTA for either option.

ii SEPP 44 – Koala Habitat Protection

This policy, which commenced on 13 February 1995, aims to protect the habitat of koalas. It applies to land with an area of more than one hectare. The Wagga Wagga Local Government Area is one of the LGAs covered by this policy. Details of this policy are discussed further in section 5.6.

3.2.3 Regional Environmental Plans (REPs)

There are no relevant REPs for the area.

3.2.4 Environmental Planning and Assessment Model Provisions, 1980

Clause 28 of the Model Provisions was adopted by the Rural LEP 1991. It contains restrictions on the construction of “general stores” fronting main or arterial roads. Clause 28 provides that a general store cannot be constructed in a rural zone where “such allotment: has a frontage to a main or arterial road or is less than 800 metres from any other allotment of land on which is erected a shop or general store”. It also contains provisions relating to the location of a general store in relation to building lines.

It could be argued that the Northside option contains a general store. However, as discussed previously if the shop is of a scale that it can be deemed ancillary then it could be argued that it is not necessary to comply with this clause of the Model Provisions.

3.2.5 Draft Rural Development Control Plan 1988 (RDCP)

Development control plans are planning documents prepared and adopted by Councils under section 72 of the Environmental Planning and Assessment Act to provide more detail to the statutory controls established in the LEP.

While the controls, and the objectives of the controls in the DCP can be included in consideration during the approval/determination process, if there is an inconsistency between the LEP and the DCP, the statutory document (LEP) prevails. Some quite considerable discrepancies exist between the LEP and RDCP on both the sites. Council is in the process of amending the draft RDCP to address these discrepancies. It is expected that these amendments will address the zones and development controls established by the LEP. The current RDCP was not considered because of the discrepancies and Council’s review.

3.3 OTHER PROVISIONS

3.3.1 Wagga Wagga Floodplain Development Manual

The southern portion of the Town Centre option (as shown on *Figure 3.1*) is identified as a flood fringe area under this manual. The manual states that “development in the flood fringe areas should not have any significant effect on the pattern of flood flows and or flood levels”.

For industrial developments within the low-hazard/flood-fringe zone the following development considerations apply:

- “any portion of a building or structure subject to inundation should be built from flood compatible materials; and
- the need to flood proof commercial and industrial development should be determined on merit.”

These provisions should be taken into consideration in the design of the facility.

3.3.2 National Highway Service Centres (Department of Transport and Communications, July 1992)

This policy requires that the following be considered when assessing the location of national highway service centres:

- service centres should be a minimum of 50 kilometres apart;
- generally each service centre should have no more than two access points off the national highway;
- a central protected right-turn lane should be provided to ensure safe access for turning vehicles;
- no costs associated with the service centre, including the cost of constructing and maintaining access roads for these centres are to be met from Federal road funds; and
- the concurrence of the Federal minister is required for highway service centres on the National Highway.

These matters were considered in this report.

3.3.3 DUAP Circular No C14 – Highway Service Centres (Hume Highway)

This circular explains the section 117 direction of the Environmental Planning and Assessment Act. It contains detailed provisions that are consistent with the RTA’s policy, for Council to consider when assessing highway service centres on the Hume Highway. Both options would have to be consistent with this policy. Key considerations include:

- minimising the effect on economies of towns by only allowing essential services to be provided in service centres;
- spacing centres approximately 80 – 110 kilometres apart;

- ensuring that access to the centre from the opposite carriageway is grade separated;
- prohibiting access from local roads; and
- implementing the standard of access in accordance with the NAASRA publication "Grade Separated Interchanges – A Design Guideline".

These matters were considered within this report.

3.3.4 Section 117 Direction Number G25

Section 117 Direction G25 of the Environmental Planning and Assessment Act states that, except where Council can satisfy the Director of Urban Affairs and Planning, a draft LEP shall not:

- a. *"rezone flood liable land from a zone described as special uses-flood liable, rural, open space to a zone described as residential, business, industrial, special use, village or by a similar description;*
- b. *contain provisions which apply to flood liable land and which -*
 - i *-permit a significant increase in the development of that land;*
 - ii *-are likely to result in a substantially increased requirement for government spending on flood mitigation measures, on infrastructure or on services; or*
 - iii *-permit development to be carried out without development consent except development for the purposes of agriculture (not including dams, drainage canals, levees, buildings or structures in floodways, high-hazard flood fringe or high-hazard flood storage areas), minor development and additions as defined in the Flood Plain Development Manual".*

The direction also requires that areas identified as high-hazard flood liable land or as floodway as defined by the Flood Plain Development Manual shall be zoned in draft local environmental plans as special uses, rural open space etc.

3.3.5 DUAP Circular Number F13

Department of Urban Affairs and Planning Circular F13, Total Catchment Management (TCM), provides a booklet for councils which intends to promote a better understanding of the relationship between TCM and planning. TCM provides a framework for the coordinated and sustainable use and management of land, water, vegetation and other natural resources on a catchment basis. The circular focuses on encouraging councils to foster planning decisions that are receptive to the needs of the catchment(s) relevant to them.

This report assesses the various potential impacts on the catchment as a whole.

3.3.6 Action for Air

This document details the NSW Government's 25-year air quality management plan. One of the key aims of this plan relevant to the proposed development is to reduce exhaust and evaporative emissions from both new and in-service cars, trucks and buses by continuing to improve the technology of vehicles and their fuels and

encouraging the use of alternative fuel sources. The objectives of this plan are considered within the environmental assessment.

3.4 ASSESSMENT PROCESS

3.4.1 Introduction

The *NSW Environmental Planning and Assessment Act, 1979* establishes the legislative requirements for land use planning and environmental assessment in NSW. Planning instruments and environmental assessments are made under the provisions of the Act. Satisfying the planning and environmental assessment provisions of the Act is therefore fundamental to this options assessment.

Central to the assessment is the determination as to whether the proposal falls under Part IV or Part V of the Act. The difference between the two parts and the approval/determination process they establish, is quite complex. Part IV provides "Consent Authorities," in this case Wagga Wagga City Council, with the ability to approve or refuse development applications (DAs) for certain developments after consideration of a range of issues. Council and the Minister for Planning are the main "Consent Authorities."

In determining a DA, the consent authority must assess the development against the matters for consideration under S.79(c) of the Act. These matters include consideration of statutory controls including LEPs, DCPs, REPs and SEPPs in addition to a range of other issues, which allow the consent authority to assess the permissibility of a proposal and the impact this development may have upon the environment, community and economy.

Part IV only applies to developments requiring development consent under an environmental planning instrument (LEP, REP or SEPP).

Part V of the Act applies where development consent is not required under an environmental planning instrument. It establishes procedures for determining whether proposals not requiring consent are likely to have a significant environmental impact. Where consent is not required, the proponent (usually a public authority) must prepare, or cause to have prepared, a review of environmental factors (REF) to determine whether the proposal could have a significant environmental impact. Where a significant impact is likely, the proponent must have an environmental impact statement (EIS) prepared.

Regardless of whether a proposal falls within Part IV or Part V of the Act, it would be subject to a rigorous environmental assessment. The key differences would be procedural, that is, whether a DA is submitted and determined by Wagga Wagga City Council or an REF prepared.

An assessment was undertaken in consultation with Wagga Wagga City Council to determine whether each proposal would be assessed under Part IV or Part V of the Environmental Planning and Assessment Act. A legal interpretation was also sought.

Each option is permitted in the 2 Village and 1 Rural zone, respectively under Rural LEP 1991, subject to development consent being obtained from Council. For the Northside option this will be subject to the shop being constructed to an appropriate scale to ensure that it is ancillary to the dominant use.

3.4.2 Is Development Consent Required?

i Model Provisions

Rural LEP 1991 adopts clause 35 of the Environmental Planning and Assessment Model Provisions 1980. This clause identifies a number of developments that are exempt from obtaining development consent. Schedule 1 of the Environmental Planning and Assessment Model Provisions outlines these developments. Two Clauses of Schedule 1 are relevant:

"6. The carrying out by persons carrying on public utility undertakings, being road transport undertakings, on land comprised in their undertakings, of any development required in connection with the movement of traffic by road, including the construction, reconstruction, alteration, maintenance and repair of buildings, works and plant required for that purpose, except-

*the erection of buildings and the reconstruction or alteration of buildings so as materially to affect the design or external appearance thereof; or
the formation or alteration of any means of access to a road."*

"8. The carrying out of any development required in connection with the construction, reconstruction, improvement, maintenance or repair of any road, except the widening, realignment or relocation of such a road."

It has been interpreted that the RTA are not carrying out road transport undertakings as it is not involved in transporting goods or passengers by road, road haulage or a conveyance business or enterprise. Therefore clause 6 of the Model Provisions cannot apply in this instance. Clause 8 would also not apply as the proposal is not required in connection to the existing road.

ii State Environmental Planning Policy No 4 – Development without consent (SEPP 4)

Clause 11C of SEPP 4 provides as follows:

Where in the absence of this clause, development for the purposes of a classified road or toll work, or a proposed classified road or toll work, may be carried out only with development consent being obtained therefore, that development may be carried out without that consent.

It has been interpreted that construction of the Northside option and the Town Centre option was not development for the purpose of a classified road or toll work and was not exempted by clause 11C from the requirement in the LEP to obtain development consent.

While it is more likely that an argument could be made that the Town Centre option is for the purposes of a classified road they conclude that this clause does not exempt the RTA from obtaining development consent under the Rural LEP 1991.

Therefore it is concluded that both options require development consent.

3.4.3 Who is the Consent Authority?

Both proposals are to be assessed under Part IV of the Environmental Planning and Assessment Act and development consent will be required from Wagga Wagga City Council who are the consent authority for the development. Section 115I of the *Environmental Planning and Assessment Act 1979* provides that a consent authority, in respect of a development application made by the Crown, must not refuse consent or impose a condition of consent without the written approval of the Minister for Urban Affairs and Planning. The RTA is the Crown for the purposes of the Act. However if the RTA were not the proponent for either development this section would not apply.

3.4.4 Designated Development

As development consent is required for each option it is necessary to determine whether the proposed developments are classified as designated development under the Environmental Planning and Assessment Act. Schedule 3 of the *Environmental Planning and Assessment Regulations 1994* lists the types of development that are designated. The only components of the two options that can be construed as designated development are the sewerage systems and the detention basins or pollution ponds.

Once a detailed concept plan has been prepared it will be possible to ascertain whether these elements of the development are designated development. However, it can be interpreted that there are already a number of precedents that have argued that if these uses are ancillary uses then they are not designated development. Therefore an EIS will not be required for either option.

3.5 NATIVE TITLE AND ENVIRONMENTAL LEGISLATION

3.5.1 Native Title

Native Title must be afforded careful consideration in determining which option (if any) is preferred, and how the preferred option can be brought to reality. It is an issue, which is complex and dynamic. It is therefore extremely difficult to address thoroughly in an options assessment such as this because the variables are still significant. Nevertheless, an outline of how the Native Title legislation could impact upon the two options is provided.

i Northside Option

The Northside option comprises Tarcutta Permanent Common (dedicated 5 November 1926), which is managed by the Tarcutta Common Trust. The DLWC advised that pursuant to section 9, schedule 5 Savings and Transitional Provisions of the *Commons Management Act 1989 (NSW)* a common can only be used for:

- grazing or watering of cattle or other stock;
- removal of fallen timber or underwood; and
- pasturing of animals.

Under these provisions the site could not be used for a highway service centre unless a management plan were prepared. The management plan would have to be prepared

in agreement and co-operation with the members of the Trust and satisfy division 5 of the Commons Management Act. Under the management plan a highway service centre could be recommended as a permitted use on the common. However, the DLWC advised that given the incompatible nature of the proposed use with the existing use of the common it is unlikely the management plan would be approved.

To allow the Northside option to proceed, the land will have to be disposed in accordance with Part 3 of the *Crowns Lands Act 1989 (NSW)*. The effects of the *Native Title Act 1993 (Commonwealth)* has to be considered as part of this process. To seek approval to dispose of crown land, the DLWC is required to carry out a land assessment. The DLWC advised that this report would be acceptable for the land assessment as it determines the highest and best use for the land. If DLWC do not approve this process the land would have to be compulsorily acquired by the RTA or Council in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*. However, if DLWC do approve this process and an agreed land value is reached, the land can be acquired by the RTA or Council. It is then to the discretion of the RTA or Council upon how to dispose of the land.

The DLWC has undertaken preliminary investigations and determined that native title has not been extinguished on the site and may continue to exist. A search of the National Native Title Register by the Native Title Tribunal indicated that no entries for determination of native title have been lodged.

The next stage of the process is for the RTA or Council to lodge a non claimant application to the Federal Court to determine whether or not native title exists in relation to the site. A non claimant application seeks to determine whether or not native title exists in relation to a particular application. Where a government makes a non claimant application and there is no native title claim lodged within three months the Federal Court will hear the application. If after hearing the matter the Court is satisfied that native title does not exist it will make a determination to that effect, registered on the National Native Title Register.

If after the end of the three month notification period a claim for native title is lodged native title rights and interests can only be extinguished by a compulsory acquisition if it is done in a non discriminatory way. In all cases native title holders are entitled to just terms compensation in accordance with the Land Acquisition (Just Terms Compensation) Act and the Native Title Act. There are a variety of issues that affect resale of this land to a private developer. It is recommended that prior to pursuing this matter any further the RTA seek legal advice on this matter.

ii Town Centre Option

Council's public road and reserve 71186 for public recreation (notified 17 March 1944 and addition 3 March 1972) forms part of the Town Centre option. Wagga Wagga Council are trustees of the reserve.

Prior to the roads being included in the proposal Council should lodge an application for road closure. The proposed closure would be advertised, and subject to no objections the road would be closed and vested in Council or the Crown for disposal. If there are substantial objections to the closure of the road the options available to the RTA or Council are to not proceed with the development or to compulsorily acquire the land in accordance with the *Land Acquisition (Just Terms Compensation Act)*.

As is the case with the Northside option an assessment of the public recreation reserve will be required. The DLWC has undertaken preliminary investigations and determined that native title has not been extinguished on the site and may continue to exist. A search of the National Native Title Register by the Native Title Tribunal indicated that no entries for determination of native title have been lodged. The exact non claimant application process described under section 3.7(i) would have to be followed for this site.

3.5.2 Summary of Additional Environmental Legislation

Table 3.1 summarises the role of other environmental legislation for the project.

Table 3.1 Additional Environmental Legislation

Subject	Administering Authority	Controlling Act
Clearing of Vegetation	NPWS/DLWC	Native Vegetation Conservation Act (1997)
Permit is not required under section 22B as works are not within 40 metres of Tarcutta Creek.	DLWC	Rivers and Foreshore Improvement Act (1948)
Permit not required under section 21D as works are not within 40 metres of Tarcutta Creek.	DLWC	Soil Conservation Act (1938)
Building Application & Notice of Completion	Local Government Act, 1993	Wagga Wagga City Council
Provision of Sewerage	Local Government Act (1993)	Wagga Wagga City Council
Pollution Control	EPA	Pollution Control Act, 1970 with reference to: Clean Waters Act, 1970; Clean Air Act, 1961; and Noise Control Act, 1975; and Protection of the Environment Operations Act, 1997 Must comply with the Ozone Protection Act, 1989.
Threatened Species	NPWS	Threatened Species Act, 1995
Heritage Items	Heritage Council of NSW	Heritage Act, 1977; and Heritage Amendment Act, 1998
Aboriginal Relics or Places	NPWS	National Parks and Wildlife Act, 1974
Due Diligence	EPA	Environmental Offences and Penalties Act, 1989
Dangerous Goods Act (1975)	Diesel/petrol storage or retail.	WorkCover Authority

3.6 CONCLUSIONS

A development application for the preferred option will need to be submitted to Wagga Wagga City Council for either proposal to proceed. Environmental Assessment under Part IV of the Environmental Planning and Assessment Act would be necessary.

The key factors identified by the various environmental planning instruments that need to be considered are:

- flooding and groundwater impacts;
- prime crop and pasture land;
- vegetation;
- land capability;
- archaeology;
- European heritage;
- traffic generation;
- access;
- total catchment management;
- air quality;
- noise; and
- social and economic impacts.

These factors are addressed in the body of the report.

The major constraint to development of either site is the issue of native title claims on the crown land. It is recommended that as soon as a preferred site is identified the RTA make a non-claimant application to the Federal Court to determine whether native title exists on the site.

3.7 LAND USE CHARACTER OF THE LOCALITY

i Northside Option

The character of the area surrounding this option is predominantly rural in nature with Prospect Street forming the interface between the rural area and the town of Tarcutta. The lots fronting the southern side of Prospect Street are predominantly vacant but those developed are single-detached houses.

To the south-west of the site is the town cemetery. This cemetery has heritage significance and the rural curtilage of the cemetery needs to be preserved to retain its significance. Privacy and amenity of visitors to this cemetery also needs to be considered. An appropriate buffer zone to protect this curtilage would be necessary.

To the north of the site is a large rural landholding. There is a homestead located approximately 200 metres to the north-west of the site. There are three houses located directly east of the site and two houses to the south. To the south-east is a motel. The restaurant that forms part of the motel is orientated towards the site. The

key impacts for these land uses are described below and will affect each resident to varying degrees. The potential impacts are:

- noise from the increase in the concentration of trucks on the site;
- an increase in air pollution;
- visual impact of lighting haze when viewed from a distance; and
- visual impact of the overall change in the landscape from rural to industrial.

Various mitigation measures are identified to minimise these impacts.

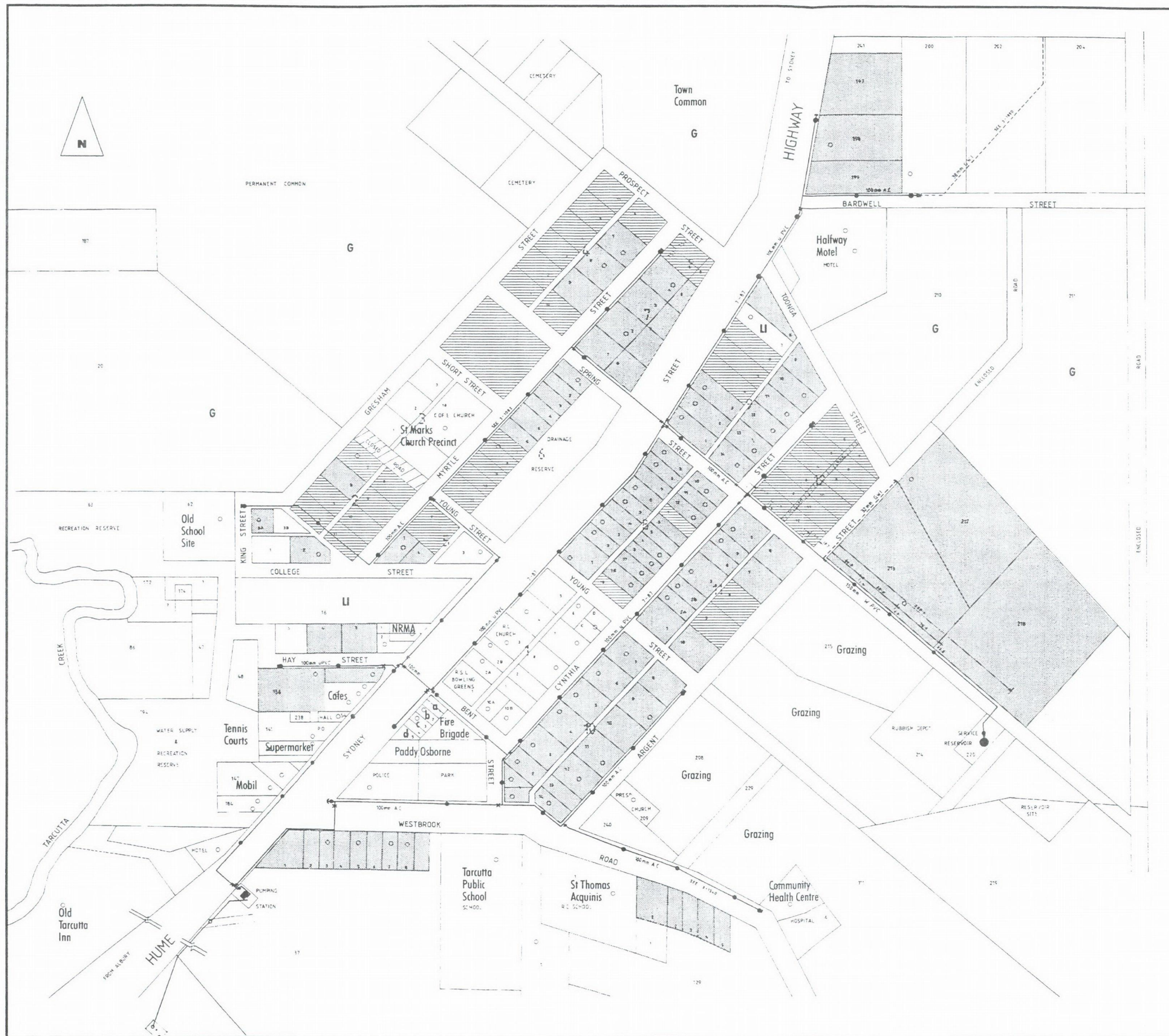
A piggery is situated approximately 500 metres to the north-east of the site. The owner expressed a concern relating to the potential odour impacts from the piggery on the users of the future facility.

ii Town Centre Option

This option is located in the middle of town and is surrounded by development on all sides except for Tarcutta Creek to the west. To the north is a residential precinct of Tarcutta. There are eight dwellings within and adjacent to the site which are likely to experience the greatest residential amenity impacts from the development. These impacts are the same as those identified above. In addition the psychological stress associated with acquisition of residential properties within the site needs to be assessed.

To the east of the site is the retail strip of the town centre. These properties have the potential to benefit from the proposed facility due to the increase in business generated by the development. It is therefore assumed that the positive impacts to these properties would outweigh the negative. To the south of the site is a recreation oval and tennis court. Expansion of the development under this option may result in the recreational facilities being located. The impact of this relocation is assessed in Chapter 5.

Details of the various land uses are provided in *Figure 3.2*.



- Residential
- Vacant Land
- LI Light Industrial
- G Grazing
- a Rural Supplies
- b Farmhouse Industries
- c Antiques
- d CWA Hall

4 COMMUNITY CONSULTATION

4.1 INTRODUCTION

The aim of the consultation process was to not reinvent the wheel but build on the consultation already undertaken and progress to the next stage. The focus was to obtain meaningful input into the environmental, social and cultural issues and into the site selection process. Specific tasks undertaken as part of the consultation process included:

- identification of key stakeholders from the community, transport industry and government;
- conducting a workshop with the key stakeholders to identify the issues relating to both options;
- individual interviews with affected businesses and residents;
- interviews with truck drivers to verify the findings of the Taverner Research report;
- observation of the community over a period of three days;
- being available in Tarcutta for two hours to discuss issues with the wider community; and
- conducting a second workshop with key stakeholders to compare the options.

Specific details of the consultation methodology are outlined below.

To inform the local and wider community that the study was being undertaken a general newsletter was distributed to the population of Tarcutta and the truckies stopping in Tarcutta. A media release was also made available to the Wagga Wagga Daily Advertiser. The newsletter sought expressions of interest from the community to be involved in two workshops as part of the study. Approximately 20 representatives from government, the community and the transport industry were selected to be involved in two workshops. Details of these participants are provided in *Appendix B*.

All relevant statutory authorities, representatives from the transport industry, trustees of crown land, sporting association presidents and principals of the schools were consulted in writing and asked for their comments. The main authorities included the Environmental Protection Authority, NSW Department of Agriculture, Department of Public Works and Services, National Parks and Wildlife Service and the Department of Land and Water Conservation. Responses from these departments are included in *Appendix C*. A meeting was held with Council's planning, environmental and engineering departments to obtain information relevant to the study and discuss issues to be considered by the study.

Individual interviews were held with the Tarcutta business community and those residents directly affected by either option on 29 and 30 April 1998 and 1 May 1998. To verify the results of the Taverner Research Company study (discussed in Chapter 4) individual interviews were also held with truck drivers on the night of 30 April 1998 between the hours of 11p.m. to 1 a.m.

Two workshops were held with representatives of the community, the transport industry and government. The first workshop identified the issues to be considered within the study and was conducted on the 30 April 1998. At the second workshop the findings of the study were presented, and the issues raised by the representatives were ranked to be included within the comparative study. Issues relating to financing either option were also discussed. This workshop was held on 26 June 1998.

4.2 PREVIOUS CONSULTATION

i Transport Industry Survey

In March 1996 the RTA commissioned Taverner Research Company to undertake a study to determine whether there was a demand for a truck changeover facility and to highlight the types of facilities that would be required to ensure the success of such a facility. The study determined that there would be a demand for the facility as at the time of the survey the majority of truck drivers (89%) indicated they normally stop in Tarcutta. Of those 89% there were 79% of drivers who indicated that they stopped for 30 – 60 minutes on each trip. In addition 98% of drivers who currently exchange trailers at Tarcutta indicated they would use a facility if it were provided and 100% of company representatives indicated that they would recommend their drivers use the facility.

Tarcutta is important to the drivers as it provides the following facilities:

- good restaurant food (84% of 200 drivers). Drivers indicated that they were fond of Gai's Place;
- rest (76%). However, of those drivers surveyed the majority classed the rest areas as being poor;
- exchange of trailers (68%). It was indicated by both drivers and company representatives that the facilities for exchange were "poor";
- toilet or washing (53%); and
- social interaction (46%).

Drivers and company representatives were presented with four options for the location of the facility. These included: south of Tarcutta; within Tarcutta township; north of Tarcutta; and near the Sturt Highway junction (about six kilometres north of Tarcutta).

Drivers indicated that they preferred the Town Centre option (69%) with the second preference being south of Tarcutta (25%). Company representatives indicated a preference for the option south of Tarcutta (32%) with a second preference for the Town Centre option (29%).

When asked to rate a number of services on their importance in being provided in conjunction with the truck changeover facility driver and company representatives were generally consistent. *Table 4.1* summarises the extremely important rating applied to these services.

Table 4.1 *Changeover Facility Services*

Service	Drivers	Company Representatives
	Extremely Important Rating	
Toilet or Washing	87%	88%
Delineation of Bays and Travel Lanes	85%	76%
Overhead Lighting	83%	83%
Restaurant Food	76%	56%
Telephone	56%	46%
Separate from Public Facilities	53%	34%
Takeaway Food	50%	41%
Vehicle Checking	33%	20%
Fuel	29%	17%
Coin Drink Dispenser	20%	17%
Rest Area	20%	44%
Overnight Accommodation	14%	10%

A number of other comments received from the truck drivers for the design of the future facility were to:

- ensure there is sufficient room for manoeuvring and parking;
- improve the safety of the existing situation;
- ensure that the new facility does not impact on the economy of the town. The importance of Gai's Place was reiterated by a number of drivers;
- provide more clean toilets; and
- design the facility so that there is a separate area for resting and exchanging trailers. It was also mentioned that "noisy refrigeration" vans and "smelly livestock" vans should be separated from other trucks.

The results of the research study were used as part of the value management study conducted in May 1996. Four options were identified within the VMS for consideration. These were the:

- Town Centre option;
- Northside option;
- near the intersection of the Hume and Sturt Highways option; and
- south of Tarcutta option.

The Hume and Sturt Highway intersection option was discarded as it was assumed to be a very long term option and very expensive to construct. It was determined from the assessment undertaken in the VMS that the southside option would likely be impacted by the railway and involve expensive access. Therefore the group recommended that the former two options be further assessed.

ii Resident Survey

The RTA, following the value management study, conducted a survey of all residents in Tarcutta. Each resident was asked to indicate whether they:

- support a truck changeover facility;

- preferred a Northside option, Town Centre option or an alternative; and
- would like to make any comment on the proposed facility.

Out of the 88 responses received 5% did not support the truck changeover facility. The main reasons provided for not supporting the facility included the safety of the town and the problems associated with maintenance of the facility. It was claimed that the drivers leave the town in an untidy state.

The results of the survey were that 60% wanted the facility in town, 32% want the facility to go to the north, 5% want the facility at the junction of Hume and Sturt Highways or a modification of the current Town Centre option (directly behind the Mobil service station and Tarcutta hotel) and 3% did not have a preference.

Other issues raised by this survey were the:

- risk of explosion from dangerous goods;
- need to protect the economic viability of the town;
- Northside Option is larger, allowing room for further expansion;
- Northside option would create more employment for locals;
- recreation facilities should not be relocated;
- need to retain town centre parking;
- Town Centre option would have a detrimental impact on Tarcutta Creek and the water table;
- important relationship between Tarcutta and the truck drivers which should be maintained;
- Town Centre option would have a greater impact on the visual quality of the existing residents; and
- impact of noise would be less at the Northside option.

4.3 RESULTS OF WORKSHOP ONE

Two workshops were completed as part of this study.

The key emphasis of the first workshop was to draw on the resident survey conducted by the RTA and identify the key issues to be considered within the study. An important element of the make-up of the group was that it incorporated people from Government, the transport industry, the local community and a number of participants who had been involved in the value management study. This allowed for a link to be established between the value management study and this study. The importance of this link was to maintain the momentum and ensure that valuable information gathered during the value management study would not be lost.

Participants were provided with details of the background of the study and briefed on SMEC Australia's role in the study process. The outputs were also described. In smaller groups, participants were asked to identify the opportunities and constraints of each site and list any issues that would require clarification within the study. The results of this workshop were summarised and are provided in *Appendix D*. However, the key issues considered for each option are outlined below.

i Northside Option

It was agreed by the group that due to the size and the location of the site more facilities for the truck drivers could be provided without having an impact on the general amenity of the town. However, the greatest disadvantage would be the economic and social impact on the town and the noise impact on the residents who do live close to the site.

ii Town Centre Option

The greatest advantage to this option is that the facilities already exist to service the site and development in this area would ensure that the town prospers. The greatest constraints identified with the site was the loss of amenity for residents adjoining the site, the need to relocate residents to accommodate the facility and the potential loss of the sports field.

4.4 INDIVIDUAL INTERVIEWS

Over three consecutive days at the end of April 1998 individual interviews were held with the business owners in Tarcutta and those residents who would be directly affected by either proposed development. A separate questionnaire was prepared for residents and business owners and is included in *Appendix E*. A survey was sent to absent landowners directly affected by the development.

The survey of the business community was used to assist with the economic impact assessment. The majority of this information is confidential and cannot be published within the report at the request of business owners. The remainder of the information is included as part of the analysis of the residents survey. The comments received were summarised and are included in *Appendix F*. Detailed conclusions reached as part of this consultation process are summarised below.

It was agreed that there is a need for the facility and almost half the people surveyed indicated their preference for the town centre option. In accepting the need for the facility most residents identified that they would be prepared to accept it being located adjacent to their residence provided appropriate mitigation measures were available to minimise the impact. The main concern expressed was the increase in noise.

While there was a general concern for the environment, particularly with regard to flooding and groundwater impacts the greatest concern related to the economic impact of the facility on the town if the northside option was developed.

4.5 TRUCK DRIVER INTERVIEWS

To verify the results of the Taverner Study and to obtain additional information for the economic impact assessment a survey of truck drivers was undertaken. This survey was conducted over a period of two hours (11 p.m. to 1 a.m.) on 30 April 1998. Due to wharf strikes at the time of the survey there were fewer trucks on the road and the majority of the truck drivers interviewed were eating at Gai's Place.

Twenty truck drivers were interviewed. Of those interviewed the majority indicated that they preferred the facility to be located in the town.

The key features of importance to the drivers in a new facility were:

- good food;
- good lighting;
- more facilities i.e. cafés for food;
- need to be located off the highway;
- need to be safe for changeover; and
- within five to ten minutes walking distance to facilities.

Drivers indicated that they spend between \$5 and \$25 a night in Tarcutta.

Drivers identified three key factors which they liked about Tarcutta. These were:

- Tarcutta is located halfway between Melbourne and Sydney;
- Tarcutta has good food and is a friendly town; and
- Gai's Place provides good food and value for money; it is a friendly environment and it is more personal than the large oil company facilities.

4.6 RESULTS OF WORKSHOP TWO

The second workshop was held on the 26 June 1998. The purpose of the second workshop was to present the findings of the report, to get the community and industry representatives to rank the issues identified in the consultation process and to discuss some alternatives for funding either of the facilities.

Ranking of the issues was undertaken to form the basis of the analysis undertaken in the comparative report. The findings from the workshop are discussed further within the accompanying comparative report.

Two groups were formed to discuss the funding options. These groups were the government and industry group, and the community group. A summary of the issues raised at this workshop by each of these groups in relation to funding is summarised below.

a Government and Industry Representatives

Wagga Wagga City Council advised that there would not be a contribution from ratepayers for the facility if the Town Centre option were chosen. There was some discussion regarding the option of a differential in rates depending on the geographic area. The industry representatives indicated that individual truck drivers would not be willing to pay to enter the facility; however, the larger companies may be prepared to be levied. It was also suggested that funds should be provided from the Road Transport Forum.

A number of other revenue sources were discussed including contributions from insurance companies, revenue from the use of wash-down bays and showers.

It was identified that diesel sales are not high as truck drivers rely on fuel cards (on which Shell appear to have the market monopoly) and the fact that they can get to Tarcutta and back on one tank.

A representative from Mobil indicated that it may be prepared to contribute some funds to capital and maintenance. However, it would be necessary for Mobil to undertake a market assessment to determine if this would be feasible. It was

identified that private investors need some insurance that their investment will be secure if there is a bypass of Tarcutta.

It was identified that funding from the government was not guaranteed.

b Community

The community group indicated the importance of providing a facility as soon as possible.

The community assumed that truck drivers would not be willing to pay for the facility and as such alternative funding sources would be required. It was indicated that rates should not be increased to pay for the facility but that Council should be responsible for providing some funds.

The community felt that the cost of the northern option would be prohibitive. The accident reduction costs as an outcome of the project were sufficient justification for the facility to be funded by the government.

The facility should be designed to maximise the opportunities for Mobil to expand so that there was an incentive for Mobil to provide funds towards the capital costs of the facility.

Concern was expressed about the relocation of the sporting field as a result of the Town Centre option.

5 BIOLOGICAL AND PHYSICAL ENVIRONMENT

5.1 INTRODUCTION

This chapter describes the biological and physical characteristics of both sites. The opportunities and constraints of each site for these characteristics are assessed. Characteristics considered include geology and topography; soils and erosion risk; agricultural suitability; hydrology and water quality; flora and fauna, and visual assessment.

5.2 GEOLOGY AND TOPOGRAPHY

The geology of the Tarcutta area is dominated by Ordovician age sediments and quaternary alluviums. The Ordovician sediments, which outcrop throughout most of the area, have been extensively metamorphosed and comprise quartzite, slate, greywacke, phyllites, schist and hornfels. This sequence underlies the Northside option site, with phyllites outcropping on the upper slopes. Quaternary alluviums, comprising gravel, sand, silt and clay, are found along the Tarcutta River and underlie the Town Centre option site.

The topography surrounding Tarcutta is flat to undulating. The Northside option site has slopes between 6 and 8 %, while the Town Centre option site has slopes between 1 and 10 %.

There are no slope limitations imposed on potential development of either of the options. However, greater consideration needs to be given to issues such as drainage and waterlogging on the Town Centre option site due to the low slope. The need for more extensive earthworks on the Northside option site will need to be considered in the final design of the facility.

5.3 SOILS AND EROSION

5.3.1 Soil Types

A study by the NSW Soil Conservation Service (SCS undated) mapped the soils of the Tarcutta area. Two main soil types are evident.

i Red Podzolic Soils

These soils are found on Ordovician slates and phyllites on the Northside option site. Red podzolics have a pronounced texture contrast profile, with reddish brown sandy topsoils overlying red clayey subsoils. At Tarcutta, these soils are inherently infertile and highly erodible, exhibiting sheet erosion and moderate to severe gully erosion (SCS undated).

ii Yellow Solonetzic Soils

Yellow solonetzic soils are found on flood plains and creek terraces of Tarcutta Creek, often in close association with red podzolic soils. They occur on the Town Centre option site. These soils have a texture contrast profile and typically comprise a dark reddish-brown loam topsoil overlying a yellowish-brown mottled medium clay subsoil. They are inherently infertile and highly erodible (SCS undated).

5.3.2 Erosion Risk

i Existing Erosion

The SCS undated study mapped the Tarcutta area as generally experiencing gully erosion with sheet erosion on uplands. Sheet erosion is often associated with the podzolic soils of the upper slopes, with gully erosion on lower slopes, usually associated with solonetzic soils.

The Northside option site exhibits significant sheet erosion on the upper slopes, with the fine sediment eroded from any bare areas, leaving quartzite gravel exposed at the surface. There is one drainage line traversing the lower slopes, which has extensive gully erosion.

The Town Centre option site is generally stable, aside from some minor gully erosion along a drainage depression. Tarcutta Creek, which bounds the site to the south, is generally stable in this vicinity.

ii Field Assessment and Laboratory Analysis

Field assessment of both sites was undertaken to confirm existing soil classifications and to describe existing erosion. Soil profiles were excavated by backhoe at two locations at both the Town Centre and Northside option sites. These locations are identified in *Figures 5.1* and *5.2*. Two representative samples from each profile were sent to the Department of Land and Water Conservation's Scone Laboratory, where they were analysed for dispersion percentage and Emerson aggregate test (EAT). The results of the analyses are given in *Table 5.1*.

Dispersion percentage measures the degree of dispersion in the fine fraction (clay plus fine silt) of a soil. It is a useful measure of the susceptibility of a soil to dispersion and tunnelling failure during earthworks. EAT is a classification of soil aggregates based on their coherence in water. It can be used as a measure of a soil's structural stability. Both tests allow inferences to be made regarding the soil's inherent erodibility.

Table 5.1 Soil Laboratory Analysis Results

Sample	Dispersion Percentage	Emerson Aggregate Test (EAT)
<i>Town Centre</i>		
Site 1, Layer 2	48	2(1)
Site 1, Layer 4	34	5
Site 2, Layer 2	43	3(1)
Site 2, Layer 3	64	2(1)
<i>Northside</i>		
Site 1, Layer 2	78	2(1)
Site 1, Layer 3	53	2(1)
Site 2, Layer 2	80	2(2)
Site 2, Layer 3	88	2(3)

Table 5.2 provides interpretations for the laboratory results of Table 5.1.

Table 5.2 Laboratory Result Interpretation

Dispersion Percentage	Tunnelling Failure
0 to 30	Slight risk
30 to 50	Moderate risk
50 to 65	High risk
65 to 100	Very high risk
Emerson Aggregate Class	Dispersibility
1 and 2(3)	Very high
2(2)	High
2(1)	High to moderate
3(4) and 3(3)	Moderate
3(2), 3(1) and 5	Slight
6,7,8	Negligible

Source: Hazelton and Murphy, (1992).

The results in Table 5.1 and interpretations from Table 5.2, suggest that soils at the Town Centre option site have a moderate risk of tunnelling failure and a slight to moderate dispersibility. Soils of the Northside option site have a very high risk of tunnelling failure and a high to very high dispersibility.

iii Discussion

There are a number of conclusions that can be drawn from the above results and the field assessment.

a Northside Option

The Northside option's soils have a very high erodibility. Despite the relatively low slope gradients, there is a high to very high erosion risk at the site. Significant erosion was evident at the site, with gullying along a drainage line and sheet erosion on upper slopes.

The soil erosion risk at this site is very high and would require special consideration during design and construction. Basic procedures may include:

- modifying the existing dam to act as a sediment basin;
- adding flocculants to sediment basins during construction;
- minimising the total area of disturbance;
- clear marking of the work site and access routes to avoid unnecessary disturbance;
- staging of works to avoid exposure of large areas;
- diverting clean run-off from upper slopes around the site;
- appropriate siting and erosion controls for soil stockpiles;
- using hay mulches for temporary erosion control, particularly on dispersible soils
- progressive rehabilitation of disturbed areas;
- maximum batter slopes; and
- protective treatments.

An appropriate erosion and sediment control plan would need to be developed prior to construction commencing. The plan would need to be developed in consultation with the Department of Land and Water Conservation.

b Town Centre Option

The soils of the Town Centre option have a moderate erodibility. The erosion risk at this site is generally low, given the low slope. This was evident during the site inspection, with the site generally stable aside from some minor gully erosion along a drainage line. Observations by the SCS undated study suggest that these soils are highly erodible, with gully erosion a particular problem.

Overall the risk of soil erosion at this site is moderate. The above requirements for design and construction will also apply to this site.

5.4 AGRICULTURAL SUITABILITY

The aim of agricultural suitability mapping is to delineate classes of rural land on the basis of its inherent suitability for general agricultural use, including crop and pastoral purposes. Classification not only considers the inherent physical characteristics and limitations of the land, but also socio-economic factors such as proximity to market, local infrastructure and a reliable water supply (Hindle, Nott & Crichton 1987). Classifications of land for each site are identified in *Figure 5.1* and *5.2*.

i Northside Option

Wagga Wagga City Council's land suitability map for the area classifies land in accordance with the NSW Department of Agriculture classification methodology. The Northside option is classified as Class 3 land. Class 3 lands are considered suitable for grazing as well as pasture improvement with occasional cash or fodder crops in conjunction with pasture management. The Northside option forms part of the town common, which is utilised for grazing purposes by the Trustees. The trustees indicated that they have no objection to the loss of this land for grazing purposes. The remainder of the land will still be available for its current use.



Figure 5.1 **ENVIRONMENTAL CHARACTERISTICS (Northside option)**

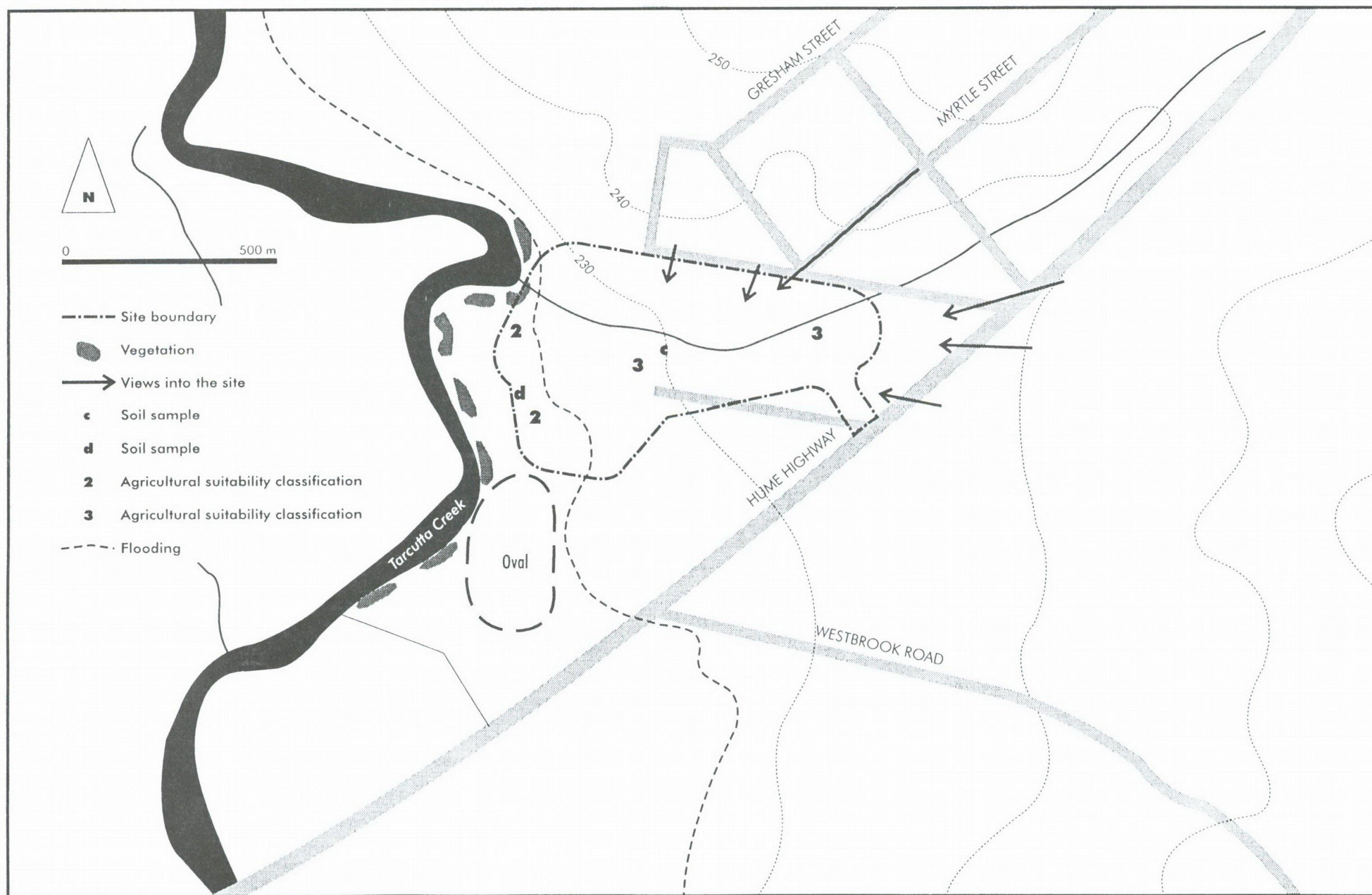


Figure 5.2 **ENVIRONMENTAL CHARACTERISTICS (Town Centre option)**

Given its classification of moderate production, the proximity of residential development and the fact that the land is used by approximately twenty different people known collectively as the trustees, the regional impacts of loss of this land are not likely to be significant.

ii Town Centre Option

The majority of the Town Centre option is classified as Class 3 land; however, the southern portion is Class 2 land. Class 2 land is generally suitable for high or sustained levels of agricultural production. This area of higher quality land is probably due to its location within the flood plain of Tarcutta Creek.

The majority of the Class 2 land is utilised for recreational purposes and no longer required for agricultural purposes. The remainder is being utilised for grazing purposes for approximately 20 head of cattle (pers. comm. Harry Podmore, 29 April 1998). Given the size of this remaining portion of land and its proximity to the urban area, the loss of this land would not have a significant regional impact. The remainder of the land on the site is developed for residential, commercial and retail purposes.

5.5 HYDROLOGY AND WATER QUALITY

5.5.1 Hydrologic Characteristics

i Local Watercourses

a Northside Option

The Northside option site is traversed by one ephemeral (with long periods of no flow) watercourse, originating immediately east of the Hume Highway. This watercourse crosses the site from east to west and drains into a small dam located near the north-western site boundary.

b Town Centre Option

The Town Centre option site is traversed by two ephemeral watercourses. One originates east of the Hume Highway and crosses through the centre of the site. The other watercourse originates south of the site and drains the cricket oval and tennis court during storm events. The later traverses the western portion of the site and flows north.

ii Main Waterways

Run-off from both sites flows west, entering Tarcutta Creek. The western boundary of the Northside option site and the Town Centre option site are approximately 700 metres and 50 metres east of Tarcutta Creek respectively.

Tarcutta Creek is a perennial watercourse (flows all the time) originating in the steep hills of the Bargo State Forest near Tumbarumba, approximately 50 kilometres upstream of Tarcutta. The creek flows north to join the Murrumbidgee River at Borambula, approximately 30 kilometres downstream of Tarcutta. Tarcutta Creek catchment area makes up about 2 % of the Murrumbidgee River catchment area. The Tarcutta Creek catchment is shown in *Figure 5.3*.

Umbango Creek flows from the Carabost State Forest near Rosewood and flows north to join Tarcutta Creek north of Umbango village. Keajura Creek joins Tarcutta Creek south of Tarcutta village. Tarcutta, Keajura and Umbango Creeks are fed by short tributaries flowing roughly east, north-east, west or north-west.

The *Clean Waters Act 1970 (NSW)* applies to Tarcutta Creek and all other waterways in the catchment. This Act prohibits the pollution of waters, except in accordance with a licence granted under the *Pollution Control Act 1970 (NSW)*. Tarcutta Creek is not a classified waterway under the Clean Waters Act. Without limiting the provisions of this Act, an unclassified waterway has lower levels of discharge water quality than a classified water.

5.5.2 Rainfall and Evaporation

No long-term rainfall or evaporation data is available for Tarcutta. The nearest Bureau of Meteorology monitoring station with long-term data is located at Wagga Wagga, about 55 kilometres north-west of Tarcutta. Average and median annual rainfalls at Wagga Wagga are 585 and 579 mm respectively (Bureau of Meteorology, 1998). The wettest months are July to October, with monthly rainfall typically exceeding 50 mm.

Highest evaporation occurs between October and April. On average, evaporation exceeds rainfall for all but two months of the year.

Rainfall data and evaporation data for Wagga Wagga are summarised in *Table 5.3*.

Table 5.3 Monthly Rainfall and Evaporation Data for Wagga Wagga

Month	Mean Rainfall (mm)	Median Rainfall (mm)	Mean Evaporation (mm)
January	42	32	310
February	38	26	255
March	45	34	214
April	43	29	120
May	56	42	62
June	49	44	36
July	58	57	37
August	53	56	59
September	51	48	84
October	61	51	146
November	44	40	213
December	45	34	295
Annual	585	580	1825

Source: Bureau of Meteorology (1998)

5.5.3 Flooding Characteristics

i Existing Flooding Regime

Flooding in the Tarcutta region is predominantly influenced by catchment run-off. The major source of floodwaters entering Tarcutta village comes from Tarcutta Creek. Minor flooding can occur when Keajura Creek overflows its banks. During major flooding events in Tarcutta, both creeks flood concurrently (DWR 1983).



Figure 5.3 **TARCUTTA CREEK CATCHMENT**

Tarcutta village experienced a major flood in 1983. Flood levels in Tarcutta Creek reached a peak of 228.5 metres (Australian height datum), upstream of the Hume Highway bridge (DWR 1983). A flood inundation map and article prepared by the Department of Water Resources (now the Department of Land and Water Conservation) suggested that this flood event was representative of the one in 100 year flood event although this was not confirmed.

Figure 5.2 shows the inundation extent of the 1983 flood event, in relation to the truck changeover site options.

Since the 1983 flood event, the RTA has extended a system of levees constructed near the Hume Highway. This flood mitigation work was conducted to prevent floodwaters from Tarcutta and Keajura Creeks cutting the highway. These levees would provide some protection to Tarcutta village during small flood events, but are likely to be overtopped during major flood events.

ii Impacts of Development

Construction of a hardstanding truck changeover facility would increase catchment run-off. This has the potential to cause localised flooding of drainage lines and Tarcutta Creek immediately upstream and downstream of the development site. To estimate the extent of this effect, hydraulic modelling would be required.

Regional flooding is not expected to significantly increase, given the small size of the development area (7 hectares and 5.5 hectares, Northside option and Town Centre option respectively) compared with the total Tarcutta Creek catchment area of 1,733 square kilometres (Robertson et al. 1993).

iii Site Opportunities and Constraints

a Northside Option

The Northside option is above the 1983 flood event inundation zone. A 700 metre buffer exists between this option and Tarcutta Creek. This significant buffer area would minimise potential increases in localised flooding of Tarcutta Creek caused by the proposed impervious truck changeover facility.

b Town Centre Option

The Town Centre option is partly located in the 1983 flood inundation zone. During major flood events parts of this site would be expected to experience flooding. This site is only 50 metres from Tarcutta Creek. Development in the flood plain not only has the potential to increase flood levels but also has the potential to affect flood patterns. Most of the facility will be hardstanding areas constructed at or close to existing ground levels. It is unlikely that the facility would significantly alter local flooding patterns but this should be confirmed during detailed design.

iv Environmental Safeguards and Mitigation Measures

To minimise potential localised flooding impacts at either site option, a detention basin that also functions as a pollution control basin is recommended. The existing dam at the Northside option site would be suitable for this function, subject to further assessment to determine the required size, depth and permeability.

Given the limited buffer between the Town Centre option site and Tarcutta Creek, more than one pollution control basin may be required to control run-off.

To contain any potential on-site spills at either site option, drainage from the facility hard standing areas should be contained, for example by kerbs and/or by drainage design.

5.5.4 Groundwater

i Existing Situation

The Department of Land and Water Conservation undertook a salinity and water-logging study of the Oberne-Tarcutta area in 1995. The study found that the hydrogeology of the flat areas adjacent to Tarcutta Creek are characterised by shallow (less than 3 metres) brackish to saline groundwater (DLWC 1995). The undulating landscape of the Tarcutta Creek catchment area limits the shallow groundwater zone to along the watercourse flats and in depressions. Waterlogging is prevalent in large portions of the catchment area (DLWC 1995).

On the basis of topographical investigation it can be inferred that groundwater at both site options flows west, toward Tarcutta Creek. Four groundwater bores and two wells are located in the Tarcutta Parish (DLWC 1995). One of these groundwater bores is used to supply town water whilst the other bores and wells are for stock or explorative purposes (DLWC 1995).

ii Development Impacts

Development of a hardstanding area can have two effects:

- a reduction in evapo-transpiration caused by the hardstand. This potentially results in a local rise in the water table and associated water logging and/or salinity problems; and
- a reduction in rainfall infiltration. This would have the reverse effect.

Given the small development area the project is unlikely to result in significant changes to groundwaters, locally or regionally.

The main risk to groundwater quality from a truck changeover facility would be an on-site chemical spill during facility operation.

The proposed Northside service centre option involves provision of underground fuel storage facilities. Leakage of these storage tanks proposes an additional risk to groundwater quality. Given the small development area of this option, the project is unlikely to result in significant changes in the position of the watertable.

iii Environmental Safeguards and Mitigation Techniques

a Construction

Prior to the development of a truck changeover facility at either of the two proposed options, an assessment of local groundwater depth should be made. The detail facility design including underground storage tanks should incorporate measures to minimise alterations to the groundwater quality and local groundwater regime.

b Operation

Pollution control basins are recommended to contain major on-site chemical spills. These basins should be designed to both contain the spill and also prevent its infiltration into the soil and groundwater.

5.5.5 Water Quality

i Existing Situation

Urban run-off from Tarcutta village, road run-off and agricultural run-off will influence water quality in the study area.

Water quality in Tarcutta Creek has been monitored monthly since 1992, by the Department of Land and Water Conservation (previously the Department of Water Resources). The monitoring site is located near the Tarcutta Creek – Murrumbidgee River junction, approximately 30 kilometres downstream of Tarcutta village. *Table 5.4* summarises the water quality monitoring results and also outlines the Australian and New Zealand Environment and Conservation Council water quality guidelines for the protection of freshwater aquatic ecosystems (ANZECC 1992).

Table 5.4 Water Quality Results for Tarcutta Creek

Water Quality Parameter	Mean Water Quality at Monitoring Site	ANZECC Guidelines
pH	7.0 - 8.2	6.5 – 9.0
Salinity ($\mu\text{S}/\text{cm}$)	325	1,500
Dissolved Oxygen (mg/L)	10	>6
Turbidity (NTU)	78	<10% change seasonal mean concentration (~20NTU)
Total Phosphorous (mg/L)	0.08	0.01 - 0.1 (indicative range)
Total Nitrogen (mg/L)	0.34	0.1-0.75 (indicative range)

Source: Department of Land and Water Conservation (1992-98)

Notes: mg/L – milligrams per litre
 NTU – nephelometric turbidity units
 $\mu\text{S}/\text{cm}$ – microsiemens %imetre

Water quality monitoring data indicates that the creek is often turbid. Bank erosion is an ongoing problem and debris from dead trees and willow blockages are common, exacerbating flooding and erosion problems (DWR 1995).

Monitoring results show that nutrient levels (total phosphorous and nitrogen) and dissolved oxygen levels meet the ANZECC guidelines.

No visual evidence of oil, grease or excessive algal growth was observed during a site inspection of watercourses in the study area. A small amount of litter was observed.

ii Development Impacts

Development of the truck changeover facility at either proposed site has the potential to adversely affect water quality in local watercourses, during both the construction and operation phases of the development.

a Construction

The main potential impacts on water quality during construction would be from erosion and sedimentation during earthworks.

b Operation

Operation of the truck changeover facility has the potential to increase levels of hydrocarbons, rubber, heavy metals, phosphorus and litter in local waterways. On-site emergencies are likely to involve fuel and oil spillages, use of fire retardants, use of detergents and other materials for cleaning vehicles.

iii Site Opportunities and Constraints

a Northside Option

The buffer between the western site boundary and Tarcutta Creek provides an opportunity for appropriate mitigation measures to be implemented to minimise the impact on water quality. The highly erodible nature of the soils on this site makes it necessary to implement more carefully designed erosion and sedimentation controls during construction on this site.

b Town Centre Option

The buffer between the western boundary of the Town Centre option site and Tarcutta Creek is only 50 metres and the soils on the site are moderately erodible.

iv Environmental Safeguards and Mitigation Measures

a Construction

Potential erosion and sedimentation impacts could be minimised through the adoption of standard construction management procedures. This would include the provision of temporary sedimentation basins and diversion drains. Erosion and sedimentation controls at the Northside option would require more careful design, given the highly erodible soil at this site.

b Operation

Design of the facility should include provision for pollution controls to contain spillages and minimise impacts on water quality. Control structures to reduce sediment, oil and grease and litter in stormwater run-off should be incorporated into the facility design. This would include the provision of sediment traps, gross pollutant traps (GTP's) or litter racks and oil/grit separators.

Emergency response procedures should be developed and followed in the event of a chemical spill. In the event of an incident occurring which may cause pollution the first priority should be personal safety. Following this, stabilising the situation and preventing additional soil or water contamination should prevent further impact.

Transportation, handling and storage of dangerous goods must be in accordance with the *Dangerous Goods Act 1975 (NSW)*.

5.6 FLORA AND FAUNA

The flora and fauna survey and subsequent report were conducted by Mr Matt Hayward (B.Sc. (Hons. 1) (Zoology) - National Parks and Wildlife Service Licence Number A2335) of SMEC Australia Pty Ltd for the New South Wales Roads and Traffic Authority (RTA). The site survey was conducted between 29 April and 1 May 1998.

5.6.1 Regional Setting

Tarcutta is located within the New South Wales South – West Slopes biogeographic region (Thackway & Cresswell 1995). This region is characterised by the extensive area of foothills and isolated ranges comprising the lower inland slopes of the Great Dividing Range. This region extends through southern New South Wales to western Victoria.

i Corridors

Corridors are areas of habitat that allow fauna to migrate or disperse between larger areas of habitat without having to cross open, unvegetated areas. Some readily mobile fauna, like larger birds, require little vegetation to move between patches of habitat. Less mobile fauna, like small birds and arboreal mammals, require densely vegetated corridors to forage and roost in while travelling to other areas. There is an existing wildlife corridor adjacent to each option. These corridors are described below.

a Tarcutta Creek – Murrumbidgee River

The Town Centre option is located at grid reference 566800 East, 6095900 North on the Tarcutta (8427-3-N) 1:25,000 topographic map. The site is cleared up to the riparian vegetation along Tarcutta Creek and is currently grazed by beef cattle. It is predominantly vegetated by introduced pastures. A small wetland is situated in the centre of the site. The site slopes from the Hume Highway in the east to Tarcutta Creek in the west.

Tarcutta Creek runs for 130 kilometres through various landforms. The upper catchment consists of a typical, narrow, upland stream that is generally less than five metres wide as it drains from the south-western highlands (Robertson et al. 1993). The middle section averages approximately eight metres width and is characterised by pool and riffle sequences. The lower section is typical of a lowland stream with a low gradient and a well-defined flood plain and a wider, meandering nature. Billabongs form an important part of the ecology of the lowland sections of the creek.

The Tarcutta Creek corridor connects native vegetation in the southern highlands with the remaining expanses of forests along the Murrumbidgee and Murray Riverina. This corridor of riparian vegetation lacks a shrub layer in many places and this may inhibit the movement of small birds and small mammals.

b Remnant Roadside Vegetation

The Northside option is located at grid reference 567500 East, 6096700 North on the Tarcutta topographic map. Several large but isolated eucalypts occur on the site.

There is little native understorey remaining. An area of revegetated land occurs in the cemetery that supports a more diverse flora and fauna.

The vegetation lining the roads and in road reserves in the agricultural areas of Australia are often the least disturbed areas remaining. Consequently, they offer habitat to native fauna. These remnants are often ungrazed and therefore have a native shrub layer remaining. In addition to this biodiversity, these remnant strips of vegetation are often very long and connect to larger expanses of native vegetation.

Remnant roadside vegetation corridors around Tarcutta include the Hume Highway, Westbrook Road and, to a greater extent, along Mates Gully Road.

5.6.2 Habitat Disturbance

There was evidence of habitat disturbance throughout both sites. Evidence of this disturbance is presented and described in *Table 5.5*.

Table 5.5 Habitat Disturbance

Disturbance	Town Centre Option	Northside Option
Cleared areas	Virtually entirely cleared Riparian vegetation lacks understorey	Virtually entirely cleared
Tracks	Minor	Minor
Grazing	Heavy beef cattle grazing observed	Light beef cattle grazing observed
Fire	Not recent	Not recent
Feral animals	Rabbits observed and appear abundant	Rabbits observed
Rubbish	Minor	Minor
Weeds	Introduced pastures and willow	Introduced pastures
Domesticated animals	Cattle	Cattle
Proximity to urban areas	Houses and shops occur along the eastern side of the site	Residential areas occur approximately 100 metres to the south of the site

As shown in the above table both sites have significant levels of disturbance. There is little difference between the disturbance level of each site.

5.6.3 Habitat Values

The habitat values of the two sites are compared in *Table 5.6*.

Table 5.6 *Habitat Values of the Two Sites*

Habitat Feature	Town Centre Option	Northside Option
Hollow logs	Present along riparian corridor beside site	Present in southern section of site
Tree debris	Present along riparian corridor beside site	Present in southern section of site
Tree hollows	Present in vegetation along riparian corridor beside site	Present in vegetation in southern section of site
Native vegetation	Very minor on site but corridor of native vegetation occurs along riparian corridor	A few large scattered eucalypts on site
Adjacent to fauna corridor	Yes	No
Wetlands	Highly polluted wetland on site	Moderately polluted wetland on site

As this table shows, both sites offer similar potential for fauna habitat.

5.6.4 Flora and Fauna Assessment

i Methodology

A site survey was conducted between 29 April and 1 May 1998. The weather on these three days is described in *Table 5.7*.

Table 5.7 *Weather Characteristics during Site Survey*

Date and Time	Temperature (°C)	Precipitation (mm)	Cloud Cover (%)
29/4/98			
9 a.m.	10	0	0
4 p.m.	18	0	25
30/4/98			
6 a.m.	8	0	Fog
4 p.m.	17	0	0
1/5/98			
6 a.m.	5	0	Fog
4 p.m.	18	0	25

The moon was about three-quarters full during the survey.

ii Flora

A general botanical survey of the two sites was conducted in accordance with the methods described by York et al. (1991). This involved surveying a 400 square metre (20 metres by 20 metres) plot in detail to identify ground cover species while species in the tree layer were all identified because of their scarcity. Plant identifications were made according to the recent nomenclature in Harden (1990, 1991, 1992 and

1993). Vegetation communities occurring in each area were identified according to the structural characteristics and floristics found in Specht (1981).

In addition to the above, attention was given to soils, topography, aspect and plant associations as indicators of rare or endangered plant species. This allowed for specific searches to be made to identify threatened plants. The conservation significance of plant species was determined from Briggs and Leigh (1996) and the New South Wales *Threatened Species Conservation Act 1995*.

iii Fauna

The fauna aspect of the survey involved walked transects to identify the following:

- birds by call or sight (according to Slater et al. (1995));
- note any tracks, scats or other signs of mammals (according to Triggs (1996));
- reptiles and amphibians by physical inspection of rocks, leaf litter, bark, logs and debris (according to Swan (1995) and Cogger (1996)); and
- frogs by their calls (according to Stewart (1995)).

Spotlighting and bat detecting occurred in the evenings between 6 p.m. and 11 p.m. to identify nocturnal species. Particular attention was paid to bird calls during the dawn and dusk period when many birds are at their most active.

Specific survey methods incorporated into the survey included the collection and identification of carnivore scats, the identification of hair within them and ultrasonic bat detection using an ANABAT 5 bat detector. Hair-tubing, Elliot trapping and pitfall trapping were excluded from use in this project because of the potential for disturbance from nearby residents and from cattle grazing on each site.

5.6.5 Study Limitations

As with most studies of this nature, time posed the major constraint. The survey was conducted over three days in autumn. As a result of this short survey period and the season in which it occurred it is likely that migratory and seasonal inhabitants of each site were under-sampled.

Rain had fallen within a week of the site survey. This meant one species of frog, *Crinia parinsignifera*, was observed. Both the time of year and the length of time since rain minimised the abundance of frog species. Six other species of frogs have been recorded in the Tarcutta region in the past. None of these is listed as threatened.

The clear weather was suitable for the observation of bats. Only one species was observed however. This was the *Chalinolobus gouldii* (Gould's Wattled Bat). The cooler night time weather of late autumn is not optimal for bat activity. Many bat species either migrate to warmer climates or go into torpor (an inactive state similar to hibernation) during the cooler months in central or southern New South Wales. Six other species of bat have been recorded in the Tarcutta region in the past. None of these is listed as threatened.

Many species of plants (particularly those from the Orchidaceae family) are not readily apparent unless they are in flower. Species may not have been detected because of the season in which the site survey took place.

5.6.6 Existing Flora and Fauna

i Flora

More than 150 species of plants have been recorded in the Tarcutta Creek catchment (Robertson et al. 1993). These are presented in *Appendix G*. This is a conservative figure as a more detailed survey at other times of the year (e.g. spring and summer) is likely to add more species to this list.

a Town Centre Option

The Town Centre option consisted of an introduced pasture vegetation community alongside a disturbed river red gum, *Eucalyptus camaldulensis*, forest with willow infestation. It is likely that this flood plain site would have originally consisted of a red gum forest with a native understorey. The location of vegetation on the site is provided in *Figure 5.2*.

The flora identified at the Town Centre option site during the survey is presented in *Table 5.8*. The lack of native species and the abundance of introduced species reflect the disturbance of the site.

Table 5.8 Flora Identified at the Town Centre Option Site

Family	Genus	Species	Common Name	Abundance	Status
Upper Stratum					
Myrtaceae	<i>Eucalyptus</i>	<i>camaldulensis</i>	River Red Gum	1	P
Cupressaceae	<i>Callitris</i>	<i>enderlichii</i>	Black Pine	3	P
Salicaceae	<i>Salix</i>	<i>babylonica</i>	Weeping Willow	1	I
Lower Stratum					
Mimosoideae	<i>Acacia</i>	<i>dealbata</i>	Silver Wattle	3	P
Poaceae	<i>Secale</i>	<i>cereale</i>	Cereal Rye	1	I
	<i>Hordeum</i>	<i>spp.</i>	Barley	2	I
	<i>Paspalum</i>	<i>paspalodes</i>	Water Couch	2	P
	<i>Paspalum</i>	<i>dilatatum</i>	Paspalum	1	I
	<i>Danthonia</i>	<i>racemosa</i>	Wallaby Grass	3	P
	<i>Trifolium</i>	<i>spp.</i>	Clover	1	I
Asteraceae	<i>Taraxacum</i>	<i>officinale</i>	Dandelion	1	I
Rosaceae	<i>Rubus</i>	<i>vulgaris</i>	Blackberry	2	I
Verbenaceae	<i>Verbena</i>	<i>bonariensis</i>	Purple Top	3	I
Dennstaedtiaceae	<i>Pteridium</i>	<i>esculentum</i>	Bracken	2	P

Key

- 1 – Common (observed during each survey period)
- 2 – Moderately Common
- 3 – Uncommon
- P – Protected
- I – Introduced

b Northside Option

The Northside option is vegetated with an introduced pasture community scattered with large, isolated ironbarks. It is likely that this area once supported an ironbark

woodland on the drier slopes and a white box *Eucalyptus albens* community in depressions. The approximate location of vegetation on the site is shown in *Figure 5.1*.

The flora identified at the northern site during the survey is presented in *Table 5.9*. The lack of native species and the abundance of introduced species reflect the disturbance of the site.

Table 5.9 *Flora Identified at the Northern Site*

Family	Genus	Species	Common Name	Abundance	Status
Upper Stratum					
Myrtaceae	<i>Eucalyptus</i>	<i>sideroxylon</i>	Mugga Ironbark	1	P
	<i>Eucalyptus</i>	<i>albens</i>	White Box	1	P
Lower Stratum					
Mimosiadeae	<i>Acacia</i>	<i>baileyana</i>	Cootamundra Wattle	3	P
Juncaceae	<i>Juncus</i>	<i>homalocaulis</i>	Rush	1	P
Poaceae	<i>Secale</i>	<i>cereale</i>	Cereal Rye	1	I
	<i>Hordeum</i>	<i>spp.</i>	Barley	2	I
	<i>Paspalum</i>	<i>paspalodes</i>	Water Couch	2	P
	<i>Paspalum</i>	<i>dilatatum</i>	Paspalum	1	I
	<i>Danthonia</i>	<i>racemosa</i>	Wallaby Grass	3	P
	<i>Trifolium</i>	<i>spp.</i>	Clover	1	I
Asteraceae	<i>Taraxacum</i>	<i>officinale</i>	Dandelion	1	I
Visaceae	<i>Notothixos</i>	<i>cornifolius</i>	Kurrajong	3	P
			Mistletoe		

Key to Abundance

- 1 – Common (observed during each survey period)
- 2 – Moderately Common
- 3 B Uncommon
- P – Protected
- I – Introduced

ii Fauna

A full list of fauna recorded by Robertson et al. (1993) in the Tarcutta Creek catchment is given in *Appendix H*. This list includes 27 species of reptiles and amphibians, 31 mammals and nearly 180 bird species. No threatened species have been recorded in the catchment (Robertson et al. 1993).

Many of the species recorded in the Tarcutta catchment do not occur in the lowland reaches of the creek around Tarcutta. A list of species observed during the current study is presented in *Table 5.10*.

Table 5.10 Fauna of the Two Options

Common Name	Scientific Name	Status	Town Centre	Northside Option	Relative Abundance
Australian Magpie	<i>Gymnorhina tibicen</i>	P	Yes	Yes	1
Australian Raven	<i>Corvus coronoides</i>	P	No	Yes	2
Australian Wood Duck	<i>Chenonetta jubata</i>	P	Yes	Yes	1
Blackbird	<i>Turdus merula</i>	I	Yes	Yes	2
Brown Treecreeper	<i>Climacteris picumnus</i>	P	Yes	No	3
Common Starling	<i>Sturnis vulgaris</i>	I	Yes	Yes	1
Crested Pigeon	<i>Geophaps lophotes</i>	P	Yes	Yes	1
Crested Shrike-tit	<i>Falcunculus frontatus</i>	P	No	Yes	3
Crimson Rosella	<i>Platycercus elegans</i>	P	Yes	Yes	1
Eastern Rosella	<i>Platycercus eximius</i>	P	Yes	Yes	1
Eastern Yellow Robin	<i>Eopsaltria australis</i>	P	Yes	Yes	2
Galah	<i>Cacatua roseicapilla</i>	P	Yes	Yes	1
Grey Currawong	<i>Strepera versicolor</i>	P	Yes	No	3
Grey Shrike Thrush	<i>Colluricincla harmonica</i>	P	Yes	Yes	2
Yellow-plumed Honeyeater	<i>Lichenostomus ornatus</i>	P	Yes	No	3
House Sparrow	<i>Passer domesticus</i>	I	Yes	No	1
Laughing Kookaburra	<i>Dacelo novaeguineae</i>	P	Yes	Yes	1
Magpie Lark	<i>Grallina cyanoleuca</i>	P	Yes	Yes	1
Noisy Friarbird	<i>Philemon corniculatus</i>	P	No	Yes	1
Pacific Black Duck-Mallard Hybrid	<i>Anas superciliosa-platyrhynchus</i>	P	Yes	No	1
Pied Currawong	<i>Strepera graculina</i>	P	Yes	Yes	1
Red Wattlebird	<i>Anthochaera cartunculata</i>	P	Yes	Yes	1
Red-browed Finch	<i>Neochima temporalis</i>	P	Yes	Yes	1
Restless Flycatcher	<i>Myiagra inquieta</i>	P	Yes	Yes	2
Flame Robin	<i>Petroica phoenicea</i>	P	No	Yes	3
Southern Whiteface	<i>Aphelocaphala leucopsis</i>	P	No	Yes	2
Spotted Pardolote	<i>Pardolotus punctatus</i>	P	Yes	Yes	1
Striated Pardolote	<i>Pardolotus striatus</i>	P	Yes	Yes	1
Striated Thornbill	<i>Acanthiza lineata</i>	P	Yes	Yes	2
Sulfur-crested Cockatoo	<i>Cacatua galerita</i>	P	Yes	Yes	1
Superb Blue Wren	<i>Malurus cyaneus</i>	P	Yes	Yes	1
Welcome Swallow	<i>Hirundo neoxena</i>	P	Yes	Yes	1
White-browed Scrub-wren	<i>Sericornis frontalis</i>	P	Yes	No	3
White-faced Heron	<i>Egretta novaehollandiae</i>	P	Yes	No	3
White-plumed Honeyeater	<i>Lichenostomus penicillatus</i>	P	Yes	Yes	1
White-necked Heron	<i>Ardea pacifica</i>	P	No	Yes	3
White-throated Warbler	<i>Gerygone olivacea</i>	P	Yes	No	3
White-winged Triller	<i>Lalage tricolor</i>	P	Yes	No	3
Willie Wagtail	<i>Rhipidura leucophrys</i>	P	Yes	Yes	1
Yellow Thornbill	<i>Acanthiza nana</i>	P	Yes	Yes	1
Froglet	<i>Crinia parinsignifera</i>	P	Yes	Yes	1
Common Brushtail Possum	<i>Trichosurus vulpecula</i>	P	Yes	No	2
Rabbit	<i>Oryctolagus cuniculus</i>	I	Yes	Yes	1
Gould's Wattled Bat	<i>Chalinolobus gouldii</i>	p	Yes	No	2
Echidna	<i>Tachyglossus aculeatus</i>	P	No	Yes	3

Key to Status and Abundance

P – Protected

I – Introduced

V – Vulnerable (Schedule 2 of the *Threatened Species Conservation Act 1995*).

1 – Common (observed during each survey period)

2 – Moderately Common

3 – Uncommon

Other fauna recorded by local naturalists but not observed during this survey include Australian ibis, pelican, eastern spinebill, dollarbird, butcherbird, blue-tongue lizard, southern boobook, bearded dragon, red foxes and grey kangaroos.

State Environmental Planning Policy 44 - Koala Habitat Protection (SEPP 44), which commenced on 13 February 1995, aims to protect the habitat of koalas. It applies to land with an area of more than one hectare. The Wagga Wagga Local Government Area is one of the LGAs covered by this policy.

Before a consent authority may grant development consent on land, it must decide whether or not the land is "potential koala habitat". The definition of potential koala habitat is "an area of native vegetation where the trees or the types listed in schedule 2 (koala feed trees) constitute at least 15% of the total number of trees in the upper or lower strata of the tree component" (clause 4).

It has been identified that feed tree species occur in the vicinity of each option. These are river red gum (*Eucalyptus camaldulensis*) located along Tarcutta Creek and white box (*Eucalyptus albens*) located along the roadside adjacent to the Northside option. These trees constitute approximately 90% of the trees in these areas. Therefore it can be concluded that both options are adjacent to potential koala habitat.

Before Council can grant development consent to development within a potential koala habitat it must satisfy itself that the area is not a core koala habitat. A core koala habitat is defined as "an area of land with a resident population of koalas evidenced by attributes such as breeding females and recent sightings of and historical records of a population". An assessment was undertaken as part of the flora and fauna survey which concluded that neither of these sites can be classed as a core koala habitat. This conclusion was reached as there were no sightings of breeding females during the survey and the National Parks and Wildlife Service database did not identify koalas as occurring in this area either recently or historically. This policy would not be relevant to the proposed use on either site.

5.6.7 Town Centre Option

Thirty-eight species were observed at the Town Centre option. While this number is likely to increase significantly in a longer survey period, it is less likely to identify any species listed on the *Threatened Species Conservation Act 1995*. The wetland on the site offered habitat to water birds and its proximity to the Tarcutta Creek means that a wide range of species may travel past the site. The preservation of the red gum forest along the creek is important for the conservation of biodiversity in the region.

5.6.8 Northside Option

Thirty-four species were observed at the Northside option site. While this number is likely to increase significantly if a longer survey period occurred, it is less likely to identify any species listed on the *Threatened Species Conservation Act 1995*. The lack of tall, protective vegetation surrounding the dam on this site minimises its use by waterbirds. The clearance and lack of native vegetation further minimised the potential of native fauna to use the site.

The large ironbarks on the site do offer habitat for native fauna. The hollows within these offer roosting and nesting sites for birds, bats and arboreal mammals despite none being observed during the site survey.

5.6.9 Species of Significance

i Flora

Species listed on the New South Wales *Threatened Species Conservation Act 1995* and have been recorded in the South-west Slopes biogeographical region are provided in *Appendix I*.

None of these species were identified during the site inspection despite specific searches occurring in potential habitats. The degree of disturbance at the two sites limits the chances of finding them at other times of the year.

The orchids that occur in sclerophyll forest flower between September and November and a specific site inspection at this time is likely to rule out the presence or absence of these species.

ii Fauna

There have been no threatened species recorded from the Tarcutta region or within the Tarcutta Creek catchment in the past. Similarly this study did not find evidence of the presence of any threatened species. The degree of disturbance, proximity to urban areas and the lack of native vegetation are likely reasons for this. Until large areas of undisturbed native vegetation regenerate in the area, this is likely to remain the case.

An eight part test was undertaken and is included in *Appendix J*.

5.6.10 Conclusions and Recommendations

Both sites being considered for the Tarcutta Truck Changeover Facility are significantly disturbed. Neither offers significant habitat for flora or fauna. No threatened species of flora or fauna were recorded or are likely to be recorded on either site. Consequently, flora and fauna are not a significant constraint to the selection of a preferred site.

The following recommendations are made regarding future development of either option:

- revegetate areas surrounding the eventual truck changeover facility with locally indigenous plants. This will increase diversity of both plants and animals in the region;
- preserve and protect the river red gum forest along Tarcutta Creek;
- fence off Tarcutta Creek to allow native understorey vegetation to regenerate;
- preserve and protect the three large ironbarks on the Northside option and the clump of large ironbarks to the south-west of the proposed interchange facility. These trees should be fenced off so that their root system is not disturbed; and
- fence off and protect the roadside vegetation along the Hume Highway beside the Northside option. This vegetation may act as a corridor for fauna movements.

5.7 LANDSCAPE CHARACTER

5.7.1 General Landscape Setting of Tarcutta

Tarcutta is sited over a series of low hills across which the Hume Highway passes. Surrounding the town to the south, west and north is the floodplain associated with Tarcutta Creek which flows generally to the north then west before joining the Murrumbidgee River to the east of Wagga Wagga. A location plan and a town layout plan are included as *Figure 1.1* and *1.2*.

Lines of undulating hills, with sparse to scattered woodland vegetation, form the skyline enclosure of the area with the cleared One Tree Hill prominent to the north-west. Together with the varied topography, the sheep and cattle-grazing land around Tarcutta provides a traditional and pleasant rural setting.

The two main Hume Highway approaches to the township offer quite different opportunities to appreciate the form and townscape character of Tarcutta. Arriving from the south-west, broad views across the Tarcutta Creek bridge enable an immediate appreciation of the cluster of main-street commercial buildings on the low-lying land as well as the residential areas spreading over the more elevated land beyond. Notable features of the cultural landscape on the fringes of the township include the old Mate family buildings with their historic curtilages, the Hambleton group and the former Tarcutta Inn, and the vegetation along the creek.

The approach from the north-eastern side of the town offers a more restricted and gradual prospect of the place. After emerging from the long cutting to the north of Mate Street, the remnant roadside vegetation encloses the road corridor such that only small parts of the town are revealed at a time. Views of the town centre are only apparent after reaching the main ridge in the vicinity of Prospect Street.

5.7.2 Description of the Proposed Town Centre Option

The proposed Town Centre option site lies on generally flat, low-lying land to the north of the Hume Highway between Tarcutta Creek (to the immediate west) and the line of commercial buildings with frontage to the highway (to the east). An easement for College Street, part of which has no formed roadway, defines the northern boundary while the flood-labile town recreation reserve lies to the south of the site.

The site is an irregular-shaped basin of improved pasture enclosed by the long, elevated spur to the north, the dense creekside vegetation to the west and the buildings to the east. Within the site are several existing buildings including cottages and a large, metal-panel clad storage shed near the College Street boundary. Apart from the eucalypts and willows fringing Tarcutta Creek there are almost no trees on the site. A solitary date palm (*Phoenix* sp.) is the most conspicuous of the planted vegetation.

Adjoining the site to the north is Tarcutta's oldest surviving schoolhouse with its south-facing veranda facing the site, and remnant plantings including monterey pine, cyprus, oak and kurrajong. Opposite this, and across the unformed easement for King Street, is a low-profile recent brick residence near the top of the Archer Street spur with some old orchard trees and young wattles partly screening it from the site.

5.7.3 Description of the Proposed Northside Option

To the immediate north of the town is the site of the other proposed interchange option. Compared with the Town Centre option site this is a more open area of largely cleared pastureland contained by the spur to the south (along which Prospect Street is located) and the long ridge to the north (through which there is a cutting for the highway).

The highway forms the eastern edge of the site; the northern boundary is indicated by a fence that extrapolates the alignment of Mate Street; and the western boundary follows another fenceline, part of which also provides one of the edges for the Tarcutta General Cemetery. Although this too is a largely cleared area, the few trees it has are almost all mature and add to the sense of depth of views across the site.

Buildings in the near vicinity of the site include several adjacent residences and a motel on the eastern side of the highway and the northern-most residence off Myrtle Street. The cemetery is also mostly clear of vegetation with some recent regeneration of indigenous plants in the corners and a group of mature trees in the area between the cemetery and the proposed interchange site. Both sites are currently readily visible from one another.

The open character of this site enables good views across it to attractive rural scenery including the line of hills to the west featuring one of the local landmarks, One Tree Hill. A pleasant contrast occurs between the relatively confined spatial corridor along the highway, defined by the groups of mature remnant eucalypts and road cuttings, and the broad open space of this visually prominent site.

As the last such open space before entering the more enclosed environment of the township, the site psychologically heightens the experience of reaching Tarcutta from this direction. This contrast is also appreciated when travelling in the other direction with the effect of leaving the township near Prospect Street and immediately entering the environment of broad pastoral land. These poignant landscape contrasts are an important part of the traditional setting of Tarcutta and are useful in understanding the character of the place.

Existing views into both options are shown in *Figures 5.1* and *5.2*.

5.7.4 Landscape Assessment

Both proposed site options for a truck interchange would entail visible changes to the existing rural landscape setting. In both cases the introduction of various structures would be noticeable from parts of the Hume Highway and the township of Tarcutta. Such changes would include acoustic shields, light standards, nightlighting effects, new sign structures and new buildings, apart from the short-term initial construction phase.

Of the two options the proposed Town Centre option site offers more scope to visually absorb development associated with the proposed interchange. This is because it is of relatively low elevation and is mostly behind the main-street buildings and screened by vegetation along Tarcutta Creek to the west as well as the elevated spur to the north along Archer Street.

Residences on the elevated land to the immediate north-east of the site would be potentially the most affected by visual impacts. These impacts would include: the construction of the facility; new structures for noise reduction; lighting and facility amenities; the concentration of a large number of trucks within the site; and, with the

planting of screen vegetation along the northern boundary, the possible loss of some existing distant views to the Keajura area to the south-west. A nightlight haze, in addition to that from the existing highway and street illumination, may be apparent from parts of the township on both sides of the highway.

If the employment of noise reduction measures is restricted to the site area it would likely require the construction of relatively high acoustic fences which, as a source of visual impact, would necessitate extensive screen planting. Where noise reduction measures could be implemented at both the site and the potentially affected residences, the heights of the acoustic fences could be substantially reduced. This would enable the development to be more easily integrated within the existing landscape.

Owing to the open and partly elevated nature of the proposed Northside option site, it is anticipated that changes to this landscape would be more apparent. An aspect of significance in the Tarcutta townscape is the abrupt transition between the town and the surrounding expansive pastoral land. The development of the Northside option site would detract from an appreciation of this transition and compromise an important part of the traditional setting of the township.

The prominence of the Northside option site means that new development within the site would be highly visible. Such development would include:

- structures such as a food, fuel and amenities building (not needed at the Town Centre option site), together with its necessarily prominent road signs;
- a separate building for truck driver amenities; and
- the concentration of large vehicles within the site.

The introduction of screen planting along the highway frontage would not offer a satisfactory solution as this would still obscure the function of this area as a part of the landscaping setting for Tarcutta. For commercial and safety reasons also the extensive use of screen planting along the highway would not be desirable.

Both sites would contribute various visual impacts within the context of their respective existing landscape settings. Assuming the recommended mitigatory measures are implemented, the Town Centre option site would entail less overall visual impact potential than the Northside option site. Full details of the assessment are provided in *Appendix K*.

5.7.5 Mitigatory Measures

i Generally

The overall principle for reducing potential visual impacts is to minimise the perceived changes to the existing landscape. This can be achieved by either introducing new elements in a way that respects the existing visual context or, where there is insufficient scope to do this, by ensuring the new elements are not seen.

ii Northside Option

Appropriate measures to reduce or eliminate the potential visual impacts from development within the Northside option include:

- retaining all mature site trees and incorporating them within the site layout;

- ensuring trees adjoining the site, along the highway, Prospect Street and the cemetery, are retained,
- minimising earthworks within the site by restricting the amount and type of development on the steeper land to the south of the site;
- minimising as much as possible the height and extent of acoustic fences;
- using appropriate screen planting on both sides of the acoustic fences;
- reinforcing screen planting between the site and the cemetery and along the northern boundary;
- implementing a high standard of architectural design for all aspects of the buildings including siting;
- devising an illumination design for the site that minimises potential light spillage and the number of structures; and
- using appropriate landscape design to reduce the extent of internal paving to a safe minimum.

iii Town Centre Option

Appropriate measures to reduce or eliminate the potential visual impacts from development within the Town Centre option site include:

- using the existing junction of Hay Street and the Hume Highway as the site entry;
- limiting road-widening for access lanes along the main street;
- minimising the height of acoustic fences as much as possible;
- planting along the acoustic fences using vegetation appropriate to the context, including fast-growing species with a mature height that would screen as much of the internal site area as possible but not obscure existing desirable views from adjacent residences;
- devising an illumination design for the site that minimises potential light spillage and the number of structures;
- siting new structures, including buildings and signs, so as to avoid undue prominence;
- designing new structures, including buildings and lighting supports, to be visually subservient to the site context;
- using appropriate landscape design to reduce the extent of internal paving to a safe minimum;
- ensuring that existing vegetation along, and north of, College Street and creek-side vegetation both within and beyond the site is retained;
- reinforcing the creek-side vegetation with compatible plantings to extend the screen around to the south of the site;
- where possible incorporating the existing date palm within the site layout; and
- allowing for the future development, where appropriate, of more buildings along the main-street frontage.

Conceptual layouts of both sites are provided in *Figures 5.4* and *5.5*.

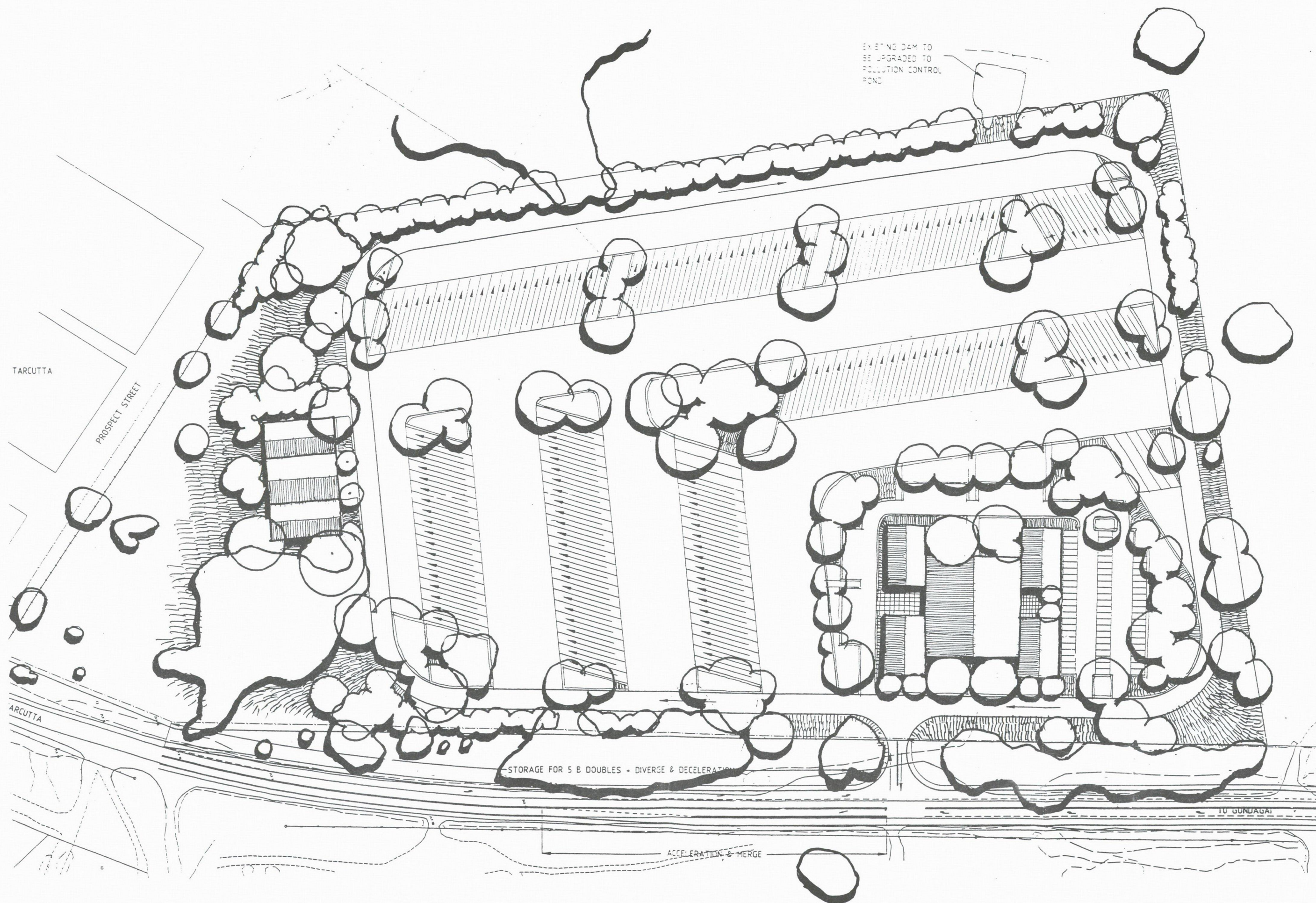


Figure 5.4 **CONCEPTUAL LAYOUT (Northside)**



Figure 5.5 **CONCEPTUAL LAYOUT (Town Centre)**

6 HUMAN ENVIRONMENT

6.1 INTRODUCTION

This chapter describes the human environment issues affecting both sites. The opportunities and constraints of each site are assessed against a number of different issues. Issues considered include Aboriginal archaeology, European heritage, noise, air quality, access and safety.

6.2 CULTURAL HERITAGE

6.2.1 Aboriginal Archaeology

i Introduction

A detailed archaeological survey is provided in *Appendix L*. This summary highlights the key findings and recommendations of the survey. The study area is located within the boundary of the Wiradjuri Regional Aboriginal Land Council (WRALC). A review of the regional context of the sites has indicated that the area could contain the following site types:

- scarred trees;
- scatters of stone artefacts;
- archaeologically sensitive areas – subsurface camp sites and/or midden deposit in aggrading areas on/or adjacent to Tarcutta Creek Floodplain; and
- isolated stone artefacts.

ii General Site Description

a *Northside Option*

This site is characterised by gently undulating granite terrain. Ground surface visibility in this area was high, however the site has been significantly disturbed.

b *Town Centre Option*

The site is characterised by low lying land between the Hume Highway and the floodplain adjoining Tarcutta Creek. Despite the disturbed nature of this site the dense cover of introduced grasses obscured the visibility of the ground surface.

iii Methodology

The Aboriginal archaeology study assessed whether the proposed development would affect any Aboriginal archaeological sites or relics. The methodology to achieve this was to:

- conduct a review of archaeological literature applicable to the area describing likely conditions for site location;
- consult with the Aboriginal Land Council;
- conduct a field study, accompanied by a member of the Aboriginal Land Council, to assess the proposed options and identify potential surface sites which may be of significance;
- identify other potential sites, including sub-surface material, and make recommendations as to their treatment; and
- present a written report summarising the findings of the above. The report discussed the value of the sites and the likely effect of the proposal on the sites, and made recommendations in relation to the preservation, recording and/or destruction of sites. The report was prepared to generally satisfy National Parks and Wildlife Service (NPWS) requirements.

A complete copy of the archaeological study is provided in *Appendix L*.

iv Summary of Results

a Northside Option

The conclusions of the study were:

- no Aboriginal archaeological sites listed with the NPWS Aboriginal Site Register are located within the Northside option impact area;
- one site, a possible Aboriginal scarred tree, North Tarcutta Scarred Tree (NTST) was found during the survey. The scarred tree is located within the proposed impact area and is potentially affected by the truck facility; and
- the archaeological potential of the Northside option study area is assessed to be low. The area has a low probability of containing sub-surface Aboriginal archaeological sites.

b Town Centre Option

The conclusions of the study were:

- no aboriginal archaeological sites listed in the NPWS Aboriginal Site Register are located within the Town Centre option impact area;
- no Aboriginal archaeological sites were found during the survey; and
- the survey identified several archaeologically sensitive areas with the potential to contain sub-surface deposits within the study area. The archaeological potential of the sensitive area is assessed to be low to moderate.

v Summary of Recommendations

Recommendations of the study were:

a Northside Option

- the changeover facility should be designed to avoid the scarred tree site NTST. If this were not possible the RTA should apply for a consent to destroy site NTST under Section 90 of the National Parks and Wildlife Act;

- should it be possible to avoid site NTST, the site must be preserved and protected from damage before and after construction works; and
- there are no further constraints on archaeological grounds to the proposed Northside development.

b Town Centre Option

- The RTA should apply to the NPWS for a preliminary research permit to carry out sub-surface testing of potential archaeological deposits.

The location of the archaeological items are identified in *Figures 6.1* and *6.2*.

vi Aboriginal Consultation

The study area is located within the boundary of the Wiradjuri Regional Aboriginal Land Council (WRALC). Mr Roley Williams, WRALC site officer, was consulted regarding the proposed development and participated in the field survey. On-site discussions were held regarding the study's recommendations. The WRALC was sent a draft copy of relevant sections of this report for comment. A response from the WRALC indicates that they concur with the findings and recommendations of the archaeological report. This response is provided in *Appendix M*.

6.2.2 European Heritage

i Historical Context

Tarcutta was declared a town in 1890. Thomas Mate and his family first settled at Hambledon, one kilometre south-west of Tarcutta, in 1837. Within four years Mate had established a sheep station of 120,000 acres, a licensed inn and a store. Other settlers who first came to the area were those employed by Mate or provided services to the district.

The track south to Victoria, known as Port Phillip Road, passed by Mate's inn and store. The town developed from a station homestead to a settlement due to its position on the road.

A half-time school was first established in 1873 from funds raised by the community. This site was located on the corner of Archer Street and Gresham Street. The school was relocated to a site west of King Street in 1884 and this land, together with the property extending to Tarcutta Creek, formed the school precinct.

Thomas Mate donated a large proportion of the funds to construct the St Mark's Church of England church at Tarcutta, which is positioned on the block of land bounded by Gresham, Short and Myrtle Streets. The Mates family grave is in St Mark's Churchyard, which formed the original cemetery in the town.

The town cemetery was developed in the early 1900s and provided burial grounds for all denominations.

The Old Tarcutta Inn was built in 1836 (pers. comm. Bill Belling 29 July 1998). The inn provided accommodation and food for travellers on the Port Phillip Road.

The town developed its historical relationship with the transport industry in 1957 when it hosted approximately 300 truck drivers for two weeks during the floods. A truckies' memorial was established in the town to commemorate all those who have died on the roads.

A review of the register of the National Estate Database identified the Hambledon Homestead as having national significance. There are no items identified by the National Trust located within the vicinity of the two options. A brief historical review of the development of Tarcutta indicates that the following sites and their curtilages are significant to the town and need to be considered in assessing the two options. For this assessment, curtilage relates to the layout, physical fabric and views from the subject property. These items are:

- the town cemetery;
- St Mark's Anglican Church;
- the old schoolyard; and
- the old Tarcutta Inn.

The location of these items is identified in *Figures 6.1* and *6.2*.

There are no heritage items identified within Wagga Wagga Rural LEP 1991.

ii Impact Assessment

a Northside Option

There will be views to the Northside option from the entry to the cemetery (from Gresham and Prospect Street) as well as within the cemetery itself. The relatively peaceful pastoral land surrounding the Tarcutta General Cemetery is an important part of its traditional curtilage. The construction and operation of the Northside option would change this setting. Noise from the facility has the potential to disturb a funeral service or visitors to the cemetery.

b Town Centre Option

There are limited vistas of the Town Centre option from along Myrtle Street and the main entry side of the St Mark's Anglican Church. However, the rural context of the church precinct will not be significantly altered.

The old schoolyard has a very prominent position located on elevated land to the immediate north-east of the Town Centre option site. The visual impacts will include:

- construction of the facility;
- new structures for noise reduction, lighting and facility amenities;
- concentration of large trucks on the site; and
- nightlight haze.

The site will be visible from the old Tarcutta Inn. This building is within a rural context but is contained by the vegetation along Tarcutta Creek. The intrusive man-made elements of the Tarcutta Creek bridge, the recreation oval and the Tarcutta

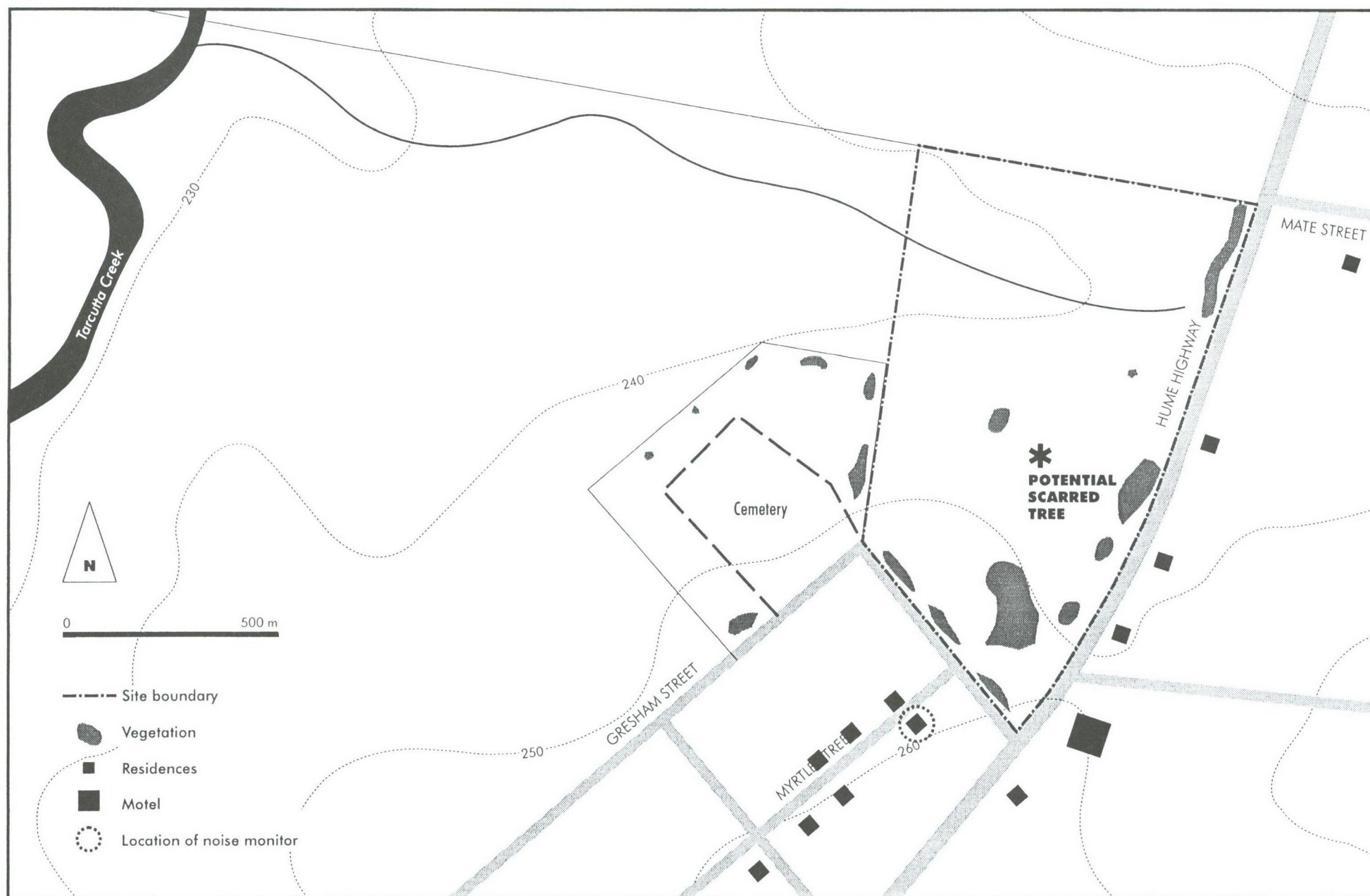


Figure 6.1 **HUMAN ENVIRONMENT (Northside option)**

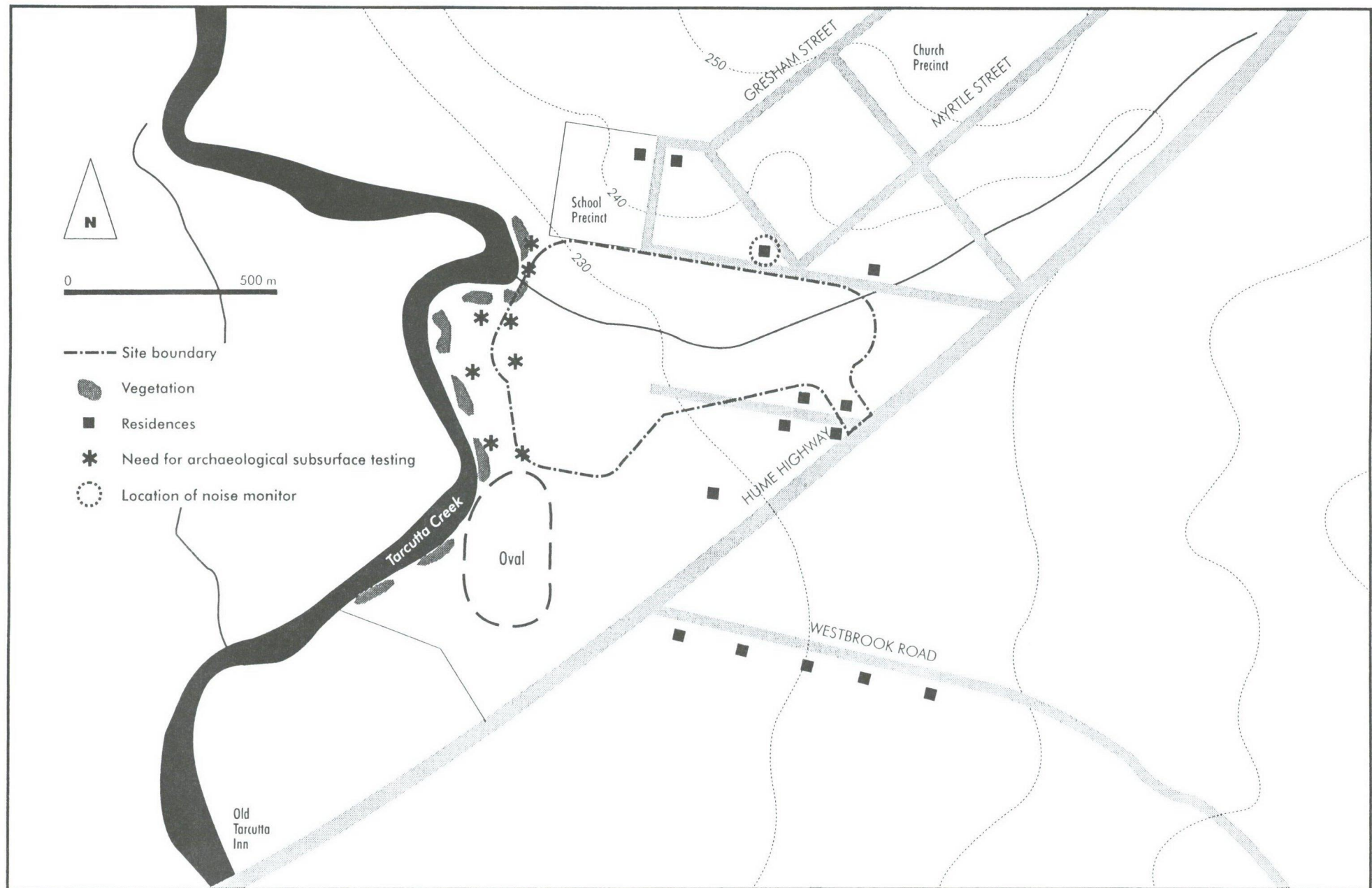


Figure 6.2 **HUMAN ENVIRONMENT (Town Centre option)**

Hotel surround the site. The use of screen planting would minimise the impact of the Town Centre option on the curtilage of the inn.

iii Recommendations

a Cemetery

To minimise the view of the Northside option from the cemetery and to maintain as much as possible the open pastoral landscape, screen planting will be required along the south-western boundary of the site. The spur that follows Prospect Street is to be retained for acoustical and amenity purposes.

b St Mark's Anglican Church

Mitigation measures identified within Chapter 5 could be used to minimise the impact on the views from the church.

c Old Schoolyard

Mitigation measures identified within Chapter 5 could be used to minimise the impact on the views from the schoolyard.

d Tarcutta Inn

Screen planting on the southern side of the Town Centre option will reduce its visual effects on the curtilage of the inn.

6.3 NOISE

6.3.1 Introduction

Richard Heggie and Associates were commissioned by SMEC Australia to assess the acoustical impact arising from the two changeover facility options. The full report is provided in *Appendix N*.

6.3.2 Truck Movement Profile

The RTA conducted a traffic volume and classification survey in April 1996 on the Tarcutta Creek bridge to show the daily hourly and daily profile of vehicle movements along the Hume Highway.

This survey indicated that the traffic volumes are highly dependent upon the day of the week and the time of day. Highest car movements occur on the weekends, typically during daylight hours, whilst the highest truck movements occur mid-week, nominally between 11.00 p.m. and 2.00 a.m. The highest number of truck movements recorded over a one-hour period of the survey was 256, between 1.00 a.m. and 2.00 a.m. on a Wednesday morning.

The trucks entering the facility may be expected to follow a similar profile to the prevailing heavy vehicle movements that occur along the Hume Highway. The night-time usage of the facility is likely to be significantly higher than the daytime usage.

The RTA has estimated that up to 80 trucks may use the facility at any time during the night. Given the maximum night-time usage and the daily truck profile, it may reasonably be assumed that up to 20 trucks may simultaneously use the facility during the day.

6.3.3 Ambient Noise Environment

To quantify the ambient noise environment at representative residences near the development site, two unattended noise loggers were deployed to simultaneously monitor the daily noise level variations between 20 April and 8 May 1998.

Noise loggers were placed at the following residential properties:

- Location 1 Near the Northside option: at a residential property at Lot 7, Myrtle Street, between Spring and Prospect Street.
- Location 2 Near the Town Centre option: Lot 2, Archer Street, on the corner of College Street.

These locations are presented in *Figure 6.1* and *6.2* and are considered to be representative of other residences in the immediate area.

These unattended noise surveys were supplemented by a number of short-term operator-attended surveys at several other residential locations, at locations shown in *Figures 6.1* and *6.2*.

6.3.4 Measured Noise Levels

During the noise monitoring exercise, the dock dispute which affected the operation of the Sydney and Melbourne wharfs reduced the amount of heavy vehicles that would normally have been on the Hume Highway. The recorded levels therefore are lower than what would be normal within the township. Using the measured levels, therefore, represents a conservative basis on which to conduct the assessment.

The EPA currently requires the determination of the "minimum repeated" background (or $L_{A90(15\text{minute})}$) noise level as the basis for establishing permissible emission limits. These limits are generally expressed as some margin above the background noise level.

Having reviewed the results of the unattended noise monitoring, the minimum repeated $L_{A90(15\text{ minute})}$ noise level for each site has been calculated and is presented in *Table 6.1* below:

Table 6.1 Minimum Repeated Background Noise Levels

Location	Minimum Repeated $L_{A90(15\text{ minute})}$ Levels	
	Daytime	Night-time
Location 1 (Northside)	36dBA	30dBA
Location 2 (Town Centre)	38dBA	33dBA

When assessing the noise emissions from roadways, the NSW Environmental Protection Authority classifies "daytime" as 6.00 a.m. to 10.00 p.m. This is consistent with the NSW RTA's and the Bavarian EPA's definition. For noise emissions from other sources (e.g. mechanical plant), the NSW EPA refer to daytime as 7.00 a.m. to 10.00 p.m. Monday to Saturday and 10.00 p.m. to 8.00 a.m. Sundays and public holidays.

When assessing traffic noise, the NSW EPA and RTA commonly refer to the $L_{Aeq(8 \text{ hour})}$ and $L_{Aeq(24 \text{ hour})}$ noise indices. Based on the unattended noise surveys conducted at the two sites, these traffic noise indices have been calculated from the results of the unattended monitoring, and are presented in *Table 6.2* below.

Table 6.2 *Measured Road Traffic Noise Indices*

Location	Road Traffic Noise Indices	
	Daytime – $L_{Aeq(24 \text{ hour})}$	Night-time – $L_{Aeq(8 \text{ hour})}$
Location 1 (Northside)	61dBA	57dBA
Location 2 (Town Centre)	54dBA	53dBA

Minimum repeated L_{A90} noise levels (as presented in *Table 6.1*) are always lower than the road traffic noise descriptors used by the EPA and the RTA (as presented in *Table 6.2*). The L_{A90} level is the level corresponding to the quietest 90 seconds in any 15 minute period, whilst the road traffic noise indices are weighted to the louder noise events, such as those associated with truck movements. The substantial difference between these two terms is an indication of the significance of road traffic on the relatively rural environment of Tarcutta.

6.3.5 Noise Criteria

Responsibility for the control of noise emission in NSW is vested in Local Council and the EPA which administers the *Noise Control Act 1975*.

The proposed development is not a Scheduled Premise as defined under the Noise Control Act, therefore the EPA is not required to grant an approval or issue a licence for the operations on the site.

The Environmental Noise Control Manual (ENCM) does not provide any specific criteria for assessing the noise emissions associated with parking facilities of any type.

i EPA Criteria for Intermittent Traffic Flows

Chapter 157 of the EPA's Environmental Noise Control Manual recommends the use of the L_{Aeq} noise index when assessing noise from low or intermittent traffic flows (of less than about 1000 vehicles per day).

For public roads, the EPA's ENCM suggests a noise impact assessment criterion for "new development in rural environs" of L_{Aeq} 50dBA, when assessed over the period of maximum traffic flow. This assessment period is usually accepted to be 1 hour.

In situations, where the ambient L_{Aeq} exceeds this 50dBA level, however, (as in the case presented in *Table 6.2*), an overall increase of 2dBA or less is usually considered acceptable.

ii EPA Criteria for Industrial/Commercial Noise Emissions

The EPA attempts to balance the possible adverse effects on individuals with the potential benefits to the broader community by drafting a schedule of recommended L_{A90} background noise levels for various land use categories.

In order that a new noise source in a community is not considered intrusive, the EPA's policy is to recommend that the contributed "average maximum" or L_{A10} noise level of the new noise source does not exceed the existing background by more than 5dBA.

iii Sleep Disturbance

The EPA advocates that the L_{A1} noise level from a noise event should not exceed the background noise level by more than 15dBA (when measured 1 metre external to the building) to avoid potential sleep disturbance in occupants within the building.

A number of recent studies have since been conducted on the effects of noise on sleep. These studies have sought to define the noise levels required to cause a change in the depth of sleep and/or sleep disturbance and have generally been carried out on a relatively small sample of people and often in laboratory or other abnormal surroundings.

A recent study (Griefahn 1992) has reviewed the bulk of sleep disturbance research and gives proposals for continuous and intermittent noise level criteria for minimising sleep disturbance. The conclusions of this study indicated that the permissible external sound limit (assuming external façade windows are open) is 65dBA.

This study finds that the L_{Aeq} is generally not suitable as a noise descriptor for the prediction of sleep disturbance as people are more disturbed by intermittent noise than by continuous noise. The number and maximum levels of a particular stimulus are best used to assess the impact of intermittent noise.

iv Project Specific Criteria

The character of noise arising from the operation of an interchange facility would be similar to that of the prevailing traffic noise from the Hume Highway. Wagga Wagga Council and the RTA view this site as being consistent with an industrial or commercial operation. The implication is that the EPA's background +5dBA rule would therefore apply. On this basis the average minimum or L_{A10} emission objectives presented in *Table 6.3* would apply.

Table 6.3 Noise Emission Objectives

Location	L_{A10} Noise Emission Objectives	
	Daytime – L_{A10}	Nighttime L_{A10}
Location 1 (Northside)	41dBA	35dBA
Location 2 (Town Centre)	43dBA	38dBA

Alternatively, the use of the L_{Aeq} index may be adopted. This parameter is an energy based index and is sensitive to short-term, high level noise sources, whereas the L_{A10} based objective does not cater for the magnitude of any existing noise from heavy vehicles along the Hume Highway.

At locations where the ambient L_{A10} level exceeds the emission objective detailed in *Table 6.3* or where it is not economically or technically feasible to comply with this objective, it is recommended that the allowable increase in the noise environment be limited to 2dBA.

Based on the ambient night-time L_{Aeq} levels presented *Table 6.4* presents the upper L_{Aeq} limit, which results in an increase in the ambient night-time L_{Aeq} noise level of 2dBA.

Table 6.4 Noise Emission Limits

Location	Existing Noise Environment (Hume Highway) $L_{Aeq}(8 \text{ hour})$	Maximum Emission Level from Development $L_{Aeq}(8 \text{ hour})$	Possible New Noise Environment (with Development) $L_{Aeq}(8 \text{ hour})$
1 – Northside	57dBA	55dBA	59dBA
2 – Town Centre	53dBA	52dBA	55dBA

In addition, the maximum noise level (L_{Amax}) should not exceed 65dBA near the facade of any residence to avoid sleep disturbance.

6.3.6 Noise Assessment

Noise modelling was conducted in order to determine whether the noise emission levels identified in *Table 6.3* and *6.4* can be achieved. Throughout the night, the use of the facility will vary considerably according to the prevailing heavy vehicle content on the Hume Highway. This assessment has modelled a “worst case scenario” by assuming that:

- the maximum hourly usage of the facility is maintained throughout the night-time period; and
- a prevailing wind of 2 m/s is blowing from each facility to all residences simultaneously. This situation can never be realised in practice, but simulates an overlay of a multitude of separate scenarios in which the wind is blowing to each of the residences in turn.

In converting the calculated L_{Aeq} value to an L_{A10} parameter, a conversion of +3dBA would apply during high use periods throughout the night-time, while a conversion of -5dBA would apply during the day-time when demand was low.

6.3.7 Impact and Recommendation

i Results of Modelling

Initial calculations resulted in significant exceedances of the noise emission limits presented in *Table 6.3* and *6.4*, at several residences near each site. Calculations indicate that significant height acoustic barriers would be required to comply with the L_{Aeq} and L_{Amax} based criteria. However, the following guideline treatment options are presented, but are highly dependent upon the final layout of the internal roadway, the grade within the facility, parking patterns and RL of the hard stand area. Comparison of the predicted L_{Amax} and $L_{Aeq(8 \text{ hour})}$ noise levels indicates that the resultant noise emissions readily comply with the relevant criteria discussed in *Appendix N* after the incorporation of acoustic barriers.

The barriers included in the model include:

- a 6.5 metre acoustic barrier around the northern boundary of the Town Centre option;
- a 6.0 metre acoustic barrier around the southern and south-eastern sides of the Town Centre option, extending to and along the southern side of the access road from the Hume Highway; and
- a 3 metre acoustic barrier around the southern sides of the Northside option.

Figures 9.1 and *9.2* show the location of these barriers.

These barriers may be constructed either from earth mounds, a wall, or a combination of the two, for example, a 6 metre wall may, for example, be constructed from a 2.5 metre wall placed on top of a 3.5 metre mound. Walls higher than 2.5 metres should have a surface density greater than 12 kg/m^2 . The wall should extend down to (or slightly below) ground level, and be solid and continuous.

ii Noise Control Measures to Residences

Adopting noise control measures in and around the individually affected dwellings may reduce the extent of barriers detailed above. The control measures may include, but not be limited to:

- increasing the glazing thickness on all facade windows;
- providing a system to supply air into the habitable rooms (not air conditioning);
- possibly upgrading perimeter doors;
- sealing eaves; and
- incorporating acoustical insulation and "wavebar" or other similar material in the roof space.

Should any of the houses in question be constructed from weatherboard, the extent of control measures may preclude the upgrading of the facade as an option, depending upon their exposure to the facility. In such cases, the construction of a new dwelling could be considered.

The purchasing or relocating of the residents potentially most affected by the proposed facility, should be considered where the cost of noise control measures are high.

iii Benefits to other residents

There are a number of residents affected by noise emissions from truck parking and exchange operations, which occur in the immediate vicinity of their dwellings. The noise associated with these operations is highly variable but levels up to (an estimate of) 90dBA would at times occur. This level would be significantly above the ambient environment and would be expected to result in sleep disturbance to some occupants.

The creation of a central changeover facility would remove the existing scatter of individual truck noise related events within the town and relocate them in one area, in which suitable noise control measures can be incorporated to minimise any acoustical impact. Significant noise reduction will occur at the residences along the Hume Highway (between Centenary Street and Toonga Street) from the creation of a central facility (located either at the proposed Town Centre or Northside option).

6.3.8 Conclusions

Various criteria have been discussed for use on the project. The night time L_{A10} criteria is not considered appropriate since the criteria is nominally 20dBA below the existing ambient L_{A10} levels, and the L_{A10} descriptor is not influenced by a number of shorter events. An L_{Aeq} based criteria was adopted, to a level that should not result in any significant increase in the overall night-time noise environment.

A range of noise control measures is discussed within the report for each site and must be considered in the light of the costs associated with relocation or purchase of the affected properties.

Once detailed design has determined the following details, calculations will need to verify that the heights and extent of the acoustic barriers are still appropriate, considering the location of any nearby dwellings. The details to be determined include:

- the final layout of the site;
- the working RLs with respect to the prevailing water table;
- the grade of the internal road network; and
- any refinement to the vehicle usage pattern of the facility etc.

The overall facility will be used by drivers for a variety of reasons. As previously discussed, these include: eating, trailer exchange operations, toilet facilities and resting. In the detailed design phase of the facility, consideration should be given to the internal layout to separate the resting areas from the exchange area. In order not to disturb the rest period of drivers, a separate area for refrigerated trucks should be considered.

6.4 AIR QUALITY

6.4.1 Existing Conditions

Comprehensive air quality monitoring data is not available for the Tarcutta region. There are no significant air pollution point sources in the area and no regional air

quality problems. The dominant activity influencing local air quality is traffic movements on the Hume Highway and, in particular, heavy vehicle movements.

The pollutants emitted by motor vehicles are principally carbon monoxide, smoke, nitrogen oxides, unburnt hydrocarbon fuel, odours and lead compounds. Motor vehicles also contribute dusts of fine rubber from tyres and asbestos dusts from brake linings and clutch plates (RTA 1994).

6.4.2 Potential Impacts

Potential impacts on air quality associated with the development of a truck changeover facility can be broken into those associated with the construction phase and those associated with the operation phase.

a Construction

The main potential adverse impact on local air quality during construction would be dust emission.

b Operation

The development of a truck changeover facility in Tarcutta would concentrate trucks within one central area. Trucks currently parking at Ironbark Hill and Kyeamba Gap (20 and 25 kilometres south of Tarcutta) are expected to take advantage of a truck changeover facility. Total vehicle emissions in the greater Tarcutta area would not significantly increase but the concentration of heavy vehicles stopping at the facility, and associated braking and engine starting up would increase vehicle emissions in the immediate vicinity of the facility. Air quality goals are not expected to be exceeded. Localised air quality improvements within the side streets of Tarcutta east of the highway and at Ironbark Hill and Kyeamba Gap could be expected.

6.4.3 Site Constraints

The main factors influencing the degree to which vehicle emissions from highways cause local pollution are:

- traffic volumes (high traffic volumes result in high total emissions);
- traffic speed (emission rates are higher when vehicles are accelerating and decelerating);
- traffic mix (diesel vehicles contribute a disproportionately high level of emissions);
- distance of receptors from the road (pollution levels decline with distance); and
- local terrain and weather patterns (affects the mixing and dispersion of pollutants).

For the purposes of this qualitative air quality assessment, traffic mix and speed approaching a truck changeover facility at both site options is assumed to be identical. Air quality site constraints are based on differences in traffic volumes, distance of residences and local terrain.

a Town Centre Option

The proposed Town Centre option is surrounded by residences to the north, south and east. Dust emission during earthworks and operational air quality impacts might affect these residents.

The village of Tarcutta is located in a shallow valley. A temperature inversion layer could form, affecting air mixing and pollutant dispersion.

b Northside Option

The truck changeover facility at the Northside option site is a larger facility than that proposed in the Town Centre. This larger facility would be capable of accommodating more trucks. Higher traffic volumes would increase pollution in the immediate vicinity of the facility. The larger area of land requiring disturbance, increases potential dust emission during earthworks.

This site is not located in the hollow of the Tarcutta valley; therefore the potential for localised temperature inversions affecting air quality is lower.

6.4.4 Environmental Safeguards and Mitigation Measures

i Construction

To minimise dust emission the following practices are recommended:

- minimising the area disturbed at any one time;
- stockpiles should be kept damp or covered with plastic if there for extended periods (topsoil stockpiles should not be covered);
- watering exposed areas during dry and/or windy conditions; and
- ensuring all construction equipment is maintained and operated in accordance with the provisions of the *Clean Air Regulation (1964)*, and with manufacturer's specifications.

ii Operation

The total amount of vehicle emissions in Tarcutta is likely to increase as additional trucks, which currently stop on the highway outside Tarcutta, are expected to make use of the facility.

Increased localised pollution at the preferred truck changeover facility site is likely to be partly offset by the implementation of the NSW Government's air quality management plan, Action for Air (EPA 1998). That plan aims to reduce exhaust and evaporative emissions from both new and in-service cars, trucks and buses through improved vehicle technology and fuels.

6.5 ACCESS

6.5.1 Northside Option

The proposed access to the site is along a two-lane two-way section of the highway (refer to *Figure 2.1*). There are presently two traffic lanes (including a climbing lane) approaching the proposed site from the north. The climbing lane presently ends at a crest north of the proposed site. The interchange design provides for a continuation of the two lanes; the right lane is marked for trucks turning into the parking area.

This design is unsafe due to the short distance allowed for heavy vehicles approaching from the north at slow speed to cross from the left climbing lane to the right-turn lane approaching the site.

To address this problem, the right-turn lane should be extended farther to the north beyond the crest so that it is clearly recognisable as a turning lane for all approaching traffic. The resultant right-turn lane would need to be in the order of 500 metres long. It is expected that with this arrangement, trucks destined for the truck parking area will move across to the right-turn lane earlier, allowing a longer and safer opportunity for the weave with faster traffic.

The site access is located midway between two crests in the existing highway profile. The crests tend to limit the sight distance to traffic turning into and from the access. The critical movements from a safety viewpoint are the right turns, speed change lanes and tapers.

Trucks turning right from the site have a short storage lane in which to shelter. The lane is too short to function as an acceleration lane for trucks. The sight distance available to a truck driver seeking a suitable gap in highway traffic from this lane is limited by the crest curve to the south of the site and is considered to be inadequate. There is no median strip proposed at this site (unlike the Town Centre option site) which further increases the safety problem by not properly defining the turning path.

To improve the safety for the right-turn exit, consideration should be given to extending the truck lane to serve as an acceleration lane or, alternatively to providing an additional southbound lane through the intersection to allow highway traffic to change lanes to avoid conflict.

The right-turn movement into the site is less critical because the approach speeds are lower for opposing highway traffic leaving Tarcutta.

6.5.2 Town Centre Option

The proposed design of the access shown in *Figure 2.2* locates the widened highway approximately in the centre of the 60 metre wide reserve. On this basis, it would be necessary to construct extensive roadworks to connect the new highway through the intersection to the existing highway at Tarcutta Creek Bridge approaches and reconstruct the existing median facilities such as parking and the toilet block.

An alternative is to construct the pavement widening along the existing highway pavement (on the western side of the reserve). A detailed survey will be required to determine the extent of impact of the proposed pavement widening on existing

median facilities. Based on the existing base plan information, only a few metres of the median would be affected.

The design generally is adequate for the expected numbers of trucks and, in the lower speed environment of the town, is acceptable from an operational and safety viewpoint.

A proposal to provide an additional access point near the Mobil service station has also been considered. There are no drawings to describe this proposal and therefore the review is necessarily sketchy.

In principle, it is not acceptable to have both driveways operating a two-way access point for all trucks. It is understood that the proposal favours the development of a one-way system. The preferable arrangement would be for entry at the northern driveway and exit at the southern driveway. This avoids right-turn entering truck queues blocking the exit and provides a longer and therefore safer line of sight along the highway to the north for trucks turning right to leave the site. It also reduces the amount of widening required between the two driveways due to the relocation of the deceleration lane farther to the south; this may ease the impact on some features in the median.

6.6 DANGEROUS GOODS

6.6.1 Introduction

The carriage of dangerous goods on the Hume Highway is a daily occurrence. In assessing the three options (including a Do Nothing option) for developing a truck changeover facility, the risks and requirements of these vehicles needs to be considered. This section of the study assesses the relative risks of dangerous goods incidents in the vicinity of Tarcutta, considers the extent of exposure to any possible dangerous goods incident, and identifies special requirements for the parking area to safely and legally accommodate dangerous goods carrying vehicles.

6.6.2 Carriage of Dangerous Goods

Dangerous goods are classified by a system, developed by the United Nations. Dangerous goods are products that represent an immediate risk to people, property or the environment when being transported, if not handled properly. There are nine dangerous goods classes some of which are further subdivided:

- gases including flammable gases, non-flammable non-poisonous gases and poisonous gases;
- flammable liquids particularly petroleum products;
- solids;
- oxidising agents and organic pesticides;
- corrosive substances;
- explosives;
- radioactive substances;
- poisonous and infectious substances; and

- miscellaneous substances.

Any goods that are not within these classifications can be classified as hazardous if they pose a threat to the environment. This includes products such as milk. The classes of dangerous goods covering explosives, radioactive substances and infectious substances are excluded from this study because they are subject to special controls and legislation.

Road transport of dangerous goods is controlled by strict regulations, codes and standards, which specify the requirements for safe transport. The main technical code is the Australian Dangerous Goods Code, which covers all aspects of dangerous goods transport by road and rail. This code covers packaging, marking and labelling, design of tanks and vehicles, driver training and licensing, owners' responsibilities and accountabilities, inspection, testing and emergencies. Almost 60% of all hazardous materials incidents in NSW are transport related.

The Environment Protection Authority in its survey of transporting dangerous goods (EPA 1992) identified that petroleum companies account for approximately 75% of dangerous goods movements in NSW. Chemical, transport and storage, and gas companies transported 8%, 9% and 7% respectively. About 90% of dangerous goods were transported by road. The RTA has confirmed this relatively high proportion of petroleum movements on the Hume Highway (Greg Watson, Manager, RTA Marulan, pers. comm.).

Discussions with the EPA and the RTA revealed that approximately 15% of trucks carry dangerous goods. On a statewide average, EPA believes that 10% to 15% of trucks carry dangerous goods. The figure for the Hume Highway is estimated to be between 15% and 20% at Marulan and most of this would be travelling south through to the border.

Due to the higher proportion of petroleum products there is a higher likelihood of an incident involving petroleum products and LPG. However, the actual risk from petroleum products is characterised by a relatively small effect distance. Risks associated with the transportation of toxic gases are low given the extremely low likelihood, even though the effect areas are high. Risks associated with the transportation of corrosives and other substances are not likely to affect people but they represent a risk to the environment (Ren Mahant 1995).

6.6.3 Dangerous Goods Incidents in the Vicinity of Tarcutta

Data has been gathered on dangerous goods incidents between Gundagai and Holbrook to assess risk and dangers from these incidents in the vicinity of Tarcutta. Data sources were the NSW Fire Brigade (which is responsible for attending and managing dangerous goods incidents), and the EPA (which is responsible for technical advice on incident management and strategic management). The statistical format of the road accident data does not indicate whether any dangerous goods were involved in the road accident or whether the emergency services were called out. This places limitations on any attempt at quantification.

Incidents over the past 10 years were extracted and are summarised in *Table 6.4*. Nine incidents have been identified, giving an annual incident rate of 0.9 per year.

Table 6.4 *Dangerous Goods*

Date	Incident	Location	Substance	Quantity Spilled (litres)	Quantity Carried (litres)
May 88	Truck	30 km north of Holbrook	Hydrogen peroxide	N/A	N/A
June 88	Road tanker	12 km north of Holbrook	Synthetic resin and other material (xylol, cobalt, and naphthenate-dimethylphthalate)	N/A	20 drums
Dec 90	Semi-trailer	5 km north of Holbrook	Carbon black	N/A	N/A
May 94	Truck and chemical fire – load of fibreglass resin in drums truck + load totally destroyed	Sturt Highway, Tarcutta	Fibreglass resin		
June 94	Road tanker	Tarcutta	Resin solution	20,000	20,000
June 94	Spill on the Highway, Non toxic water base for manufacture of ink, was hosed down with water	Hume Highway, Tarcutta	Non toxic water base for manufacture of ink	N/A	N/A
June 96	Fire involving chemicals, paints and diesel fuel from prime mover fuel tanks. Chlorine plume necessitated evacuations. Three semi-trailers were involved.	South Gundagai Shell service station	Chemicals and diesel	No accurate information as the file from EPA has been subpoenaed by the court	
Nov 96	Benzene spill from fuel tanker	Hume Highway, Tarcutta	Benzene	8,000	33,000
Apr 97	Diesel leak from fuel tank	Sturt Highway, Tarcutta	Diesel	N/A	N/A

Source: EPA Extract from Database 1998

NSW Fire Brigades – Statistical Unit, Extract from Database 1998

Of these incidents, the fire at the south Gundagai Shell service station in June 1996 is the most significant in relation to a truck changeover facility. This particular incident involved a parked vehicle at a service station. This incident could have been much

worse had a fuel tanker been involved (Alan Rugg, EPA Albury, pers. comm. July 1998).

Figures relating to the probability of a dangerous goods incident on the Hume Highway in the vicinity of Tarcutta in relation to total incidents in the corridor are presented in *Table 6.5*. The calculation is based on a conservative estimate of 15% of trucks carrying dangerous goods.

Table 6.5 *Likelihood of Accidents*

	Average Number of Trucks (Yearly)	Average Annual Crash Rate 1992 X 97	Average Annual Incident Rate 1992 X 97	Likelihood of Incident (Based on Past Incidents)
Total truck population	448 220 ¹	16.6 ²	-	1 in 250 (accident)
Trucks carrying dangerous goods	67 160	-	1.2	1 in 10 000 (dangerous goods)

Source: ¹RTA traffic count data for Tarcutta

²RTA crash data.

The analysis in the table indicates that the likelihood of a dangerous goods incident is far less than the likelihood of a general accident involving a truck.

Provided they remain within their proper containment during transport, dangerous goods pose no hazard to people, property or the environment. Dangerous goods incidents can develop when dangerous goods are released or escape. There are a number of reasons that containment could be lost including:

- vehicle accidents;
- errors during loading; and
- equipment failure.

Amongst these reasons, vehicle accidents are likely to be the single largest contributor (ERM Mitchell McCotter 1998).

Factors affecting the severity of accidents involving hazardous materials include the extent of dislodgment of load, the extent of the spillage, the effectiveness of containment, the proximity to populated or environmentally sensitive areas and the effectiveness of emergency services plans.

6.6.4 Risk Assessment

The risk of a dangerous goods incident needs to be assessed for the three development scenarios. These are:

- the Do Nothing option, leaving truck parking to occur roadside;
- the Northside option; and
- the Town Centre option.

In many cases the actual degree of the incident goes unrecorded. Not all records provide detailed information regarding the event as shown in *Table 6.4*. For example information such as the quantity of goods spilled or carried is not identified nor is there data available on the degree of containment and the measures taken to "clean up" the incident. The degree of impact is difficult to assess but the risk of an incident with dangerous goods will be lower than the risk associated with accidents involving trucks carrying non-dangerous goods.

Two broad aspects influence the impact of exposure to a possible incident:

- population exposure. Approximately 30% of the residents of Tarcutta live within a 500 metre radius of the Northside option site and approximately 70% live within a 500 metre radius of the Town Centre option site; and
- environmental exposure. Tarcutta Creek is a sensitive natural resource, and is located 50 metres to the west of the Town Centre site. The Northside option is approximately 700 metres east of Tarcutta Creek.

In these broad terms, the risk of impact of any dangerous goods incident is lower at the Northside option site. The larger facilities provided for the Northside option could be expected to accommodate more dangerous goods trucks on the basis that it can accommodate more trucks. This would increase the risk of incident. However, the consequences of any incident would be expected to be lower due to the lower population proximity and the distance from Tarcutta Creek.

The Town Centre option could be expected to have fewer dangerous goods vehicles stopping due to its smaller size, but the consequence of any incident would be higher due to the close proximity of a higher proportion of the population and Tarcutta Creek.

The Do Nothing option does not allow for trucks that are transporting dangerous goods to be separated from the main traffic stream. At the present time the trucks are clustered around the existing commercial facilities and park in residential streets. In addition there are currently a large number of unsafe manoeuvres due to the inadequacies of the space currently provided. A dangerous goods incident within the Do Nothing scenario could have higher impact due to the proximity of the existing traffic stream, Tarcutta Creek and the surrounding residences, and the absence of any dangerous goods incident-management facilities.

It is assumed that the design of facilities at both sites will satisfactorily address containment of any spillage to avoid any effect on the adjacent environment, and will provide adequate safety equipment and emergency services if any incident were to occur. This in itself places either option above the Do Nothing option.

6.6.5 Parking Requirements for Trucks Carrying Dangerous Goods

The Australian Dangerous Goods Code requires that a vehicle transporting dangerous goods must not be parked or left standing in the following areas:

- a built-up area with public access;
- within 15 metres of any building in which there is or likely to be a concentration of people (other than on a building on premises where the vehicle is loaded or unloaded);

- at any other place where there is likely to be a concentration of people including public works buildings such as hospitals; and
- within eight metres of another vehicle which is transporting a load of dangerous goods.

There are exceptions to these rules. A vehicle may be parked or left standing:

- for the purpose of loading or unloading dangerous goods onto or from the vehicle;
- because the vehicle has broken down;
- because of a dangerous situation involving the vehicle;
- to comply with the requirement of any law; or
- for a brief rest or refreshment break, providing the vehicle is not parked or left standing for any longer than necessary.

One of the most critical issues is that dangerous goods should not be parked within eight metres of another truck carrying dangerous goods. The trucks can however park next to another truck.

At any truck-stop or changeover facility, provision must be made for the driver to be able to check his load. At Tarcutta, most trucks are travelling through the town during the night and extra lighting will need to be provided.

6.6.6 Conclusion

The actual risk of a dangerous goods incident is low. However, the incident that occurred at Gundagai shows that the ramifications can be far-reaching with people having to be evacuated.

Assuming the same level of facility provision is provided at both the Northside option and the Town Centre option, there are fewer likely impacts at the Northside option. Of the three options the Northside option poses less overall risk to the environment and the local population in a dangerous goods incident. The risk of a dangerous goods incident is very low at either location.

7 DEMOGRAPHIC, SOCIAL AND ECONOMIC CHARACTERISTICS

7.1 DEMOGRAPHIC CHARACTERISTICS

i Age Structure and Employment

The age profile of the village of Tarcutta at the 1991 and 1996 census is presented in *Table 7.1* below. A comparison is also given with the NSW average in 1996. The total number of people in Tarcutta increased by 19 people during this time, from 236 persons in 1991 to 255 persons in 1996.

Table 7.1 Age Profile

Age Group	1991		1996		NSW (1996)
	Number	%	Number	%	%
0 – 4	24	9.6	25	10.2	7.08
5 – 9	18	7.2	27	11.1	7.12
10 – 19	27	10.8	24	9.9	13.9
20 – 29	29	12	12	4.9	14.64
30 – 39	42	16	25	10.2	15.68
40 – 49	15	6	31	12.7	14.2
50 – 59	34	14	34	14	10.06
60 – 64	18	7.2	9	3.7	3.94
65 – 75	29	11	34	14	7.4
75+	16	6	22	9	5.21

The percentage of the population aged between 40 – 49 doubled between 1991-1996 and with this increase there was also an increase in the 0 – 10 age group. The proportion of the 50 – 59 age group remained the same and there was a decrease in the 60 – 64 age group. These figures are fairly representative of the state average. These increases may be attributable to the increase in employment in agriculture, cafes and restaurants and the transport and storage industry within the region. A point of interest is that the percentage of Tarcutta's population, aged between 20 and 39 fell from 28 % to 15 % between the censuses.

The key industry sectors for the area in 1996 were agriculture (13%), manufacturing (14%), transport and storage (17%) and accommodation, cafés and restaurants, retail and wholesale (26%). While the employment categories were not identical in the 1991 census they are comparable. Figures in the 1991 census were agriculture (5.7%), transport and storage industry (6.8%), and accommodation, café and restaurant, retail and wholesale industries (17%). It can be concluded that a significant increase in participation in these sectors has occurred since the 1991 census.

It is assumed that the growth of employment in the transport and storage and accommodation, cafés and restaurants, retail and wholesale sectors is largely the result of the increase in the number of trucks and light vehicles stopping in the town. RTA figures indicate that there is a 4 % annual growth rate in the traffic on the Hume Highway which correlates with the trend in industry.

The increase in the elderly population may be attributable to the number of retirees from the land wishing to stay close to their families.

ii Educational Qualifications of Residents

Another explanation for the increase in the 40 – 49 age group within the region is that the skills of the population match the employment offered. The age structure is less likely to alter if the town is providing opportunities for the vocation of the community. It is assumed that the population's skills developed as a result of the historical relationship of the town with the trucking industry and the need for the town to support the rural community. These assumptions are reflected in the educational qualifications of the town. The 1996 census data shows that out of the population aged 15 and over, 80% were unqualified while only 20% had some form of qualification. Qualifications include 5% of the population with an undergraduate diploma; 2% an associate diploma; 11% skilled vocational training (building, engineering and agriculture) and 2% basic vocational training (business and administration).

The unemployment rate for Tarcutta was 13.5% in 1991 and dropped to 12.8% in 1996. These figures are significantly higher than the rate for the state (8.8% in 1996). However, they do reflect a growth in employment and business within the area.

The dramatic decrease in the 20 – 39 age group and the slight decrease in the 10-19 age group over the 1991 to 1996 census period may be explained by the desire to improve educational qualifications or to seek alternative employment from that offered in the town. This in turn requires a move to larger centres. Once obtained there is little demand for these skills within the town and therefore more likelihood for these people to move out of Tarcutta.

The median weekly household income for Tarcutta is \$300 – \$499 which is lower than the state median of \$500 – \$699.

iii Housing

The average occupancy rate of Tarcutta is 2.16 persons per household with nearly all houses being detached dwellings with a small percentage of aged persons accommodation in the area. Average occupancy rate is lower than the state average of 2.43 persons per household.

Just over 14% of dwellings were unoccupied in the 1996 census, which has almost doubled since the 1991 census when only 9% were unoccupied. This may be attributable to the drop in the 20 – 40 age range within the town and the fact that a proportion of those employed come from the surrounding rural properties.

Home ownership is high with 45% of houses being fully owned and 20% in the process of being purchased. The remaining 20% are rented and 15% of the housing stock is vacant. Rental stock is private with 14% of the dwelling stock being rented. Median weekly rent is between 0 – \$99 per week, while the median monthly

household loan repayment is \$400 – \$599. This represents a substantial investment in the town. This investment needs to be considered when addressing the impact of acquisition of properties.

The demographic profile indicates that there has been growth in employment, particularly for those sectors associated with the transport industry despite the dramatic decline in the 20 – 39 age bracket.

7.2 SOCIAL IMPACT ASSESSMENT

The population of regional and rural Australia is affected by economic decline and its population and resource base is diminishing (Falk & Harrison 1998). Withdrawal of services and employment has resulted in the decline of rural towns, resulting in the growth of metropolitan areas and large regional cities. This in turn leads to general rural disadvantage on a number of socio-economic indices such as unemployment levels and income levels (Cheers 1990). Rural people have a strong sense of locality and feel a strong sense of personal identification and ownership of the place they live (Cheers 1990, 1992b; Martinez-Brawley 1990).

The key issues for this assessment are the importance of maintaining sustainable rural settlements and enhancing community cohesion. These issues will be discussed in relation to the siting of the proposed truck changeover facility at either the Town Centre or Northside options.

The Commonwealth and State Governments have recognised that the current facilities provided in Tarcutta and along the Hume Highway are inadequate for trailer exchange. A key objective is to provide a more appropriate facility. Tarcutta was identified due to its strategic location halfway between Melbourne and Sydney and its historical relationship with the trucking industry.

The potential for the siting of the facility at either location to affect the lifestyle of the members of the community needs to be assessed. The assessment was broken into three sections:

- neighbourhood and community impacts;
- individual lifestyle impacts; and
- impacts on the trucking industry.

7.2.1 Neighbourhood and Community

i Community Cohesion

Rural people maintain and develop their local social identifications by sharing an active commitment to the development of their region (Cheers undated). This is important economically, socially and psychologically. As the development of the Northside option has the potential to effect the cohesion of Tarcutta the social effects on the population need to be assessed.

Community cohesion in small rural communities is essential as it provides an informal social support network, for those communities not large enough to sustain high levels of formal organisations. These informal support systems may include

childcare assistance, advice and consultation about personal and family problems, and household help.

Some of the effects that may result from taking business out of the town are:

- unemployment increases as businesses contract or disappear;
- current business owners lose investment in businesses and are forced to move to other areas to start new businesses or seek other employment opportunities;
- income levels fall;
- supplies cost more as competition is reduced and businesses need to survive as a result of declining populations;
- services such as schools, community and recreation facilities decline;
- relocation costs are high for those choosing or being forced to leave the town in search of employment; and
- there is a higher incidence of feelings of social isolation as informal support systems are lost due to relocation (Cheers undated).

Town decline also results in financial cost to the taxpayer. This is a direct result of: increased dependency on the welfare system; the cost of subsidising the relocation of people; the loss of previous government investment in service infrastructure; and the cost of providing services to those people who remain increase and economies of scale are reduced (Cheers undated).

The economic impact assessment in this chapter found that employment levels will be maintained under either option but the number of businesses in the town may decline if the Northside option proceeds. This is due to the fact that a number of the businesses rely on the cafés and the Mobil service station to encourage passing trade to stop in the town. The antique shop, craft shop and two supermarkets will be difficult to sustain under these conditions. Some of the effects identified above will occur in Tarcutta if the Northside option is chosen.

ii Production of Social Capital

Social capital is described as “the network, norms and trust that facilitate co-ordination and co-operation for mutual benefit” (Putnam 1993 and 1994). It has been argued that fostering the production of social capital can lead to community sustainability (Harrison & Falk 1998). Long-term community sustainability is described as the community’s ability to “become and maintain itself as the community wants to be” (Topolsky 1997 p4).

In assessing the social impacts of this development the historical relationship between the town and the truck drivers needs to be considered. Tarcutta has a history of providing support facilities for the trucking industry. The community developed its skills and its businesses to cater for this industry. The current trend in Tarcutta is a substantial growth in these industries since the last census period and a decline in unemployment due to the opportunities provided for unskilled labour. The siting of the facility in the town provides an opportunity to promote and build on the existing vocations of the community. Promoting the skills, knowledge and values of the individuals can lead to a community, which is sustainable and productive (Falk & Harrison 1998).

The importance of the increase in the production of social capital is vital to the sustainability of the town of Tarcutta. The NSW Government's Social Justice Strategy (Social Policy Development Unit 1997) recognises the importance of social capital as a social index. Its policy promotes the need for government action to assist in the production of social capital (Social Policy Development Unit 1997). The Town Centre option will assist in the production of social capital, while the Northside option will hasten its depletion.

The siting of the development should promote the growth and sustainability of this town rather than causing further economic decline in rural Australia.

iii Community Preference

Consideration also needs to be given to the voice of the community and the trucking industry. The majority of drivers indicated that they would like to see the facility within Tarcutta (69%). Of the residents surveyed by the RTA 60% wanted the facility in town. The results of the consultation conducted as part of this study indicated that 46% want the facility retained in town, 32% want it to go northside and 22% did not state a preference. The clear consensus is for the facility to remain in town.

iv Neighbourhood Safety

In the resident survey conducted by the RTA and in this study's consultation process the issue of neighbourhood safety was raised by a large number of residents. In particular, this issue was raised by those residents who would be directly affected by either option. This concern relates to the issue of bringing large numbers of truck drivers off the road into a concentrated area that directly abuts the residential areas of Tarcutta. Concern was raised that bringing an increased number of "strangers" into these areas could increase the incidence of burglary.

This issue is largely a perception issue as discussions with local Tarcutta police indicated that the crime rate in the area is very low. Any burglaries in the area are largely by people from out of the area and do not involve truck drivers (Snr. Con. Richard Harvey pers. comm. 12 July 1998). Mitigation measures can be implemented in the design of the facility to minimise the perceived danger. These could include security to monitor the site and the construction of fencing.

v Road Safety

The schools in town have indicated their concern regarding the safety of children walking to school if the facility is constructed in the town. There will be the same volume of traffic on the Hume Highway regardless of which option is chosen. The purpose of the facility is to take the trucks out of the residential streets, thereby minimising the risk of accidents (both pedestrian and vehicular).

Construction of either facility will improve the current road safety conditions within the town.

vi Recreation Needs

The town currently has three tennis courts, a cricket oval and a touch football oval located behind the hotel, Mobil service station and Four Square store. These facilities are accessed via Hilton Drive. Tennis courts are used throughout the year by:

- Tarcutta and District Tennis Association;

- St Thomas Aquinas Primary School;
- Tarcutta Public Primary School;
- Ron Littlewood Coaching Clinic (every Friday in term 3 between 9 a.m. to 3 p.m.);
- Mark Southward Coaching Clinic (September holidays: 1 week coaching between 9 a.m. and 3 p.m.);
- Wednesday Ladies social competition (9 a.m. to 12 p.m.); and
- the general public and members.

During the winter competition the facilities are used Saturday afternoon between 1 p.m. to 5 p.m. and the summer competition is between 7.30 p.m. to 11 p.m.

The cricket ground is used in summer on the weekends.

The touch football competition runs from October to the end of March. It attracts ten teams from the surrounding area and Wagga Wagga. There are a total of 150 people involved in the competition.

One of the major design constraints to the Town Centre option, in its present design, is that its future expansion would result in the relocation of the touch football oval. The relocation of this facility would result in fragmentation of an important recreational resource in the town. At the present time the facility is important as a central focus for congregation within the town. It also provides an important informal network, which promotes community cohesion. The location allows for spectators to view games from the beer garden behind the hotel.

A criticism of the current design of the Town Centre option identified during the consultation process is that the facility does not capitalise on the location of the Mobil service station and the businesses on the Hume Highway. The community and the transport industry identified a need to realign the facility at the southern end of the site near the Mobil service station and place the facility behind existing businesses to minimise the walking distance for truck drivers. This would also give an opportunity for existing businesses to re-orientate their buildings to provide frontages to both the highway and the parking facility.

The realignment of the design would result in the need to relocate the cricket oval as well as the touch football oval. However, there may be some scope to retain the tennis courts. An appropriate site has not been identified within the town for the relocation of sporting facilities. The future relocation of facilities would have to be cognisant of the need to maintain community cohesion. These facilities are an important part of the community network, which could be lost if adequate facilities are not provided in an appropriate location.

The future location of the facilities should be in a location central to the town, especially the Tarcutta Hotel as this provides an important component of the social facility. To improve the current facility it should be located on flood-free land so that the facility can be used all year round. In the event of the facilities having to be relocated the positive benefits to the town are that brand new facilities will be built which may attract more sporting groups from outside the area.

vii Loss of Grazing Land

The Northside option forms part of the town common which is being utilised for grazing purposes. The trustees of the town common advised that they have no objection to this land being utilised for the Northside option.

Portion of Lot 86 DP 757255, Lot 47 and 48 DP 757255 is being used for grazing purposes together with the private allotment known as Lot 2 DP 215285.

7.2.2 Individual Impacts

i Acquisition of Residential Properties

The Town Centre option would require purchasing a number of residential properties to accommodate the facility. In addition a number of additional properties will need to be acquired where noise impacts exceed levels acceptable to the RTA and the EPA.

There are eight private landowners located within the boundaries of the Town Centre option. A portion of the site contains crown land currently managed by the Wagga Wagga City Council and used for recreation and grazing. One further residence would have to be acquired as noise levels would exceed acceptable levels at this residence. Individual interviews were held with those private landowners that could be contacted. A survey form was sent to those landowners that reside outside of Tarcutta. The survey specifically asked each landowner their individual views on property acquisition. Seven out of ten landowners indicated that they would be prepared to sell their properties provided they were adequately compensated.

Two landowners indicated that they would not be prepared to sell their properties. One landowner identified that they may be prepared to sell provided that they could obtain an adequate alternative location within the town for their business.

The psychological stress associated with relocation of residents who have lived in the community all their lives needs to be considered in the assessment of this option. Relocation impacts may include:

- moving expenses;
- inability to purchase a new property due to the greater expense of property in the region; and
- cost of losing important social and support networks if forced to move out of the town.

Any negotiation for compensation should take account of these impacts.

No private properties will need to be acquired as a result of the Northside option.

ii Residential Amenity

The major impacts on the amenity of residents adjacent to the site include the loss of views currently enjoyed from the property and the impact of noise on sleep disturbance.

a Noise Impacts

There are four residential properties which will be directly affected by noise from the Town Centre option. These are three residences located on Archer Street and the postmaster's residence located directly behind the post office. To reduce the noise impacts to an acceptable level a 6.5 metre high noise barrier will be required along the northern boundary of the site. Individual noise mitigation measures are required for the postmaster's residence or the property will have to be purchased.

There are three residences directly affected by the Northside option. Two of these residences are located to the south of Prospect Street and the third is positioned to the north-west of the site on the adjacent rural property. Noise impacts on the residences to the south of Prospect Street will be minimised through the construction of a 3 metre high noise barrier on the southern boundary. Negotiations will be required with the residence on the adjacent farmland property to install noise mitigating measures to the house. These could include double-glazing and air conditioners.

Noise impacts from both options are comparable.

The positive benefit of both options is that the creation of a central facility will remove the current noise impacts for residents on and close to the Hume Highway, particularly for residences between Centenary Street and Toonga Street. Placing the trucks within a central facility provides greater opportunity for the noise impacts to be controlled by suitable mitigation measures. Therefore the overall benefits outweigh the negative impacts.

b Visual Impact

The conclusions of the visual assessment are that the Town Centre option offers more scope to visually absorb development associated with the proposed interchange. This is because of its relatively low elevation and the screen provided by commercial buildings, vegetation along Tarcutta Creek and the spur to the north along Archer Street. Mitigation measures were identified to minimise the visual impact of the development.

c Lighting Impact

This issue addresses the impact of nightlight haze and the effect of lighting spilling into residential properties. The existing arrangement is that trucks are changing trailers under normal street lighting conditions. While this is inadequate for the truck drivers there is little lighting impact on the residential properties. Under the Town Centre option the residential properties that would be potentially affected by lighting are located on a higher elevation to the site and in closer proximity to the site, than that of the Northside option. There are a greater number of people potentially affected by the Town Centre option. The lighting will have to be designed to ensure that there is no light spill into adjoining properties and that the impact of night lighting haze is no greater than that caused by existing street lighting.

iii Health Impacts

An assessment was undertaken to determine the risk of a dangerous goods incident at either of the sites. It was concluded in Chapter 6 that the risk of an accident is low for either option. The repercussions of an accident are likely to be higher for the Town

Centre option due to the greater number of people nearby and the proximity of Tarcutta Creek.

7.2.3 Transport Industry

i Driver Health

“Healthy eating on the road” is a project that addresses the issue of heavy vehicle drivers' health through better eating habits and improvements in physical activity. The idea and inspiration to develop and implement such a project was based on identified needs within the transport industry. A number of roadhouses are piloting the “Healthy Eating on the Road – Food Service Accreditation Program”. This involves providing an additional menu within the truck drivers seating section which incorporates meals lower in fat and salt, and higher in fibre. Six roadhouses are testing this program.

One of the main reasons that truck drivers gave for stopping in Tarcutta was the restaurant food. Both takeaway and restaurant food rated well; however, a number of drivers indicated that they were “fond of Gai’s food”, as it was more like a home-cooked meal. In assessing the importance of services provided with any new facility restaurant food was rated as extremely to moderately important by truck drivers (92%) and companies (95%). It had slightly higher weighting than takeaway food with 81% for drivers and 90% for companies. It was concluded as part of the truck survey that Gai’s Place may have some bearing on the high rating for restaurant food and the importance of restaurant food to a new facility.

The design of any future facility should take into account the need to improve the amenity for truck drivers and address the issue of providing an appropriate option for takeaway food. In addition the issues of importance identified in the Taverner Research Company report should be incorporated in the facility design.

ii Road Safety

Truck parking facilities in the town are currently inadequate. There was one fatality in the past year resulting from a truck driver changing trailers in the parking space allocated within the road reserve. A new and safer facility would reduce the potential for future fatalities. Both options, provided they are appropriately designed, will provide a safe rest area and changeover facility.

7.2.4 Conclusions

Table 7.2 compares the social impacts of each option. Mitigation measures are identified where possible to minimise these impacts.

Table 7.2 Summary of Social Issues

Issue	Likely to Result (Do Nothing)	Likely to Result (Northside)	Likely to Result (Town Centre)	Mitigation Measures to be Incorporated in the Design
Community Cohesion and Social Capital Production	Yes, but is restricting the full economic potential of the town	No	Yes	The Town Centre option requires no mitigation measures. To minimise the impact from the Northside option, measures would be required to enhance the appearance and presentation of the town to encourage passing trade to stop. These measures may include: landscaping; footpath paving; retaining parking in the town for trucks to stop to purchase food (but prohibit changeovers in the town); enhancing the heritage features of the town; and improving the entrances into town. There are funding limitations to these mitigation measures.
Community/ Industry Preference	No	No	Yes	Not applicable.
Improve Neighbourhood Safety	Yes	Yes	Yes	Noise barriers and the Hume Highway would act as security barriers to prevent access to properties. Security monitoring of the site would improve the perception of safety.
Improve Road Safety	No	Yes	Yes	Adequate signage, careful design of the facility and the access to the facility will improve the existing unsafe conditions.
Retain Recreation Facilities	Yes	Yes	No	If the facilities are relocated the town will benefit from improved facilities that can be used all year round. However, in siting the facility, consideration must be given to the following: <ul style="list-style-type: none"> • maintain the relationship of the sporting facility with the Hotel; • provide the facility in a centralised location within the town; and • ensure that the facility is easily accessible.
Retain Adequate Grazing Land	Yes	Yes	Yes	There is adequate grazing land within the town.
Result in Acquisition of Properties	No	No	Yes	If properties are acquired individuals need to be adequately compensated to ensure that they can afford to relocate to an equivalent property within the town.

Issue	Likely to Result (Do Nothing)	Likely to Result (Northside)	Likely to Result (Town Centre)	Mitigation Measures to be Incorporated in the Design
Noise Mitigation Measures	Noise limits are currently exceeded	Yes	Yes	Where possible mitigation measures should be incorporated into individual dwellings to minimise the height and extent of noise barriers.
Create Visual Impact	Yes	Yes	Yes	Refer to mitigation measures identified in Chapter 5.
Lighting Impacts	No	Yes	Yes	Lighting should be designed to minimise spill on adjacent residential properties. Night lighting haze should not be any greater than the impact from street lighting.
Accident from Dangerous Goods	Higher probability	Low probability	Low probability	The design of the facility should ensure that adequate measures exist to contain any spill on the site and to minimise the likelihood of a collision on the site or during access to the site.
Caters for Driver	No	Yes	Yes	If the facility goes northside the future proprietor is encouraged to provide an alternative healthy menu for truck drivers in accordance with the "Healthy Eating on the Road – Food Service Accreditation Program". The facility should be designed to ensure adequate shade, lighting, clean and hygienic amenities, a manoeuvring area, quiet rest area and separate changeover area.

7.3 ECONOMIC IMPACT ASSESSMENT

7.3.1 Introduction

This section assesses the economic impacts of the proposed Tarcutta Truck Changeover Facility.

7.3.2 Existing Economic Situation

Tarcutta depends on its highway location for its current and future economic livelihood. The town is used by a large number of truck transport drivers for parking, rest, food and fuel and is commonly used for rig and trailer exchange. The location allows drivers from Sydney and Melbourne, to exchange rigs and trailers and return to their home location, in a 10 – 12 hour period, in most cases avoiding the need for overnight accommodation.

The progressive upgrading of the Hume Highway means that most towns are now bypassed. Tarcutta is the last remaining town along the highway, giving it a strategic advantage. There are no current plans to construct a Tarcutta bypass.

The town provides cafe and takeaway food services, convenience goods and services for passing trade, local residents and surrounding rural areas. Major shopping and other facilities are available in Wagga Wagga, which is approximately 55 kilometres from Tarcutta.

There are 11 businesses in the town. Total employment in Tarcutta is approximately 62 full- and part-time jobs. This employment is estimated to be equivalent to 42 full-time jobs, taking into account the number of hours that part-time staff work in each business. These figures include the Changeover Cafe, which is soon to re-open.

Two businesses (Gai's Place and the Mobil service station) are heavily dependent on business from truck drivers. Other businesses (the post office, the hotel and the motel), have some business (around 10%) generated from truck drivers. Remaining businesses rely little on trade with truck drivers.

Trucks and other passing trade is estimated to generate 77% of the business and employment in the town, while the remaining 23% is from local trade. These estimates are based on the number of employees and the estimated percentage of passing and local trade. Business from truck drivers is estimated to be responsible for 33% of the employment in the town, equivalent to 14 full-time jobs.

There are opportunities for growth and expansion of the existing businesses and possibly for additional businesses, based on the highway trade. Realisation of these opportunities will involve improving the attractiveness of, and the ease of access and parking in the town for both car and truck users. There is a need to separate truck areas from car parking areas for safety and business reasons. Also truck parking restricts access to local businesses by passing cars and local trade during the day.

7.3.3 Economic Benefits and Costs of the Proposal

The main benefits of the proposal to develop a truck changeover facility, on either site, are:

- an increase in the number of truck parking bays which will facilitate truck changeover operations (currently peak period demand significantly exceeds supply);
- a reduced frequency of accidents and associated costs, as a result of less informal parking, fewer undesirable manoeuvres and less interaction of trucks with other traffic;
- a reduced time loss for truck drivers due to congestion and unnecessary manoeuvres;
- a greater use of local facilities, restaurants, fuel, retail and other local services by truck drivers and passing trade;
- an improved amenity for most local residents and those using town facilities;
- a likely increase in passing trade as a result of improving or removing the disruption in the town caused by truck parking and changeover; and
- a likely increase in local employment as a result of the increase in passing trade.

The costs of the proposal are:

- capital costs associated with the proposal, including construction of facilities and buildings and the relocation of sporting facilities, in the case of the Town Centre option; and
- an increase in annual maintenance and operation costs of the facility compared with existing maintenance and operating costs.

7.3.4 Comparison of the Site Options

The two sites have some different economic impacts.

i Capital and Operating/Maintenance Costs

The Town Centre option utilises the existing infrastructure and retail/restaurant facilities of the town, which makes the capital cost of this option significantly lower than the Northside option. The Town Centre option comprises two stages: the second stage is assumed to be required in ten years time to provide for growth in the number of trucks using the facility.

The capital and operating/maintenance costs of both options are shown in *Table 7.3*:

Table 7.3 Capital and Operating Costs

Capital Costs	Town Centre Option	Northern Option
	\$ million	\$ million
Stage 1	\$5.866	\$12.813
Stage 2 (Year 10)	\$1.161	-
Access Costs	\$0.700	\$1.000
Land Cost	\$0.030	\$0.045
Relocation of Sport Facilities	\$0.625	-
Total Capital Costs	\$8.382	\$13.858
Operating Costs	Town Centre Option	Northern Option
Operating and Maintenance	\$0.317/annum	\$0.317/annum

Source: SMEC.

The capital costs in the table include the costs of clearing, earthworks, drainage, pavements, signage, lighting, public amenities, noise barriers, services, revegetation and landscaping, erosion control, design fees, construction supervision and project management costs. There is a 10% construction contingency. The costs of the Northside option also include the cost of a food and fuel outlet. These costs are based on the available information and provide indicative costs only. They are not intended to be used for any purpose other than for economic evaluation. The rates used in developing the estimates were not approved by the relevant authorities.

Access costs include the costs of roadworks associated with construction of the site and allowing access from the highway. These costs are estimated to amount to \$700,000 in the case of the Town Centre option and \$1.0 million for the Northside option.

The cost of the Northside option includes the cost of acquisition of the site, estimated to be \$45,000.

The Town Centre option involves the cost of the land in the town, estimated to be \$30,000 and the relocation of the sporting facilities to the Northside option site. The cost of this relocation is estimated to be \$25,000 for land acquisition and \$600,000 for earthworks, landscaping and amenities.

Annual operating and maintenance costs of both facilities are assumed to be approximately similar. These costs are estimated to be \$317,600 per annum and include lighting, landscape maintenance, cleaning of parking areas, toilets and facilities, rubbish removal, sewer/water, pollution control and security.

ii Accident Costs

The two site options are expected to have similar and significant impacts on reducing road accidents. The current accident rate on the section of the highway between Gundagai and Holbrook is estimated to be 16.6 large truck accidents per year, based on RTA accident records.

The truck exchange facility is estimated to reduce the accident rate by:

- reducing truck driver fatigue due to improved facilities. It is estimated that the truck changeover facility will reduce the overall accident rate on that section of the highway by 10%;
- reducing the number of accidents associated with informal parking and trailer exchange manoeuvres along the road. It is estimated that this effect will reduce accidents by one per year;
- reducing the severity of hazardous freight accidents due to the improved facilities. It is estimated that this effect will reduce serious injury accidents by one per year.

Using the above estimates and applying average RTA costs for each accident type, the annual savings from reduced accidents costs are given in *Table 7.4*.

Table 7.4 Accident Reduction Savings

Accident Cost Savings	Saving Per Annum
Reduced Driver Fatigue	\$197,100
Reduced Trailer Informal Parking and Manoeuvres	\$118,800
Reduced Severity of Hazardous Freight Accidents	\$112,700
Total Annual Saving	\$428,600

Source: SMEC, using RTA accident frequency and average cost data.

These annual savings in accident costs have a net present value of \$4.9 million over 20 years.

7.3.5 Net Present Value of Costs

Net Present Value (NPV) provides a means of comparing the costs of alternatives that have different capital and maintenance/costs in each year. NPV discounts the effect

of costs and savings in future years compared with the current year in order to include the effect that money today is worth more than in the future, because the money can earn interest over time.

The NPV calculations are based on a 6% discount, which is the current long-term government bond rate. This discount rate is in effect a real discount rate as the current level of inflation is negligible. The calculations are also based on a twenty-year analysis period with zero residual values at the end of that time.

The NPV of capital and other costs of both options are shown in *Table 7.5*.

Table 7.5 *Net Present Value of Capital*

NPV (6% discount rate over 20 years)	Town Centre Option \$ million	Northside Option \$ million
Capital and Access Costs	\$6.515	\$12.004
Land Acquisition	\$0.030	\$0.045
Relocation of Sporting Facilities	\$0.625	-
Operating and Maintenance Costs	\$3.643	\$3.643
less Accident Cost Savings	(\$4.915)	(\$4.915)
Total NPV	\$5.898	\$10.777

The above table shows that the Town Centre option is significantly less expensive than the Northside option. This is primarily because the Town Centre option utilises the existing infrastructure and retail restaurant facilities of Tarcutta, while under the Northside option these facilities must be developed.

7.3.6 Other Impacts of the Options

In addition to the above costs and benefits, the two site options have other costs and benefits.

The Town Centre option retains and enhances the existing businesses in Tarcutta that depend on truck and passing trade. The improvement in the amenity of the town as a result of removing truck parking from the highway would encourage business expansion and the development of additional businesses aimed at passing trade.

The Northside option would create significant retail and restaurant competition outside the town area and would threaten the viability of the existing town businesses that rely on truck and passing trade. The operators of the existing businesses are unlikely to be able to move their businesses to the new facility on the Northside option, even if this were possible, as it would involve significant additional investment and a loss on the investment in their current operations.

Both options are likely to have similar impacts on employment, providing increased local employment owing to an enhanced ability to attract business from truck drivers and passing trade. The Northside option would generate additional employment in the new service centre, while the Town Centre option would generate employment through the expansion of existing businesses and new businesses in the town.

7.3.7 Justification of the Project

The cheapest cost option is the Town Centre option, although this may involve significantly more public sector funds compared with the Northside option. The NPV of cost of the Town Centre option is \$5.9 million, after deducting the savings in accident costs of \$4.9 million.

To justify the project overall would require additional benefits from the project amounting to more than \$5.9 million in NPV terms. These benefits, if they were to be generated, would flow to the businesses in the town through increased business activity and to truck operators in the form of better facilities for parking and changeover.

Improving the amenity and business activity in the town will over time increase property values, which will increase property rates. This increase in rates will flow to the Council to compensate them for the cost of maintaining the new facilities. The increase in rates is likely to be small compared with the relatively high cost of cleaning and maintaining the facility.

It would be difficult to charge truck drivers for the use of the facility. Even if parking and changeover were prohibited outside of the Tarcutta facility, it is likely that drivers would be reluctant to pay for use of these facilities.

There is a need to ensure that the beneficiaries of the project pay for the costs and this may be difficult for the Town Centre option. The Northside option could possibly be funded entirely through private sector investment.

7.4 FUNDING OF THE SITE OPTIONS

A major difference between the options is the likely source of funding.

The Town Centre option would need to be funded from a range of sources including:

- sponsorship initiatives from road transport companies;
- the trucking industry in the form of charges for the use of parking, changeover and other facilities;
- contributions from the existing businesses and property owners for the improvement in the amenity of the town which should increase business opportunities; and
- the State Government and Commonwealth Government through reductions in accidents, which are a cost burden to government.

The Northside option could be fully funded by the private sector and may not involve cost to government, although this is not proven. Funding from private sector sources would depend on the viability of the Northside option site for such a private sector operation. This would have to be tested in the market place.

The cost of the development would require a significant investment that would seek to capture fuel sales, and particularly food and retail sales, from the existing Tarcutta facilities as well as further sales of these items from trucks and passing trade. The market for the facility would have to be significantly larger than that generated by the existing Tarcutta businesses. It would be up to potential developers to assess the

market and to develop a facility that could attract sufficient business to justify the investment.

There are few remaining highway facilities outside the major service centres, because most towns are now bypassed. The market for the fuel, food and other business of trucks and passing trade remains very competitive.

The Town Centre option would require government funding and probably contributions from the trucking industry and local business. One possible scenario is for government to put in the capital costs, for construction and relocation of sporting facilities. The trucking industry, Mobil and other local businesses would then be responsible for the cost of operating and maintaining the facility, probably by contributing funds to the local Council, who would organise the maintenance.

This model would depend on developing an appropriate method for annual contribution to these costs from the parties and may be difficult to ensure over the long term.

The rationale for seeking government funding is for the saving in accident costs. Accident cost reduction is generally considered a responsibility of the Commonwealth Government and State Government.

8 OUTLINE ENVIRONMENTAL MANAGEMENT PLAN

8.1 PRINCIPLES OF ESD

Ecologically sustainable development (ESD) may be defined as development that "meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987).

The four ESD principles are:

- the precautionary principle. If there are threats of serious or irreversible environmental damage, lack of full certainty should not be used as a reason for postponing measures to prevent environmental degradation;
- intergenerational equity. The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;
- conservation of biological diversity and ecological integrity; and
- improved valuation and pricing of environmental resources.

The principles of ESD aim to balance social, economic and environmental considerations in the decision-making process. This environmental and comparative study provides the social, economic and environmental information necessary to assist in the selection of a preferred option based on the principles of ESD.

8.2 MATTERS TO BE ADDRESSED

The preparation of environmental management plans (EMP) are recommended to cover design, construction and operation of a truck changeover facility. The aim of the EMPs would be to summarise environmental management procedures and act as an environmental operations manual for use by facility design, construction and operational personnel.

The EMPs would include:

- a demonstration of sound environmental management practices with consideration of ESD;
- identification of all licensing and approval requirements; and
- an outline monitoring program and procedures for reporting results.

The EMPs should address the following key environmental issues:

- working hours;
- erosion and sediment controls;
- noise controls;
- dust control;
- flora and fauna management;

- access and traffic management;
- stormwater run-off control during operation;
- heritage management;
- waste water disposal;
- solid waste disposal measures;
- landscape and rehabilitation methodology;
- community liaison and complaint handling procedures;
- incident management and emergency response procedures; and
- monitoring requirements.

9 CONCLUSIONS

9.1 INTRODUCTION

Figure 9.1 identifies the mitigation measures for the Northside option and *Figure 9.2* for the Town Centre option. These figures illustrate the implications of the various environmental characteristics identified in the earlier chapters. They have been based on the assessment of elements of the environment to determine which areas may be able to sustain development without adverse impacts on the site, adjoining lands and downstream areas.

Both sites are capable of being developed for the proposed truck changeover facility. Furthermore, there are a number of measures proposed in this study to mitigate identified areas of environmental impacts.

9.2 MITIGATION MEASURES

9.2.1 Northside Option

i Hydrology, Groundwater and Water Quality

The following safeguards will be incorporated in the proposal to minimise the potential for adverse impacts on Tarcutta Creek water quality and the total catchment (refer to Chapter 5):

- implementing specialised soil and sedimentation control measures at the time of construction;
- constructing a detention basin that also functions as a pollution control basin. The existing dam at the Northside option would be suitable for this function, subject to further assessment to determine the required size, depth and permeability;
- an assessment of local groundwater depth should be made. The detailed facility design should incorporate measures to minimise alterations to the local groundwater regime;
- installing pollution control basins to contain major on-site chemical spills. The material used to line these basins should provide a minimum permeability of 1×10^{-9} metres per second;
- developing emergency response procedures for chemical spills; and
- control structures to reduce sediment, oil, grease and litter in stormwater run-off should be incorporated into the facility design.

ii Soils

The following mitigation measures were developed to ameliorate impacts on soils during the construction of the facility (refer to Chapter 5):

- modifying the existing dam to act as a sediment basin;

- adding flocculants to sediment basins during construction;
- minimising the total area of disturbance;
- clearly marking the work site and access routes to avoid unnecessary disturbance;
- staging works to avoid the exposure of large areas;
- diverting clean run-off from upper slopes around the site;
- appropriately siting the facility and using erosion controls for soil stockpiles;
- using hay mulches for temporary erosion control, particularly on dispersible soils; and
- progressively rehabilitating disturbed areas.

An appropriate erosion and sediment control plan would need to be developed prior to construction commencing. The plan would need to be developed in consultation with the Department of Land and Water Conservation.

iii **Terrestrial Flora and Fauna**

No significant impacts on flora and fauna at the Northside option are expected. The potential for impact will be further mitigated by implementing the following measures (refer to Chapter 5):

- retaining all mature site trees and incorporating them within the site layout; and
- ensuring trees adjoining the site, along the highway, Prospect Street and the cemetery, are retained and protected during construction.

iv **Visual Impacts and European Heritage**

Visual impacts from developing this option will be difficult to mitigate. The following measures are recommended in addition to those outlined for flora and fauna (refer to Chapters 5 and 6 respectively):

- minimising earthworks within the site by restricting the amount and type of development on the steeper land to the south of the site;
- using appropriate screen planting on both sides of the acoustic fences;
- reinforcing screen planting between the site and the cemetery and along the northern boundary;
- implementing a high standard of architectural design for all aspects of the site buildings including the siting;
- devising an illumination design for the site that minimises potential light spillage and the number of structures; and
- through appropriate landscape design reducing the extent of internal paving to a safe minimum.

v **Archaeology**

The site has low significance but the following mitigation measure was identified (refer to Chapter 6):

- retain the scarred tree on the site (if possible) and incorporate it into the design of the facility.

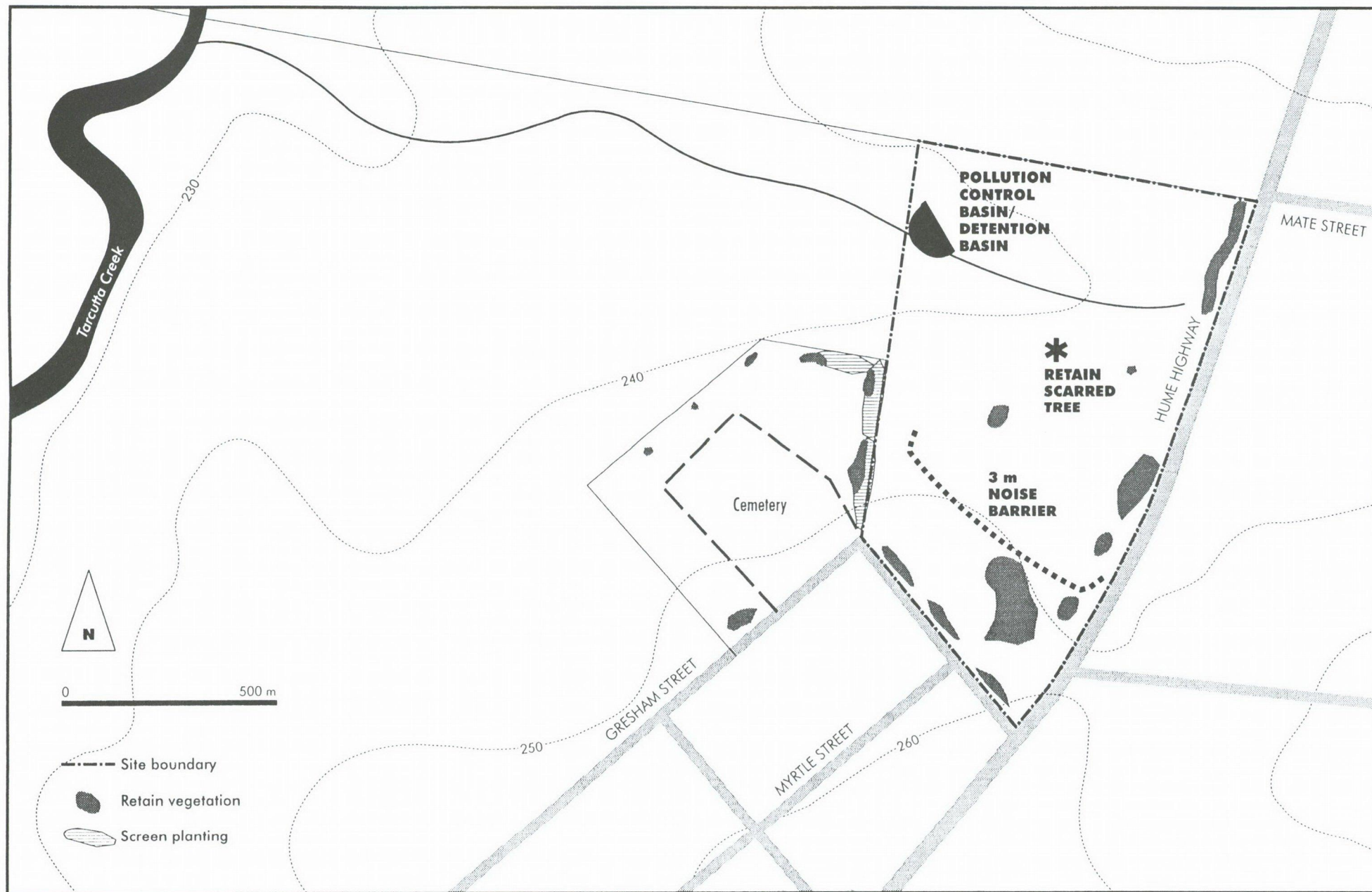


Figure 9.1 **MITIGATION MEASURES (Northside option)**

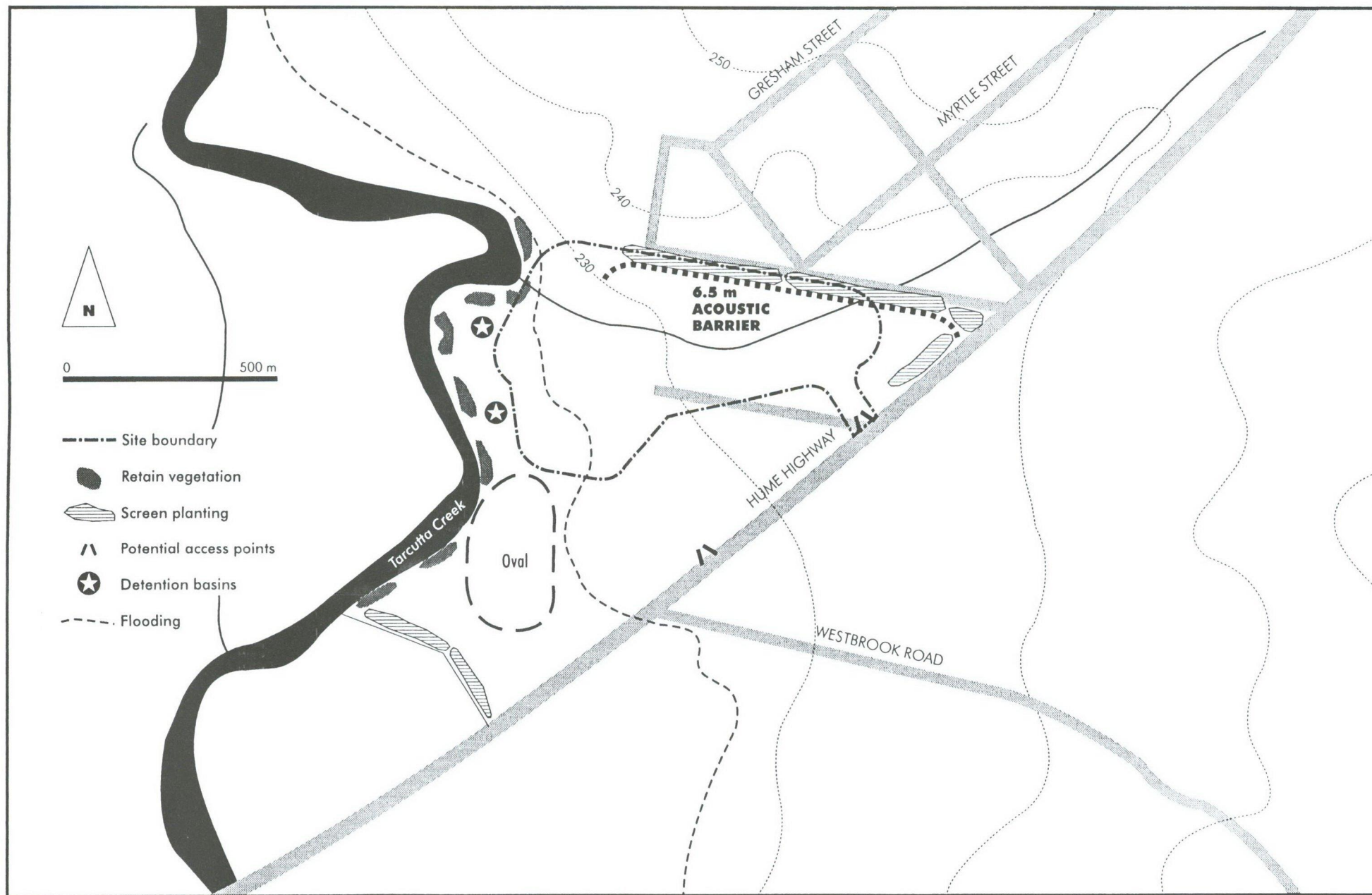


Figure 9.2 **MITIGATION MEASURES (Town Centre option)**

vi Noise and Air Quality

a Noise

The following mitigation measures were derived from the noise assessment (refer to Chapter 6):

- minimise the height and extent of acoustic fences as much as possible by incorporating mitigation measures into individual dwellings; and
- negotiate with landowners regarding alternative options for mitigating noise.

b Air Quality

The following mitigation measures are required during construction of the facility (refer to Chapter 6):

- minimising the area disturbed at any one time;
- watering exposed areas during dry and/or windy conditions; and
- ensuring all construction equipment is maintained and operated in accordance with the provisions of the Clean Air Regulations and with manufacturer's specifications.

vii Access

The following mitigation measure was identified to improve the proposed access identified within the concept plans (refer to Chapter 6):

- extending the truck lane to serve as an acceleration lane or, alternatively to provide an additional southbound lane through the intersection to allow highway traffic to change lanes to avoid conflict.

viii Dangerous Goods

The design of the facility should ensure that adequate measures exist to contain any spills on site and to minimise the likelihood of a collision on the site or while accessing the site (refer to Chapter 6).

ix Social and Economic

The only way to mitigate the social and economic impact of this option on the town is to develop the Town Centre option (refer to Chapter 7). To minimise the impact from the Northside option, measures would be required to enhance the appearance and presentation of the town to encourage passing trade to stop. These measures may include: landscaping; footpath paving; retaining parking in the town for trucks to stop to purchase food (but prohibit changeovers in the town); enhancing the heritage features of the town; and improving the entrances into town. There are funding limitations to these mitigation measures.

9.2.2 Town Centre Option

i Hydrology, Groundwater and Water Quality

The following safeguards will be incorporated in the proposal to minimise the potential for adverse impacts on Tarcutta Creek water quality and the total catchment (refer to Chapter 5):

- implementing soil and sedimentation control measures at the time of construction;
- constructing more than one detention pond/pollution control basin to minimise potential adverse water quality impacts;
- control structures to reduce sediment, oil and grease and litter in stormwater run-off should be incorporated into the facility design;
- using pollution control basins to contain major on-site chemical spills. The material used to line these basins should provide a minimum permeability of 1×10^{-9} metres per second;
- developing emergency response procedures for chemical spills; and
- an assessment of local groundwater depth should be made. The detailed facility design should incorporate measures to minimise alterations to the local groundwater regime.

ii Soils

The following mitigation measure was developed to ameliorate impacts on soils during the construction of the facility (refer to Chapter 5):

- an appropriate erosion and sediment control plan would need to be developed prior to construction commencing. The plan would need to be developed in consultation with the Department of Land and Water Conservation.

iii Terrestrial Flora and Fauna

No significant impact on flora and fauna at the Town Centre option is expected. The potential for impact will be further mitigated by implementing the following measures (refer to Chapter 5):

- retaining all river red gum trees along Tarcutta Creek;
- fencing off Tarcutta Creek and rehabilitating the understorey along the creek line; and
- revegetating the site with indigenous species.

iv Visual Impacts and European Heritage

The following measures are recommended in addition to those outlined for flora and fauna (refer to Chapters 5 and 6 respectively):

- minimising the height of acoustic fences as much as possible;
- planting along the acoustic fences using vegetation appropriate to the context including fast-growing species with a mature height that would screen as much of the internal site area as possible but not obscure existing desirable views from adjacent residences;

- devising an illumination design for the site that minimises potential light spillage and the number of structures;
- siting new structures, including buildings and signs, to avoid undue prominence;
- designing new structures, including buildings and lighting supports, to be visually subservient to the site context;
- reducing the extent of internal paving to a safe minimum through appropriate landscape design;
- reinforcing the creek-side vegetation with compatible plantings to extend the screen around to the south of the site;
- incorporating the existing date palm within the site layout where possible; and
- allowing for the future development, where appropriate, of more buildings along the main-street frontage.

v Archaeology

The site has low to moderate significance but the following mitigation measure was identified (refer to Chapter 6):

- the RTA apply to the NPWS for a preliminary research permit to carry out sub-surface testing of potential archaeological deposits.

vi Noise and Air Quality

a Noise

The following mitigation measures were derived from the noise assessment (refer to Chapter 6):

- minimise the height and extent of acoustic fences as much as possible by incorporating mitigation measures into individual dwellings; and
- negotiate with landowners for alternative options for mitigating noise.

b Air Quality

The following mitigation measures are required during construction of the facility (refer to Chapter 6):

- minimising the area disturbed at any one time;
- watering exposed areas during dry and/or windy conditions; and
- ensuring all construction equipment is maintained and operated in accordance with the provisions of the Clean Air Regulations, and with manufacturer's specifications.

vii Access

The following mitigation measures were identified to improve the proposed access identified within the concept plans (refer to Chapter 6):

- develop a one-way system through the site with entry at Hay Street and exit at the Mobil service station. Detailed design work will be required to assess this proposal; and

- use the existing road layout for access to the site and minimise the need to widen the existing road reserve.

viii Social and Economic

The following mitigation measures were recommended to minimise the social impact of the Town Centre option:

- if the recreation facilities are relocated, the benefit to the town will be improved facilities that can be used all year round. In siting the new facilities consideration must be given to:
 - maintaining the relationship of the sporting facility with the hotel;
 - providing the facility in a centralised location within the town; and
 - ensuring that the facility is easily accessible; and
- if properties are acquired individuals need to be adequately compensated to ensure that they can afford to relocate to an equivalent property within the town.



PART B

Comparative Study

10 COMPARATIVE STUDY

10.1 PURPOSE OF THE REPORT

The environmental, social and economic study, which forms Part A of this two-part document, identified the opportunities and constraints of both options. Part B provides decision-makers with an objective analysis of the three options taking into consideration the issues identified by the community in workshop one and the ranking of these issues undertaken in workshop two. In addition the findings of the environmental study together with the feedback received during the consultation process are incorporated in this analysis. The three options being considered are:

- the Northside option;
- the Town Centre option; and
- the Do Nothing option.

The preferred option will not be determined as part of this study. Each option is assessed against a number of categories. These categories were weighted by three separate interest groups to ensure that broad spectrums of views were incorporated in the assessment. These interest groups were:

- the community;
- government agencies; and
- the transport industry.

The report provides a summary of the option that best suits each category. Presentation of the data in this way enables decision-makers to determine the most appropriate option by applying weighting to each category.

In addition a number of recommendations were made regarding the next stage of the assessment process.

10.2 RANKING OF ISSUES

The key issues identified in the first workshop, held as part of this study, were summarised and included in *Appendix D*. These issues are summarised in *Table 10.1*.

At the second workshop each of the interest groups was asked to rank the issues according to their importance on a scale of 1 to 5 with:

1. not relevant
2. relevant but not an important factor
3. relevant and of moderate concern
4. between 3 and 5
5. a key assessment issue.

The numbers of people in each group category were not distributed evenly, as there were more community representatives. To even up the assessment process the median of each score for each group was taken and is presented in *Table 10.1*.

The result of the ranking of issues is summarised in *Table 10.1*.

Table 10.1 *Ranking of Issues*

Issue	Community	Transport Industry	Government
Impact of Vehicle Noise	4.5	4	2
Air Pollution	4	4	2
Impact from Lighting	2.5	5	2
Road Safety/Accident Reduction	5	5	5
Security at Home/Businesses	2.5	1	2
Loss of Property Values	4.5	1	2
Rural Landscape	2	1	3
Views from Properties	2.5	3	2
Entry Statements to Town	3.5	3	2
Overall Appearance of the Town	4	2	2
Risk from Hazardous Spills	4.5	5	4
Size of the Facility	3	5	3
Life of the Facility	3	5	3
Maintenance of the Facility	5	4	4
Funding for the Facility	4	3	5
Economic Viability of the Town	4.5	2	3
Employment	5	2	3
Loss of Businesses in Town	5	1	3
Civic Improvement in the Town	4	1	3
Retention of Bays in the Middle of Town	4.5	3	3
Access to the Facility	5	5	4
Potential for Expansion of the Facility.	4	3	4
Flora and Fauna	2.5	2	2
Archaeology	2	1	2
European Heritage	2	1	2
Flooding	4	4	4
Water Quality	4.5	3	2
Water Table	4	3	2
Soil Erosion	4	3	3
Ecologically Sustainable Development (ESD)	3	3	3

The four issues shown shaded in *Table 10.1* were ranked 2.5 or less by all interest groups, including security of homes and businesses, flora and fauna, European heritage and archaeology. These issues were excluded from the assessment. The remaining issues were used to compare the three options.

10.3 **SCORING OF OPTIONS AGAINST CRITERIA**

An assessment of the existing situation and identification of the opportunities and constraints of the Town Centre and Northside options are outlined in Part A. From that analysis it is possible to determine which option best satisfies each issue. Based on this assessment each option was scored against each issue using the following classification:

- 0 The option that least satisfies the issue;
- 2 The option that partially satisfies the issue; and
- 1 the option that most satisfies this issue.

Justification for the scoring of each option is presented below.

10.3.1 Impact of Vehicle Noise

To comply with EPA criteria the Town Centre option will require more extensive mitigation measures than the Northside option. Therefore a higher ranking has been applied to the Northside option. Current noise levels exceed EPA noise criteria for a number of properties along the Hume Highway. The Do Nothing option does not satisfy this issue.

10.3.2 Air Pollution

Air pollution does not exceed EPA criteria for any of the options. In effect there will be transference of the pollutant source from the road reserve to either the Town Centre or Northside option. Tarcutta is situated in a valley that runs north – south. Observation by local residents suggests that the prevailing winds are from the south, funnelling up through the valley (McGhie 1993). There is the possibility of a temperature inversion layer that could affect the mixing and dispersion of pollutants for the Town Centre or Do Nothing option. The Northside option is not located in the hollow of the Tarcutta valley and therefore the potential for localised temperature inversions affecting air quality is lower than the Town Centre or Do Nothing options.

10.3.3 Impact from Lighting

This issue relates to the impact of nightlight haze and light spillage into residential properties. Presently trucks are changing over under normal street lighting conditions. While this is inadequate for the truck drivers there is no significant lighting impacts on residential properties. Under the Town Centre option the residential properties that may be affected by lighting are located on a higher elevation to the site and in closer proximity to the site, than that of the Northside option. Therefore, the potential exists for greater impact from the Town Centre option site.

10.3.4 Road Safety and Accident Reduction

This issue relates to the current unsafe manoeuvring of trucks and the inadequacy of changeover facilities in the town at the present time. Both the Town Centre and the Northside option will remove the trucks from the road and provide a safe facility for changeover.

10.3.5 Loss of Property Values

Without a proper market assessment this issue is difficult to address. However, it is assumed that under the Do Nothing option property values will remain the same. Under the Town Centre option the potential exists for some residential property values to be affected while values for local businesses may increase due to the

increase in trade and the ability to expand businesses. Property and business values are also assumed to be adversely affected by the development of the Northside option.

10.3.6 Rural Landscape

The conclusions of the visual assessment are that development of the Northside option site would detract from an appreciation of the abrupt transition from the township to the surrounding rural landscape. Surrounding vegetation and commercial strip development would hide the Town Centre option. However, views into the rural landscape of the Town Centre option would be lost. The existing rural landscapes would be preserved under the Do Nothing option.

10.3.7 Views from Properties

The visual assessment in Part A concluded that the Town Centre option site offers more scope to visually absorb development. The open character of the Northside option enables good views across it to attractive rural scenery and development of this site would hinder these views. The existing views would not be affected by the Do Nothing option.

10.3.8 Entry Statements to Town

At the present time the southern entrance into the town is affected by the large number of trucks parking in the centre of the road reserve. Development of the Northside option would detract from the current poignant landscape contrasts which are an important part of the traditional setting of Tarcutta and are useful in understanding the character of the place. The Town Centre option would locate the trucks behind existing developments thereby taking the trucks off the highway and preserving and enhancing the current entry to town.

10.3.9 Overall Appearance of the Town

Both options will improve the overall appearance of the town, as they will remove the trucks from the middle of town. However, as mentioned previously, the Town Centre option offers more scope to absorb the development. The current situation detracts from the appearance of the town due to the large number of trucks congregating in the centre of the town.

10.3.10 Risk from Hazardous Spills

The dangerous goods assessment in Part A concluded that of the three options the Northside option appears to have less impacts due to the lower number of residents within 500 metres of the site. The Do Nothing option has the greatest impact due to the number of residents within 500 metres of the parking area.

10.3.11 Size of the Facility

The Northside option is the largest facility as it is larger in size and has the capacity to cater for a greater number of B-doubles. At the other end of the scale the Do Nothing option is currently inadequate for the demand. The Town Centre option is in the middle of these two options.

10.3.12 Life of the Facility

As mentioned above, the largest facility will have the longest life due to the ability to increase in size with demand. The rating applied for size also applies for life of the facility.

10.3.13 Maintenance of the Facility

This issue relates to the ability to fund the maintenance of the facility. Should the Northside option be feasible it will be maintained by private investment while the Town Centre and Do Nothing option will need to be maintained by government funding or sponsorship and levies applied to the private sector. It will be more difficult to maintain the Town Centre or Do Nothing options due to the uncertainty of government funding.

10.3.14 Funding for the Facility

The same score was applied for this issue as the maintenance of the facility. This rating is applied on the assumption that the Northside option can be funded by the private sector.

10.3.15 Economic Viability of the Town

The Town Centre option retains and enhances the existing businesses in Tarcutta that depend on truck and passing trade. The improvement in the amenity of the town as a result of removing truck parking from the highway, would encourage business expansion and the development of additional businesses aimed at the passing trade.

Significant retail and restaurant competition at the Northside option would threaten the viability of many of the existing town businesses. Operators of the existing businesses are unlikely to be able to move their businesses to the Northside option, even if this were possible, as this would involve significant additional investment and a loss of the investment in their current operations.

The current situation inhibits the development of the town as the trucks currently screen existing businesses from the view of passing trade.

10.3.16 Employment

The Town Centre and Northside options are likely to have similar impacts on employment, as they will result in increased local employment owing to an enhanced ability to attract business from truck drivers and passing trade. The Northside option would generate additional employment in the new service centre, while the Town Centre option would generate employment through the expansion of existing businesses and new businesses in the town. Under the Do Nothing option employment levels will not increase.

10.3.17 Loss of Businesses in the Town

The number of businesses is unlikely to increase under the Do Nothing option. However, due to the increase in trade from the Town Centre option, potential exists for the town to grow. The Northside option will compete heavily with existing

businesses and have the potential for business to contract or disappear. This has the long-term impact of causing economic decline and reducing social capital.

10.3.18 Civic Improvement in the Town

At the present time it is not possible to incorporate civic improvements in the townscape as the trucks are likely to destroy these improvements and these changes can potentially create accidents. Either of the two development options will remove trucks from the town main street allowing for civic improvement.

10.3.19 Retention of Parking Bays in the Middle of Town

Under the Do Nothing option the bays are retained but they are monopolised by trucks which inhibit their use by passing light-vehicle trade. The Town Centre option will provide parking for the trucks in town and off the highway. This will free up the parking in the town for caravans and light vehicles. The benefit of the Town Centre option is that all passing trade including trucks will have a separate space to stop in the town, and importantly, they will remain in the town. Under the Northside option, the bays will be retained, while the trucks will be taken out of the town. The police and the RTA advised that the bays in the middle of town could not be used for truck parking if a changeover facility were provided.

10.3.20 Access to the Facility

The cost of constructing the access to the Northside option will be more expensive than the Town Centre option as greater modifications to the existing road layout will be required. The current facility is inadequate.

10.3.21 Potential for Expansion of the Facility

The Northside option has the greatest potential for expansion due to the farmland surrounding it and the smaller proportion of residences within the vicinity of the site. The Town Centre option has limited expansion potential that will result in the need to relocate the sports facility. There is no potential to expand the current facilities.

10.3.22 Flooding

Limited potential exists for the Northside option and the Do Nothing option to be subject to flooding. The southern portion of the Town Centre option is located on flood prone land.

10.3.23 Water Quality

The Do Nothing option is the worst for water quality as there are no controls on stormwater run-off from the parking bays. The Town Centre option can be differentiated from the Northside option as it is closer to the creek. Stormwater controls can be implemented at the Town Centre option site but they would be more difficult to design.

10.3.24 Water Table

The water table is closer to the surface at the town centre option than the Northside option, creating greater potential for groundwater impacts. As the Do Nothing option has already been constructed there are no new impacts but as there are no controls there is potential for spills to access the groundwater.

10.3.25 Soil Erosion

Overall the risk of soil erosion at the Town Centre option is moderate. Standard erosion and sediment controls would be sufficient to ensure sediment movement off-site is controlled. The Northside option has very high erodibility and would require additional controls. Despite the relatively low slope gradients, there is a high to very high erosion risk at the site.

10.3.26 ESD

The Northside and Town Centre options can be developed to comply with the principles of ESD. The Do Nothing option does not satisfy these principles.

Table 10.2 summarises these scores against each of the issues.

Table 10.2 Option That Best Satisfies Issues

Issue	Do Nothing	Town Centre	Northside
Impact of Vehicle Noise	0	½	1
Air Pollution	½	½	1
Impact from Lighting	1	0	½
Road Safety/Accident Reduction	0	1	1
Loss of Property Values	1	½	0
Rural Landscape	1	½	0
Views from Properties	1	½	0
Entry Statements to Town	0	1	0
Overall Appearance of the Town	0	1	½
Risk from Hazardous Spills	0	½	1
Size of the Facility	0	½	1
Life of the Facility	0	½	1
Maintenance of the Facility	0	½	1
Funding for the Facility	0	½	1
Economic Viability of the Town	½	1	0
Employment	½	1	1
Loss of Businesses in Town	½	1	0
Civic Improvement in the Town	0	1	1
Retention of Bays in the Middle of Town	0	1	½
Access to the Facility	0	1	½
Potential for Expansion of the Facility.	0	½	1
Flooding	1	0	1
Water Quality	0	½	1
Water Table	0	0	1
Soil Erosion	1	½	0
ESD	0	1	1

10.4 PREFERRED OPTION SCENARIOS

This section applies the ranking of each issue by each interest group to the ability of each option to satisfy each issue. The purpose of this analysis is to determine the preferred option for each interest group.

By taking the weight that the interest group applied to each issue (*Table 10.1*) and multiplying it by their satisfaction scores (*Table 10.2*) it is possible to determine the preferred option. *Tables 10.3 – 10.5* summarise the findings for community, transport industry and government respectively.

Table 10.3 Community Option Analysis

Issue	Do Nothing	Town Centre	Northside
Impact of Vehicle Noise	0	2.25	4.5
Air Pollution	2	2	4
Impact from Lighting	2.5	0	1.25
Road Safety/Accident Reduction	0	5	5
Loss of Property Values	4.5	2.25	0
Rural Landscape	2	1	0
Views from Properties	2.5	1.25	0
Entry Statements to Town	0	3.5	0
Overall Appearance of the Town	0	4	2
Risk from Hazardous Spills	0	2.25	4.5
Size of the Facility	0	1.5	3
Life of the Facility	0	1.5	3
Maintenance of the Facility	0	2.5	5
Funding for the Facility	0	2	4
Economic Viability of the Town	2.25	4.5	0
Employment	2.5	5	5
Loss of Businesses in Town	2.5	5	0
Civic Improvement in Town	0	4	4
Retention of Bays in the Middle of Town	0	4.5	2.25
Access to the Facility	0	5	2.5
Potential for Expansion of the Facility	0	2	4
Flooding	4	0	4
Water Quality	0	2.25	4.5
Water Table	0	0	4
Soil Erosion	4	2	0
ESD	0	3	3
Total	28.75	68.25	69.5

Table 10.4 *Transport Industry Option Analysis*

Issue	Do Nothing	Town Centre	Northside
Impact of Vehicle Noise	0	2	4
Air Pollution	2	2	4
Impact from Lighting	5	0	2.5
Road Safety/Accident Reduction	0	5	5
Loss of Property Values	1	0.5	0
Rural Landscape	1	0.5	0
Views from Properties	3	1.5	0
Entry Statements to Town	0	3	0
Overall Appearance of the Town	0	2	1
Risk from Hazardous Spills	0	2.5	5
Size of the Facility	0	2.5	5
Life of the Facility	0	2.5	5
Maintenance of the Facility	0	2	4
Funding for the Facility	0	1.5	3
Economic Viability of the Town	1	2	0
Employment	1	2	2
Loss of Businesses in Town	0.5	1	0
Civic Improvement in Town	0	1	1
Retention of Bays in the Middle of Town	0	3	1.5
Access to the Facility	0	5	2.5
Potential for Expansion of the Facility	0	1.5	3
Flooding	4	0	4
Water Quality	0	1.5	3
Water Table	0	0	3
Soil Erosion	3	1.5	0
ESD	0	3	3
Total	21.5	49	61.5

Table 10.5 Government Option Analysis

Issue	Do Nothing	Town Centre	Northside
Impact of Vehicle Noise	0	1	2
Air Pollution	1	1	2
Impact from Lighting	2	0	1
Road Safety/Accident Reduction	0	5	5
Loss of Property Values	2	1	0
Rural Landscape	3	1.5	0
Views from Properties	2	1	0
Entry Statements to Town	0	2	0
Overall Appearance of the Town	0	2	1
Risk from Hazardous Spills	0	2	4
Size of the Facility	0	1.5	3
Life of the Facility	0	1.5	3
Maintenance of the Facility	0	2	4
Funding for the Facility	0	2.5	5
Economic Viability of the Town	1.5	3	0
Employment	1.5	3	3
Loss of Businesses in Town	1.5	3	0
Civic Improvement in Town	0	3	3
Retention of Bays in the Middle of Town	0	3	1.5
Access to the Facility	0	4	2
Potential for Expansion of the Facility	0	2	4
Flooding	4	0	4
Water Quality	0	1	2
Water Table	0	0	2
Soil Erosion	3	1.5	0
ESD	0	3	3
Total	21.5	50.5	54.5

This analysis clearly demonstrates the Do Nothing option is not favoured by any of the three groups. There is a slight bias towards the Northside option exhibited by the community and the government but the scores are close. The trucking industry preference for the Northside option is distinct.

10.5 SENSITIVITY TESTING

10.5.1 Interest Group Issues

The preceding assessment has tested each option against the collective issues. There were a number of issues that are more important to each interest group than others. To test whether the consideration of specific issues affects the final outcome an analysis of the most important issues to each interest group was completed. From this analysis specific criteria emerged.

i Issues of Importance to the Community

The following assessment only considers the issues ranked 4.5 or 5 by the community. These issues primarily relate to residential amenity and economic viability of the town.

Each interest group was assessed against this range of issues and the assessment is given in *Tables 10.6a, 10.6b and 10.6c*. This data was extracted from *Tables 10.3, 10.4 and 10.5* respectively.

Table 10.6a Community Option Analysis

Issue	Do Nothing	Town Centre	Northside
Impact of Vehicle Noise	0	2.25	4.5
Road Safety/Accident Reduction	0	5	5
Loss of Property Values	4.5	2.25	0
Rural Landscape	2	1	0
Risk from Hazardous Spills	0	2.25	4.5
Maintenance of the Facility	0	2.5	5
Economic Viability of the Town	2.25	4.5	0
Employment	2.5	5	5
Loss of Businesses in Town	2.5	5	0
Retention of Bays in the Middle of Town	0	4.5	2.25
Access	0	5	2.5
Water Quality	0	2.25	4.5
Total	13.75	41.5	33.25

Table 10.6b Community Factors-Transport Industry Analysis

Issue	Do Nothing	Town Centre	Northside
Impact of Vehicle Noise	0	2	4
Road Safety/Accident Reduction	0	5	5
Loss of Property Values	1	0.5	0
Risk from Hazardous Spills	0	2.5	5
Maintenance of the Facility	0	2	4
Economic Viability of the Town	1	2	0
Employment	1	2	2
Loss of Businesses in Town	0.5	1	0
Retention of Bays in the Middle of Town	0	3	1.5
Access	0	5	2.5
Water Quality	0	1.5	3
Total	3.5	26.5	27

Table 10.6c Community Factors-Government Analysis

Issue	Do Nothing	Town Centre	Northside
Impact of Vehicle Noise	0	1	2
Road Safety/Accident Reduction	0	5	5
Loss of Property Values	2	1	0
Risk from Hazardous Spills	0	2	4
Maintenance of the Facility	0	2	4
Economic Viability of the Town	1.5	3	0
Employment	1.5	3	3
Loss of Businesses in Town	1.5	3	0
Retention of Bays in the Middle of Town	0	3	1.5
Access	0	4	2
Water Quality	0	1	2
Total	6.5	28	23.5

An analysis using the factors considered of most importance to the community again clearly rates the Do Nothing option an obvious third. The community and government prefer the Town Centre option. There is little to separate the Town Centre and Northside option in the rating of the transport industry.

ii Issues of Importance to the Transport Industry

Issues ranked 4 or 5 by the Transport Industry related to the design of the facility and road safety. A key focus of this is to provide a safe and suitable facility that will improve the existing situation. Tables 10.7a, 10.7b and 10.7c present the options evaluations against the transport industry factors.

Table 10.7a Trucking Industry Factors – Community Analysis

Issue	Do Nothing	Town Centre	Northside
Impact from Lighting	2.5	0	1.25
Road Safety/Accident Reduction	0	5	5
Risk from Hazardous Spills	0	2.25	4.5
Size of the Facility	0	1.5	3
Life of the Facility	0	1.5	3
Access to the Facility	0	5	2.5
Total	2.5	15.25	19.25

Table 10.7b Trucking Industry Factors X Trucking Industry Analysis

Issue	Do Nothing	Town Centre	Northside
Impact from Lighting	5	0	2.5
Road Safety/Accident Reduction	0	5	5
Risk from Hazardous Spills	0	2.5	5
Size of the Facility	0	2.5	5
Life of the Facility	0	2.5	5
Access to the Facility	0	5	2.5
Total	5	17.5	25

Table 10.7c Trucking Industry Factors X Government Analysis

Issue	Do Nothing	Town Centre	Northside
Impact from Lighting	2	0	1
Road Safety/Accident Reduction	0	5	5
Risk from Hazardous Spills	0	2	4
Size of the Facility	0	1.5	3
Life of the Facility	0	1.5	3
Access to the Facility	0	4	2
Total	2	14	18

All three groups identified the Northside option as the preferred option under the trucking industry factors.

iii Issues Important to Government

Issues ranked 4 or 5 were used to identify the principal issues of concern to government. These related to road safety, funding of the facility, the future expansion potential of the facility and flooding. *Tables 10.8a, 10.8b and 10.8c* present the option evaluations against the government factors.

Table 10.8a Government Factors X Community Analysis

Issue	Do Nothing	Town Centre	Northside
Road Safety/Accident Reduction	0	5	5
Risk from Hazardous Spills	0	2.25	4.5
Maintenance of the Facility	0	2.5	5
Funding for the Facility	0	2	4
Access to the Facility	0	5	2.5
Potential for Expansion of the Facility	0	2	4
Flooding	4	0	4
Total	4	18.75	29

Table 10.8b Government Factors X Trucking Industry Analysis

Issue	Do Nothing	Town Centre	Northside
Road Safety/Accident Reduction	0	5	5
Risk from Hazardous Spills	0	2.5	5
Maintenance of the Facility	0	2	4
Funding for the Facility	0	1.5	3
Access to the Facility	0	5	2.5
Potential for Expansion of the Facility	0	1.5	3
Flooding	4	0	4
Total	4	17.5	26.5

Table 10.8c Government Factors X Government Analysis

Issue	Do Nothing	Town Centre	Northside
Road Safety/Accident Reduction	0	5	5
Risk from Hazardous Spills	0	2	4
Maintenance of the Facility	0	2	4
Funding for the Facility	0	2.5	5
Access to the Facility	0	4	2
Potential for Expansion of the Facility	0	2	4
Flooding	4	0	4
Total	4	17.5	28

The Northside option was the preferred option when considering issues considered most important by the government.

10.5.2 Issues Grouping by Subject

A further method of sensitivity testing was to group issues according to subject. Six subject groups were identified:

- environmental;
- economic;
- residential amenity;
- visual quality;
- facility design; and
- road safety.

An analysis according to these groups is presented in *Tables 10.9 – 10.14* respectively.

i Environmental Issues

Table 10.9a Community Analysis

Issue	Do Nothing	Town Centre	Northside
Impact of Vehicle Noise	0	2.25	4.5
Air Pollution	2	2	4
Flooding	4	0	4
Water Quality	0	2.25	4.5
Water Table	0	0	4
Soil Erosion	4	2	0
ESD	0	3	3
Total	10	11.5	24

Table 10.9b Trucking Industry Analysis

Issue	Do Nothing	Town Centre	Northside
Impact of Vehicle Noise	0	2	4
Air Pollution	2	2	4
Flooding	4	0	4
Water Quality	0	1.5	3
Water Table	0	0	3
Soil Erosion	3	1.5	0
ESD	0	3	3
Total	9	10	21

Table 10.9c Government Analysis

Issue	Do Nothing	Town Centre	Northside
Impact of Vehicle Noise	0	1	2
Air Pollution	1	1	2
Flooding	4	0	4
Water Quality	0	0	2
Water Table	0	0	2
Soil Erosion	3	1.5	0
ESD	0	3	3
Total	8	6.5	15

All three interest groups identified the Northside option as the preferred option on environmental grounds.

ii Economic Issues

Table 10.10a Community Analysis

Issue	Do Nothing	Town Centre	Northside
Loss of Property Values	4.5	2.25	0
Maintenance of the Facility	0	2.5	5
Funding for the Facility	0	2	4
Economic Viability of the Town	2.25	4.5	0
Employment	2.5	5	5
Retention of Bays in the Middle of Town	0	4.5	2.25
Loss of Businesses in Town	2.5	5	0
Total	11.75	25.75	16.25

Table 10.10b Trucking Industry Analysis

Issue	Do Nothing	Town Centre	Northside
Loss of Property Values	1	0.5	0
Maintenance of the Facility	0	2	4
Funding for the Facility	0	1.5	3
Economic Viability of the Town	1	2	0
Employment	1	2	2
Retention of Bays in the Middle of Town	0	3	1.5
Loss of Businesses in Town	0.5	1	0
Total	3.5	12	10.5

Table 10.10c Government Analysis

Issue	Do Nothing	Town Centre	Northside
Loss of Property Values	2	1	0
Maintenance of the Facility	0	2	4
Funding for the Facility	0	2.5	5
Economic Viability of the Town	1.5	3	0
Employment	1.5	3	3
Retention of Bays in the Middle of Town	1.5	3	0
Loss of Businesses in Town	0	3	1.5
Total	6.5	17.5	13.5

The community and the government identified the Town centre option as the best option to protect and enhance the economic development of the town. The transport industry slightly favoured the Town Centre option.

iii Residential Amenity Issues

Table 10.11a Community Analysis

Issue	Do Nothing	Town Centre	Northside
Impact of Vehicle Noise	0	2.25	4.5
Air Pollution	2	2	4
Impact from Lighting	2.5	0	1.25
Views from Properties	2.5	1.25	0
Risk from Hazardous Spills	0	2.25	4.5
Total	7	7.75	14.25

Table 10.11b Trucking Industry Analysis

Issue	Do Nothing	Town Centre	Northside
Impact of Vehicle Noise	0	2	4
Air Pollution	2	2	4
Impact from Lighting	5	0	2.5
Views from Properties	3	1.5	0
Risk from Hazardous Spills	0	2.5	5
Total	10	8	15.5

Table 10.11c Government Analysis

Issue	Do Nothing	Town Centre	Northside
Impact of Vehicle Noise	0	1	2
Air Pollution	1	1	2
Impact from Lighting	2	0	1
Views from Properties	2	1	0
Risk from Hazardous Spills	0	2	4
Total	5	5	9

Impacts on residential amenity will have less significance for the Northside option.

iv Visual Quality

Table 10.12a Community Analysis

Issue	Do Nothing	Town Centre	Northside
Rural Landscape	2	1	0
Views from Properties	2.5	1.25	0
Entry Statements to Town	0	3.5	0
Civic Improvement in Town	0	4	4
Overall Appearance of the Town	0	4	2
Total	4.5	13.75	6

Table 10.12b Transport Industry Analysis

Issue	Do Nothing	Town Centre	Northside
Rural Landscape	1	0.5	0
Entry Statements to Town	0	3	0
Overall Appearance of the Town	0	2	1
Civic Improvement in Town	0	1	1
Total	1	6.5	2

Table 10.12c Government Analysis

Issue	Do Nothing	Town Centre	Northside
Rural Landscape	3	1.5	0
Entry Statements to Town	0	2	0
Overall Appearance of the Town	0	2	1
Civic Improvement in Town	0	3	3
Total	3	8.5	4

The assessment has identified the **Town Centre** option as the preferred option to enhance and preserve the visual quality of the area.

v Facility Design

Table 10.13a Community Analysis

Issue	Do Nothing	Town Centre	Northside
Impact from Lighting	2.5	0	1.25
Size of the Facility	0	1.5	3
Life of the Facility	0	1.5	3
Access to the Facility	0	5	2.5
Potential for Expansion of the Facility	0	2	4
Total	2.5	10	13.75

Table 10.13b Trucking Industry Analysis

Issue	Do Nothing	Town Centre	Northside
Impact from Lighting	5	0	2.5
Size of the Facility	0	2.5	5
Life of the Facility	0	2.5	5
Access to the Facility	0	5	2.5
Potential for Expansion of the Facility	0	1.5	3
Total	5	11.5	18

Table 10.13c Government Analysis

Issue	Do Nothing	Town Centre	Northside
Impact from Lighting	2	0	1
Size of the Facility	0	1.5	3
Life of the Facility	0	1.5	3
Access to the Facility	0	4	2
Potential for Expansion of the Facility	0	2	4
Total	2	9	13

All three interest groups identify the Northside option as the preferred option when assessing the design criteria.

vi Road Safety

Table 10.14a Community Analysis

Issue	Do Nothing	Town Centre	Northside
Road Safety/Accident Reduction	0	5	5
Risk from Hazardous Spills	0	2.25	4.5
Access to the Facility	0	5	2.5
Total	0	12.25	12

Table 10.14b Trucking Industry Analysis

Issue	Do Nothing	Town Centre	Northside
Road Safety/Accident Reduction	0	5	5
Risk from Hazardous Spills	0	2.5	5
Access to the Facility	0	5	2.5
Total	0	12.5	12.5

Table 10.14c Government Analysis

Issue	Do Nothing	Town Centre	Northside
Road Safety/Accident Reduction	0	5	5
Risk from Hazardous Spills	0	2	4
Access to the Facility	0	4	2
Total	0	11	11

This analysis demonstrates that the two new sites are comparable when assessing the issue of road safety.

10.6 CONCLUSIONS

The purpose of this part of the report is to assist the RTA in their decision making process to determine a preferred option. This multi-criteria analysis identified a

number of different categories of issues to be considered in the selection. Categories considered can be broadly summarised as:

- environmental issues;
- economic impact on the town;
- residential amenity;
- visual quality of the town;
- design of the facility; and
- road safety.

The analysis of issues provided in this part was not intended to make the decision about a preferred scheme. It is a tool to be considered by the decision-makers (the RTA) in its determination. A summary of the comparisons and rankings provided in the preceding sections and shown in *Tables 10.3 – 10.14* is presented in *Table 10.15*. There are three components to the table:

- Component A which summaries the ranking of *Tables 10.3 – 10.5* that considered all comparative factors raised in the workshops; and
- Component B1 which summarises rankings when only the principal issues of concern raised by the three interest groups are used. This is the analysis of *Tables 10.6 – 10.8*; and
- Component B2 which summaries the rankings when the issues raised are grouped under specific categories. This is the analysis of *Tables 10.9 – 10.14*.

In *Table 10.15* the option which ranked first (i.e. was “preferred”) is identified. If all three groups (the community, the trucking industry and the government) had the same preferred option only a single numeral 1 is shown. If a numeral 1 in brackets is shown this indicates that one of the three groups had a different preference to the other two.

Table 10.15 Summary of Rankings

	Category	Do Nothing	Town Centre	Northside
A	ALL FACTORS (Tables 10.3 to 10.5)			1
B	SENSITIVITY TESTING			
B.1	BY INTEREST GROUP			
a	Community Factors (Tables 10.6)		1	(1)
b	Tracking Industry Factors (Tables 10.7)			1
c	Government Factors (Tables 10.8)			1
B.2	BY SUBJECT			
a	Environmental (Tables 10.9)			1
b	Economic (Tables 10.10)		1	
c	Residential Amenity (Tables 10.11)			1
d	Visual Quality (Tables 10.12)		1	
e	Facility Design (Tables 10.13)			1
f	Road Safety (Tables 10.14)		1	1

The following conclusions can be made from the overall analysis:

The Do Nothing option is clearly not favoured. It was never ranked first under any testing and was always a distinct third choice; and a preference for the Town Centre and Northside option depends on the factors considered.

If all the factors were used then the trucking industry and the government preferred the Northside option. The community score was similar for both options with no clear preference. The main factors leading to a preference for the Town Centre option are economic and the town's visual quality. If these factors dominate then the town centre is preferred.

The Northside option tends to be preferred under other factors as it has fewer physical constraints which leads to both simpler facility design and environmental control. Some of these issues can be managed through design and construction which would

reduce the difference between the two options. Both options were considered to provide the same level of improvement in road safety.

The greatest constraint for both options is the funding of the facility. The costs are a distinguishing feature with the Town Centre option being significantly lower in cost but the Northside option offers more potential for external or private funding. The source of funding for either option needs to be identified together with an estimate of the proportion of funding that can be made available through sponsorship, levies, contributions from private sector and the government (both Federal and State). This information is required before the preferred option can be determined.

It is recommended that the RTA ascertain whether either site can be funded by calling for expressions of interest from the private sector for development. Negotiations could also be held with Mobil, the transport industry, large companies related to the transport industry for sponsorship and the Federal government.

Should either of the options be developed the design should incorporate the recommendations of the environmental study. More detailed investigations will be required once a site has been chosen in order to prepare the development application and rezoning documentation to be submitted to Council.

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APPENDICES

APPENDIX A VMS OUTCOMES

APPENDIX A VMS OUTCOMES

The key findings of the Value Management Study (VMS) relevant to this study are:

PROJECT OBJECTIVES

To deliver a facility which will:

- improve transport industry efficiency;
- improve safety;
- improve amenity for drivers and the local community;
- satisfy environmental, safety concerns and socio-economic needs;
- improve the environment;
- meet short term needs as well as future developments;
- not impede other developments or commercial opportunities;
- facilitate future expansion of the facility; and
- allow staged implementation (if appropriate).

FUNCTIONS OF THE FACILITY

The facility must allow the “park trucks”, “exchange trailers” and “exchange rigs” operations which the group considered were the key operations. The functions were identified as a facility which:

- has a level platform with a 3% grade (maximum). Ideally a concrete surface (subject to life cycle costing);
- must contain and treat spillages;
- has standard car park lighting;
- must be of a homogenous design for the whole area (i.e. standard pavement loading throughout the facility);
- has clearly identified/delineated parking bays;
- provides internal circulation and movements;
- provides safe entry and exit points and good access to the highway; and
- provides toilets/wash areas.

CONCLUSIONS

Highlighted a number of conclusions during discussions of the preferred options including:

- The Town Centre option would most likely require the Wagga Wagga City Council to own the facility and be responsible for its operation and maintenance. This option was less likely to attract commercial interest in funding the

construction or operation. The Federal Department of Transport and Regional Development would consider funding construction of this option but would require a firm commitment to ongoing operation and maintenance of the facility before committing such funding.

- The Northside option is likely to be more attractive to the private sector and likely to attract a commercial operator to maintain and operate the facility and provide ancillary services. Some level of government funding (if any) for construction may still be required.
- The Northside option, due to its location further from town amenities; would need to include basic ancillary facilities such as toilets and wash areas as a minimum. Other facilities such as food/drink provisions, fuel provisions, accommodation, service and repair provisions provides a commercial opportunity to be supplies by the private sector should demand warrant.
- Although there is no current economic warrant or proposal for a highway bypass of Tarcutta, either of the preferred sites could be accommodated within a bypass proposal (assuming the bypass was on the western side of Tarcutta which is the most likely route).
- Employment opportunities as a result of either option should increase.
- Continued use of the existing facility may continue with either option.
- There is a need to call for Expressions of Interest on both sites as soon as possible.

APPENDIX B WORKSHOP PARTICIPANTS

APPENDIX B

WORKSHOP PARTICIPANTS

Chris Page	Operations Manger, Witchmount (Aust) P/L
Robert Hartwig	Hartwig Trucks
Dianne Ramage	Mobil Tarcutta
S C Richard Harvey	Tarcutta Police
Narelle Winnel	Tarcutta Resident
Brian Hanson	RTA Wagga Wagga
David Hehir	DLWC Landcare Facilitator
Bill Belling	Tarcutta Resident
Faye Belling	Tarcutta Resident
Geoff Baker	President RSL Sub Branch
Peter Meyers	Tarcutta Progress Association
Rhonda Shoemark	Tarcutta Progress Association
Kevin Wales	Councillor, Wagga Wagga City Council
Ed Cory	Dept of Transport and Regional Development
Bob Osborne	Local Landowner
Narelle Hann	Tarcutta Resident
Jean Pottie	Tarcutta Resident
Brian Moon	Tarcutta Resident
Garry Gaffney	Wagga Wagga City Council
Warrick Irvine	Transport Workers Union
Phillip McAleer	Mobil
Don Clode	Transport Workers Union
Nell Pearce	Tarcutta Resident
Gai Derrick	Proprietor of Gai's Place

APPENDIX C

SUMMARY OF RESPONSES FROM GOVERNMENT AUTHORITIES AND STAKEHOLDERS

APPENDIX C

SUMMARY OF RESPONSES FROM GOVERNMENT AUTHORITIES AND STAKEHOLDERS

Authority	Issue	Response
DLWC	Erosion and Sedimentation	<p>The environmental assessment should outline methods to minimise erosion and sedimentation from all disturbed areas.</p> <p>A revegetation plan for the disturbed areas should be considered.</p>
	Water Supply	The environmental assessment should describe the water requirements of the development in terms of how much water will be required and where the water will be sourced.
	Impacts on Hydrology	The likelihood and extent of runoff impacts on Tarcutta Creek and properties upstream and downstream needs to be considered.
	Impacts on Groundwater	Permeability of sediment/pollution basins must be less than 1×10^{-9} metres per second.
	Impacts on Water Courses	The assessment should describe and consider the impacts of any proposed works within 40 metres of the banks of a river or creek.
	Vegetation Management	The location and extent of the vegetation clearing required should be specified. Measures which will be undertaken to manage and conserve native vegetation should be addressed. Opportunities may exist to source Carbon Sink Funding for the revegetation of the proposed sites.
	Water Quality	Consideration should be given to possible changes to water quality.
Greater Murray Health Service	Health	The aim of the Roadhouse Food Service Accreditation Program is to increase the variety and availability of tasty, healthy meals, desserts and snacks at roadhouses and truckstops, so as to allow heavy vehicle drivers to maintain or improve their health status while on the road. These issues should be considered in the design of the facility.
RTF	Changeover Facility	The RTF is of the view that the facility has broad community and industry support to be positioned in town with arrangements put in place to align the facility with the Mobil service station.
		From a survey conducted by the transport workers union in association with the RTF we believe that there are approximately 400 vehicle changeovers in the 24 hour period in Tarcutta. This equates to 120,000 physical changeovers per year. The RTF believes that once the facility is put in place these numbers may increase.
		Consideration should also be given to providing healthy alternatives to food as well as hygienic showers, toilets etc.

Authority	Issue	Response
DUAP	Planning	Development should be in accordance with Wagga Wagga Rural Local Environmental Plan 1991. Consideration should also be given to national and state policies regarding highway service centres.
NPWS	Flora and Fauna	Habitat for threatened species may occur in the area. An assessment should be undertaken to consider the likely impact of the proposed development on flora and fauna.
	Archaeology	Consultation should be conducted with the local Land Council and an experience archaeologist should undertake the archaeological survey
NSW Agriculture	Agriculture	The Department has no particular concerns with the proposal other than an ongoing interest that the soil and water resources are not adversely affected. The issue of buffering against noise, dust, visual amenity should also be considered in site selection and design.
Tarcutta Public School	Safety and Recreation	<p>The tennis court and oval are used annually by the small schools of the Kyeamba Valley throughout the year. It is used for touch football cricket and athletics carnivals. Both schools use the tennis courts each Friday during Term 3 between 10.30 a.m. till 1.30 p.m.</p> <p>Tennis lessons are conducted by a tennis coach from Wagga Wagga.</p> <p>Safety issues to be considered are:</p> <ul style="list-style-type: none"> • increased traffic near the access roads will add to the problem of crossing the highway; and • fencing should prohibit the access of children to the facility.
Saint Thomas Aquinas School	Safety and Recreation	School uses the tennis courts once a week for two hours during third term. The sportsground is used for athletics and touch football carnivals twice a year, but it is planned to use it more regularly for Friday Sport. The sporting facilities are essential for the cohesion of the community.
Tarcutta Tennis Club	Recreation	Will the lights from the facility affect the use of the tennis courts and will children be allowed access to the facility?
Tarcutta Cricket Club	Recreation	The town option would not affect the cricket oval but it would impact on the touch football competition.

APPENDIX D RESULTS FROM WORKSHOP ONE

APPENDIX D RESULTS FROM WORKSHOP ONE

NORTHSIDE

Opportunities

- Natural sound barrier provided by the ridge.
- There is sufficient area to accommodate wash bays and tyre services.
- There is room for more and larger trucks.
- By taking the trucks out of town there is more opportunity for civic improvements to the town including landscaping, picnic areas expanded, signs and information bays.
- Close to sewerage and power.
- No restriction on size.
- Crown land, possibility of favourable lease.

Constraints

- Noise and air pollution- the entry/exit point would be the best on the top of the ridge for trucks to have downhill run.
- Loss of business in town.
- Trucks need level ground – this area is quite sloped.
- Putting existing business out of business.
- Will truck drivers use this or prefer to patronise existing cafes – and so where then do they park their trucks?
- Noise pollution to nearby residents.

TOWN CENTRE

Opportunities

- Services and amenities are already there.
- Water and sewerage exist.
- Protect existing business people – Mobil – cafes.
- Protect Tarcutta township.
- Develop an undeveloped area.
- Can be commercial – protecting existing employment.
- Level and stable ground.
- Number of sites allocated would be quite adequate to cope with truck numbers.

Constraints

- Two people would have to be relocated.
- Limited number of trucks being aware that new longer trucks could be allowed on the roads.
- Limited in the room for commercial businesses to meet the demands, although could be an opportunity with the NRMA site.
- Noise and air pollution – could be partially offset by planting of trees as carbon sinks or sound barriers.
- Limitations could be faced with the additional section being low lying and loss of sports facility.
- Residents could face a lot of noise and air pollution with the exit north uphill.
- Noise pollution to nearby residents.
- Need separate exit (Hay Street entrance and exit inadequate).
- Need entrance to suit existing Mobil.
- Fuel entrance at Mobil and exit further on than Hay Street north at College should be sufficient (eliminating entrance at Hay Street).
- Loss of sports ground.
- Relocation of some houses.
- Need to purchase some land.

ISSUES TO BE CLARIFIED WITHIN THE STUDY

- What is Mobil's position?
- Who will maintain the facility and improve the current litter problem within the town?
- Concern over the truck stop being just another servo and MacDonalds – would it be viable with the current employment problems of young people?
- Conditions be provided that new or other businesses are allowed on the site.
- Shade must be provided in either location.
- Can the sewerage and stormwater systems take the additional loads?
- How much does the existing Mobil depend on tourists or truckies and how long are the slow times?
- Would some of the existing bays stay for caravans etc?
- Employment in the town could be increased no matter the location of the truck stop.
- Could buildings (including on the edge of the plan), current vegetation cover, scale and topography be included in the plans.
- Opportunity for industry, council and community groups to show their commitment to the environment. With the move to polluter pays industry could sponsor the planting of trees as a carbon sink and lower the water table to combat salinity. With signs to advertise their acknowledgement and commitment to environmental issues.
- There are 3000 movements each way each night with 5% increase each year.

APPENDIX E

BUSINESS AND RESIDENT SURVEY

APPENDIX E BUSINESS AND RESIDENT SURVEY

Tarcutta Environmental Study Business Survey

About the Business

What is the nature of your business? What do you produce/sell/provide etc?

How long has the business been in operation?

How many owners of the business are there? (Could you please provide names and addresses).

How many people (equivalent full time people) does the business employ?

How many employees and owners live in:

- Tarcutta

- in the surrounding district,

- or from other areas?

What are the key facilities/components of the business e.g. how many tables/what facilities does the business have/kitchens/what are the hours of operation etc?

About the Market (Truck Drivers)

Can you estimate the number of trucks visiting the business?

each week

month

or year?

Are there busy seasons/periods/times?

If so, how many truck drivers are there in a busy period and in a slow period?

Busy Period

Slow Period

To what extent is your business dependent on the trucking industry for its revenue? (%)

What other customers does the business serve? Market and %.

Has the number of truckies stopping in Tarcutta been growing or declining in recent years?

Why do they stop here (at the business and in Tarcutta)?

At the Business

In Tarcutta

What do they like about it?

What don't they like about it?

Business Opportunities

What opportunities are there for the business to expand (space, capital, demand etc)?

What plans, if any, do you have to expand or change the business?

The Truck Stop Options

What impacts - positive and negative - will both options have on the business and the town?

What additional opportunities for the business of other businesses might arise as a result of the options?

Would you relocate the business if the truck facility were located out of town?

What should the new facility contain to be successful/attract the truck drivers?

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Tarcutta Environmental Study Resident Survey

General Introduction

Attached is a map showing the approximate location of both facilities and an indicative plan which identifies the "initial concept" layout of the facility in the vicinity of your property.

Social Impacts

(This section assesses the positive and negative impacts that the proposed facility may have on your current lifestyle)

Do you perceive that there is a need for an appropriate truck parking and changeover facility at Tarcutta? (Please give reasons for your answer)

Where would you prefer the facility to be located (either the in town or the northside option)?

Will the siting of the facility at either of the locations have any impact (both positive and negative) on your current lifestyle? (State the location that will have the greatest impact and provide reasons why ie noise, access, visual intrusion, improved safety, more employment).

Positive Impacts

Negative Impacts

Would the siting of the proposed facility impact on the existing access to your property?

If yes, how would your access be affected?

Could this be rectified?

Would the siting of the proposed facility at the northside site impact on your use of the town common?

Would the siting of the proposed facility at the "in town" site affect your existing access to recreational pursuits in the town?

Do you currently utilise the existing cafes and service stations in town? (Could you describe which businesses you frequent and for what purpose.)

Would the siting of the proposed facility at the Northside site reduce the frequency of use of these facilities?

Mitigation Measures

(Mitigation measures are often employed to minimise impacts from development proposals. Below are examples of some of the measures which may be utilised, should the facility have a detrimental impact on your property).

If appropriate mitigation measures were put in place to reduce the impact on your property would you offer no objection or concern to the siting of the facility near your property?

Noise barriers are a method employed to minimise the impact of truck noise on residents. Would you have any objection to landscaped earth mounds, brick, timber, colourbond or concrete walls (with patterns or texturing for appearance) being constructed at the boundary of your property to minimise the impact of noise?

If noise exceeded acceptable levels, would you object to the installation of an air conditioning system to enable you to keep your windows closed at night to minimise noise?

Can you suggest any other mitigation measures which could be used to minimise the impact of noise on your property?

Are there any significant views which you currently enjoy from the property which may be affected by the siting of the proposed facility?

Would the planting of trees and vegetation within and around the perimeter of the site minimise the impact of the facility on your views? (Can you please explain your answer?)

Can you suggest any design features that could be incorporated within the facility to minimise the impacts on your lifestyle that you have not outlined previously?

Environmental Issues

(This section identifies environmental issues which should be taken into consideration within the study)

Are there any environmental issues that may affect the siting of the facility on either of the proposed sites (i.e. flooding, loss of significant vegetation)?

Town Centre site

Northside site

Are there any additional issues that the study should be addressing?

Are there any additional comments you would like to make?

Thank you for your assistance

APPENDIX F SURVEY RESULTS

APPENDIX F

SURVEY RESULTS

i Is There a Need for the Facility

The majority of residents surveyed indicated that there was a need for a facility. One respondent indicated that they were not really sure if a facility was needed now but there may be a need in the future. It was indicated by a number of people surveyed that:

- there is not enough room in town for the B-doubles;
- a site needs to be developed for the safety of the town; and
- to enable the town to expand and develop.

ii Preferred Location of the Facility

Of the 28 people and businesses surveyed 46% want the facility in the town, 32% want the facility to go northside and 21% do not have a preference. There was a concern expressed that as the Federal government won't fund the facility it will have to go northside.

iii Positive and Negative Impacts of the Facility

A comment was made that the study should be deferred until the RTA identify where the facility should be located. The positive and negative impacts on the facility have been identified below.

a Northside

The major negative impacts expressed were:

- concern about noise from the facility;
- concern about the impact of odour from an adjacent pig farm if an increased number of people are brought into this area;
- security concerns regarding an increase in numbers of people in the area at night;
- increased air pollution in a concentrated area;
- loss of the use of the common;
- impact on property values;
- impact on the economic viability of the town;
- concern about access to properties due to an increase in numbers of trucks turning in front of existing driveways;
- impact of lighting on residents and as a hazard for road users ; and
- impact of loss of the view of the common as it is picturesque.

The major positive impacts of this site are:

- it would provide a better development;
- the positive impacts of the site outweigh the negative;
- more employment;
- will be developed by private enterprise; and

- the noise impacts will be minimal compared to the other option.

b Town Centre

The negative impacts identified included:

- concern about safety of residents due to the increase in truck drivers in close proximity to homes;
- need to maintain the facility and ensure that rubbish is picked up and the site remains clean;
- concern about the town centre site being accessed via College Street due to the safety of children who currently ride their bikes and play in the street;
- this site is subject to flooding and the water table is very high effecting the stability of the ground and the proposed development;
- there is not sufficient room on this site;
- the impact of noise on local residents;
- odour from rubbish and faeces;
- lighting impacts;
- deter passing trade if the facility is not adequately maintained; and
- financing.

The positive impacts are:

- the town needs it in the centre;
- maximise the use of facilities in town and retain employment;
- improve the drainage and flooding impacts on this site;
- impact of access;
- would prefer any road widening not to be close to the existing houses;
- turning off the road may become quite hazardous and site works may be required at the property entrance;
- access to properties from the Hume Highway are insufficient at the moment and would have to be improved before access is shared with a large number of trucks;
- need separate and clearer access;
- access is a problem now as need to get semi-trailer into existing property; and
- service area should be provided for residents along this route.

iv Use of Town Common

The trustees are happy to relinquish the land.

A concern was expressed about loss of the common as there would be no where else to put the cattle.

v Use of Recreational Facilities

These facilities are important to the town and are used extensively by schools and sporting clubs.

vi Facilities Used in Town

Most people surveyed use the existing facilities in the town. Not a lot of residents visit Gai's Place regularly but may go there for fish and chips on a Friday night.

Some residents shop in Wagga Wagga but buy day to day things in Tarcutta.

vii Northside Reduce the Use of These Facilities

Most people surveyed indicated that they would not use this facility. However, a few indicated that:

- they wouldn't use Macdonalds but would use Hungry Jacks;
- it would depend on what type of facilities that were provided and the hours of operation;
- depend on whether petrol was cheaper;
- would be convenient and therefore probably use it if it was there.

viii Mitigation Measures

The general response appeared to be that if mitigation measures were put in place then concerns regarding potential impacts would be reduced. However, some residents mentioned that they were not sure how the proposed mitigation measures would minimise the impact.

a Northside

- preference to the use of earth mounds;
- a number of residents indicated that they already have air conditioners and double glazing;
- fencing acceptable but would prefer something done to the house i.e. double glazing and air conditioners;
- would also like extra security for the house if there are increasing numbers of people in the area;
- would not accept fencing on their properties;
- would like mitigation measures done to the house like bricking up the property etc;
- noise X earth mounds won't work, have to use brick;
- landscaping; and
- lower speed limits.

b Town Centre

- not willing to let the facility stay in town as it would devalue their property;
- wouldn't accept noise barriers at the boundary of their property;
- have plans to have the lounge room extended to the front which will contain windows. The plans have been approved and the proposed facility would have a detrimental impact.
- at the present time they spend a lot of time outside in summer. At night it is quiet and the reason they bought the property was that it was quiet and serene and no one could build them out;
- would accept sound proofing of windows and landscaping; and
- bought here because it is quiet and a good place to bring up the children. There are nine children in College Street

ix Would Views be Affected

Only a few residents expressed concern over loss of their view.

- need to plant trees along property boundary and within the site to minimise the impact of the facility;
- concerned about the impact on the views that are currently enjoyed from the restaurant. Mitigation measures such as landscaping are all well and good but they take a long time to grow;
- have views into the creek, however, would be in favour of landscaping to minimise the impact on these views;
- loss of views due to direct view into a sound barrier; and
- yes, enjoy views of the common. Landscaping would assist in minimising impact.

x Design Features

Ensure that all trucks are off the road.

a Town Centre

- ensure that there is no access off College Street;
- minimise the impact of lighting on residents;
- how do you ensure that their properties will be safe with so many strangers in town close to their property;
- plant trees along the front of individual properties;
- concern about the expansion ability of this facility;
- need security guards;
- need heavy fines for littering;
- who is going to maintain the facility?
- need more toilets; and

- it is a long way for truck drivers to walk.

b Northside

- need to plant trees, tidy up the site etc; and
- need two accesses, preferably not right outside an existing house.

xi Environmental Issues

a Town Centre

- water runoff;
- increase pollution from oil spills;
- flooding;
- water table;
- water quality;
- air pollution;
- danger to residents if chemical spills;
- danger for children crossing the road;
- non impervious soils;
- fauna in creeks;
- where will the overflow go;
- affect a greater number of people regarding noise;
- security concerns; and
- impact on use of recreational facilities.

b Northside

- no flooding;
- concern about the economic impact on town;
- air pollution;
- visual impact;
- less residents affected;
- augmentation of sewer; and
- more room.

xii Property Acquisition

a Town Centre

- would have concerns about relinquishing the lease on the town centre site due to flooding, however, stock could be relocated;

- bought into the area as it is quiet;
- can't sell now because who is going to buy a house knowing that the facility is going to be there; and
- the majority of residents surveyed indicated that they would be happy to sell their properties, however, one resident indicated that they would not be prepared to sell.

b Northside

- may relocate if the facility was put here but would stay in Tarcutta; and
- would object to moving as love the country and want to stay close to the family.

xiii Any Additional Comments

- concern about noise, security, impacts on tank water from increased air pollution, impact of dangerous good spills;
- really want the facility in town;
- noise;
- access;
- lights;
- what is going to happen to parking bays in the street;
- who will maintain the facility; and
- maintenance costs will be too high in town and don't want ratepayers to have to pay for it.

APPENDIX G**FLORA SPECIES RECORDED
IN THE TARCUTTA CREEK
CATCHMENT**

APPENDIX 2: VASCULAR PLANT SPECIES OF TARCUTTA CREEK CATCHMENT

H = habitat type: U = upland areas above 400 m altitude, L = lowland areas below 400 m

A = relative abundance: 1 = abundant/widespread ; 2 = common; 3 = rare/restricted

	SPECIES	COMMON NAME	H	A
Pteridophyta				
Adiantaceae	<i>Adiantum aethiopicum</i>	Maiden Hair Fern	U	1
Aspidiaceae	<i>Polystichum proliferum</i>	Mother Shield Fern	U	1
Aspleniaceae	<i>Asplenium flabellifolium</i>	Necklace Fern	U	2
Azollaceae	<i>Azolla filiculoides</i>	Azolla	U,	1
Blechnaceae	<i>Blechnum nudum</i>	Fishbone Fern	U	1
Dennstadaedtiaceae	<i>Pteridium esculentum</i>	Bracken	U	1
Sinopteridiaceae	<i>Cheilanthes tenuifolia</i>	Rock Fern	U	1
Angiospermae - Dicotyledonae				
Amananthaceae	<i>Alternanthera denticulata*</i>	Lesser Joyweed	U,	1
Apiaceae	<i>Daucus glochidiatus</i>	Austral Carrot	U	2
	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort	U	1
Asteraceae	<i>Calotis scabiosifolia</i>	Burr Daisy	U,	2
	<i>Carduus tenuifolius*</i>	Nodding Thistle	U,	1
	<i>Carduus pycnocephala*</i>	Slender Thistle	U,	1
	<i>Carthamus lanatus*</i>	Saffron Thistle	U,	1
	<i>Cassinia aculeata</i>	Dolly Bush	U	1
	<i>Cassinia longifolia</i>		U	1
	<i>Cirsium vulgare*</i>	Spear Thistle	U,	1
	<i>Conyza albida*</i>	Flaxleaf Fleabane	U,	1
	<i>Craspedia sp</i>		U	1
	<i>Hypochoeris radicata*</i>	Cat's Ear	U,	1
	<i>Microseris lanceolata</i>	Yam Daisy	U	3
	<i>Silybum marianum*</i>	Variegated Thistle	U,	2
	<i>Sonchus asper*</i>	Prickly Sowthistle	U,	1
	<i>Sonchus oleraceus*</i>	Sow Thistle	U,	1

APPENDIX 2: VASCULAR PLANT SPECIES OF TARCUTTA CREEK CATCHMENT

	<i>Taraxacum officinale</i> *	Dandelion	U,	1
Boraginaceae				
	<i>Echium plantagineum</i> *	Patterson's Curse	U,	1
Brassicaceae				
	<i>Rorippa nasturtium-aquaticum</i> *	Watercress	U,	2
Brunoniaceae				
	<i>Brunonia australis</i>	Blue Pincushion	U	2
Campanulaceae				
	<i>Wahlenbergia communis</i>	Austral Bluebell	U,	2
	<i>Wahlenbergia strictus</i>	Austral Bluebell	U,	2
Caryophyllaceae				
	<i>Cerastium glomeratum</i> *	Mouse-ear Chickweed	U,	1
	<i>Stellaria pungens</i>	Prickly Starwort	U	2
Convolvulaceae				
	<i>Convolvulus erubescens</i>	Pink Bindweed	U,	2
	<i>Dichondra repens</i>	Kidney Weed	U,	2
Crassulaceae				
	<i>Crassula sieberiana</i>	Australian Stonecrop	U,	2
Dilleniaceae				
	<i>Hibbertia obtusifolia</i>	Grey Guinea Flower	U	2
Droseraceae				
	<i>Drosera auriculata</i>	Sundew	U	2
	<i>Drosera peltata</i>	Pale Sundew	U	2
Epacridaceae				
	<i>Brachyloma daphnoides</i>	Urn Heath	U	2
	<i>Leucopogon virgatus</i>	Peach Heath	U	2
	<i>Melichrus urceolatus</i>	Urn Heath	U	2
	<i>Monotoca scoparia</i>		U	2
Euphorbiaceae				
	<i>Euphorbia peplus</i> *	Petty Spurge	U,	1
Fabaceae				
	<i>Daviesia latifolia</i>		U	2
	<i>Glycine clandestina</i>	Twining Glycine	U,	2
	<i>Hardenbergia violaceae</i>	Sarsparilla	U,	2
	<i>Indigofera australis var australis</i>	Austral Indigo	U	2
	<i>Medicago sp</i> *	Burr Medic	U,	1
Gentianaceae				
	<i>Centaurium erythraea</i> *	Centaury	U,	1
	<i>Centaurium tenuifolium</i> *		U,	1
Geraniaceae				
	<i>Geranium solanderi var solanderi</i>	Native Geranium	U	2
Haloragaceae				
	<i>Gonocarpus sp</i>	Raspwort	U,	1
	<i>Hypericum perforatum</i> *	St John's Wort	U,	1

APPENDIX 2: VASCULAR PLANT SPECIES OF TARCUTTA CREEK CATCHMENT

Lamiaceae	<i>Ajuga australis</i>	Austral Bugle	U	2
	<i>Prunella vulgaris</i> *	Self-heal	U,	1
	<i>Salvia verbenacea</i> *	Wild Sage	U,	1
Linaceae	<i>Linum marginale</i>	Native Flax	U	3
Lobeliaceae	<i>Isotoma fluviatilis</i>	Rock Isotome	U	3
Loranthaceae	<i>Amyema pendulum</i>	Mistletoe	U,	2
	<i>Muellerina eucalyptoides</i>	Mistletoe	U,	2
Mimosaceae	<i>Acacia baileyana</i> *	Cootamundra Wattle	U,	1
	<i>Acacia buxifolia</i>	Box-leaf Wattle	L	2
	<i>Acacia dealbata</i>	Silver Wattle	U,	2
	<i>Acacia gunnii</i>	Ploughshare Wattle	U,	2
	<i>Acacia melanoxylon</i>	Blackwood Wattle	U	1
Myrtaceae	<i>Eucalyptus albens</i>	White Box	U,	1
	<i>Eucalyptus blakelyi</i>	Blakely's Redgum	U,	2
	<i>Eucalyptus bridgesiana</i>	Apple Box	U,	2
	<i>Eucalyptus camaldulensis</i>	River Red Gum	U,	1
	<i>Eucalyptus camphora</i>	Mountain Swamp Gum	U	1
	<i>Eucalyptus dalrympleana</i>	White Gum	U	1
	<i>Eucalyptus goniacaly x</i>	Long-leaf Box	U	1
	<i>Eucalyptus macroryncha</i>	Red Stringybark	U	1
	<i>Eucalyptus sideroxylon</i>	Ironbark	U,	2
Oleaceae	<i>Ligustrum lucidum</i> *	Large-leaved Privet	U,	3
Onagraceae	<i>Epilobium hirtigerum</i>	Willow Herb	U,	2
	<i>Ludwigia peploides</i>	Water Primrose	L	2
	<i>ssp montevidensis</i> *			
Oxalidaceae	<i>Oxalis corniculata</i>	Wood Sorrel	U,	1
	<i>Oxalis pes-caprae</i> *	Yellow Wood Sorrel	U,	1
	<i>Oxalis purpurea</i> *	Large-flower Wood Sorr	U,	3
Pittosporaceae	<i>Bursaria spinosa</i>	Sweet Bursaria	U	2
Plantaginaceae	<i>Plantago lanceolata</i> *	Ribbed Hornwort	U,	2
Polygonaceae	<i>Acetosella vulgaris</i> *	Sorrel	U,	1
	<i>Polygonum aviculare</i> *	Wireweed	U,	1
	<i>Polygonum decipiens</i>	Slender Knotweed	U,	1

APPENDIX 2: VASCULAR PLANT SPECIES OF TARCUTTA CREEK CATCHMENT

	<i>Polygonum hydropiper</i>	Water Pepper	U,	1
Primulaceae				
	<i>Anagallis arvensis</i> *	Pimpernel	U,	1
Proteaceae				
	<i>Lomatia myricoides</i>	River Lomatia	U	3
Ranunculaceae				
	<i>Ranunculus lappaceus</i>	Common Buttercup	U,	2
	<i>Ranunculus muricatus</i> *	Sharp Buttercup	U,	2
Roseaceae				
	<i>Acaena novae-zelandiae</i>	Bidgee-widgee	U	2
	<i>Acaena ovina</i>	Sheep's Burr	U	2
	<i>Crataegus monogyna</i> *	Hawthorn	U,	2
	<i>Pyracantha angustifolia</i> *		U,	2
	<i>Rosa rubiginosa</i> *	Briar Rose	U,	2
	<i>Rosa fruticosa</i> *	Blackberry	U,	1
Rubiaceae				
	<i>Asperula scoparia</i>	Common Woodruff	U	2
Salicaceae				
	<i>Salix albens</i> *	White Willow	U,	1
	<i>Salix babylonica</i> *	Weeping Willow	U,	1
Scrophulariaceae				
	<i>Verbascum virgatum</i> *	Twiggy Mullein	U,	1
Sterculiaceae				
	<i>Brachychiton populneus</i>	Kurrajong	U,	2
Urticaceae				
	<i>Urtica urens</i> *	Stinging Nettle	U,	2
Verbenaceae				
	<i>Verbena bonariensis</i> *	Purple-top	U,	1
Violaceae				
	<i>Viola hederaceae</i>	Ivy-leaved Violet	U	2
Angiospermae - Monocotyledonae				
Cyperaceae				
	<i>Carex appressa</i>	Tall Sedge	U,	1
	<i>Carex fascicularis</i>		U,	2
	<i>Carex gaugichaudiana</i>		U	2
	<i>Cyperus eragrostis</i> *	Umbrella Sedge	U,	1
	<i>Eleocharis acuta</i>	Common Spike-rush	U,	1
	<i>Eleocharis spiculata</i>	Tall Spike-rush	L	1
	<i>Lepidosperma laterale</i>	Variable Sword-sedge	U	2
	<i>Schoenus apogon</i>	Common Bog-rush	U,	2
Hydrocharitaceae				
	<i>Vallisneria spiralis</i>	Ribbon-weed	L	3

APPENDIX 2: VASCULAR PLANT SPECIES OF TARCUTTA CREEK CATCHMENT

Hypoxidae	<i>Hypoxis hygrometica</i>	Golden Star	U	2
Juncaceae	<i>Juncus homalocaulis</i>	Rush	U,	1
	<i>Juncus subsecundus</i>	Finger Rush	U,	1
Liliaceae	<i>Bulbinopsis bulbosa</i>	Native Leek	U	2
	<i>Burchardia umbellata</i>	Mother Hen	U	2
	<i>Dianella revoluta</i>	Spreading Flax Lily	U,	2
	<i>Dichopogon fimbriatus</i>	Vanilla Lily	U	2
	<i>Dichopogon strictus</i>	Chocolate Lily	U	2
	<i>Thysanotus tuberosus</i>	Common Fringe-lily	U	2
	<i>Wurmbea dioica</i>	Early Nancy	U,	2
Poaceae	<i>Aira cupaniana</i> *	Silvery Hairgrass	U,	1
	<i>Bothriochloa macra</i>	Red-legged Grass	U,	1
	<i>Briza maxima</i> *	Large Quaking Grass	U,	1
	<i>Briza minor</i> *	Shivery Grass	U,	1
	<i>Bromus diandrus</i> *	Giant Brome	U,	1
	<i>Bromus molliformis</i> *	Soft Brome	U,	1
	<i>Bromus rubens</i> *	Red Brome	U,	1
	<i>Chloris truncata</i>	Windmill Grass	U,	1
	<i>Cynodon dactylon</i>	Couch	U,	1
	<i>Danthonia caespitosa</i>	Wallaby Grass	U,	1
	<i>Danthonia racemosa</i>	Wallaby Grass	U,	1
	<i>Eragrostis sp</i>	Love Grass	U,	1
	<i>Holcus lanatus</i> *	Yorkshire Fog	U	1
	<i>Lolium perenne</i> *	Perennial Ryegrass	U,	1
	<i>Lolium sp</i> *	Ryegrass	U,	1
	<i>Paspalum dilatatum</i> *	Paspalum	U,	1
	<i>Paspalum paspalodes</i>	Water Couch	U,	1
	<i>Phragmites australis</i>	Austral Reed Grass	U,	1
	<i>Poa labillardierii</i>	Tussock Grass	U,	2
	<i>Poa sieberana</i>	Fine-leaf Tussock Grass	U,	2
	<i>Setaria sp</i> *	Pigeon Grass	U,	1
	<i>Stipa spp</i>	Spear Grass	U,	1
	<i>Themeda australis</i>	Kangaroo Grass	U,	2
	<i>Vulpia bromoides</i> *	Squirrel-tail Fescue	U,	1
Potamogetonaceae	<i>Potamogeton tricarinatus</i>	Floating Pondweed	L	3
Typhaceae	<i>Typha dominguensis</i>	Cumbungi	L	2
Xanthorrhoeaceae	<i>Lomandra filiformis</i>	Wattle Mat-rush	U,	2

APPENDIX H

FAUNA SPECIES RECORDED IN THE TARCUTTA CREEK CATCHMENT

APPENDIX 3: MACROINVERTEBRATES

Habitat codes: wr = willow root, rgr = red gum root, bil = billabong, r = riffle, p = Phragmites
e = Eleocharis, rgs = red gum timber

Abundance codes: 1 = uncommon, 2 = common, 3 = very common

Class or Order	Family, Genus or Species	Abundance	Habitat	Upland or Lowland
Arachnida	<i>Hydracarina</i>	1	wr	L
Bivalvia	<i>Sphaerius</i>	1	bb	L
Coleoptera	<i>Coxelmis</i> sp	1	rgr, wr, r	L, U
Coleoptera	<i>Enochrus</i> sp			L
Coleoptera	<i>Helochares</i> sp			L
Coleoptera	<i>Hydora</i> sp			L
Coleoptera	<i>Notalina</i> sp	1	r	U
Coleoptera	<i>Sclerocyphon maculatus</i>	2	r	U
Coleoptera	<i>Hydrochus</i> sp			L
Coleoptera	<i>Hydrovatus</i> spp			L
Coleoptera	<i>Hyphydrus</i> sp			L
Coleoptera	<i>Laccobius</i> sp			L
Coleoptera	<i>Liodessus</i> sp	1	el	L
Coleoptera	<i>Notriolus</i> spL57E	1	rgr	L
Coleoptera	<i>Simsonia</i> sp	1	rgr	L
Coleoptera	<i>Sphaerius</i>	1	bb	L
Decapoda	<i>Paratya australiensis</i>	2	wr, rgr	L
Decapoda	<i>Macrobrachium australien</i>	1	rgs	L
Decapoda	<i>Cherax destructor</i>	1	wr, bb	L
Decapoda	<i>Eustacus armatus</i>	1	wr	L
Dipera	Ceratopogonidae	1	wr, bb, bil	L
Dipera	Empididae	1	wr, el	L
Dipera	Sciomyzidae	1	wr	L
Dipera	Ephydriidae	1	rgr	L
Diptera	<i>Chironomus cloacalis</i>	3	bil	L
Diptera	<i>Cladopelma</i> sp			L
Diptera	<i>Cladotanytarsus</i> sp			L
Diptera	<i>Clinotanytus</i> sp			L
Diptera	<i>Conochironomus</i> sp			L
Diptera	<i>Cricotopus</i> sp	1	rgr	L
Diptera	<i>Cryptochironomus</i> sp	2	el	L
Diptera	<i>Dicrotendipes</i> sp	1	p	L
Diptera	<i>Harnischia</i> sp	1	el	L
Diptera	<i>Kiefferulus</i> sp			L
Diptera	<i>Larsia albiseptis</i>			L
Diptera	<i>Nanocladius</i> sp	1	el, bb	L
Diptera	<i>Paracheptagya tonnoiri</i>			L
Diptera	<i>Parachironomus</i> sp			L

APPENDIX 3: MACROINVERTEBRATES

Diptera	<i>Paracladotanytarsus sp</i>	1	el	L
Diptera	<i>Parakiefferiella sp</i>	1	bb	L
Diptera	<i>Paralymnius sp</i>	2	el, bb	L
Diptera	<i>Paramerina sp</i>			L
Diptera	<i>Paratrichotopus sp</i>	2	bb	L
Diptera	<i>Procladius sp</i>			L
Diptera	<i>Rheocriotopus sp</i>			L
Diptera	<i>Rheotanytarsus sp</i>	3	rgr, wr	L
Diptera	<i>Tanytarsus sp</i>	3	bb,rgr	L
Diptera	<i>Thienema</i>	1	p	L
Diptera	<i>Zavreliella sp</i>			L
Diptera	<i>Simulium sp</i>	2	wr, rgs	L
Diptera	<i>Austrosimulium furiosum</i>	2	wr, rgs	L,U
Ephemeroptera	<i>Baetis sp</i>	3	wr,r	L,U
Ephemeroptera	<i>Cloen sp</i>			L,U
Ephemeroptera	<i>Tasmanocoenis tillyardi</i>	3	wr, bb	L,U
Ephemeroptera	<i>Coloburiscoides sp</i>	1	wr	L,U
Ephemeroptera	<i>Atalophlebeia sp</i>	1	wr	L,U
Ephemeroptera	<i>Atalonella sp</i>			L,U
Ephemeroptera	<i>Jappa sp</i>	1	r	U
Ephemeroptera	<i>Atalophlebiodes</i>	3	r	U
Gastropoda	<i>Physa acuta</i>	1	r	U
Gastropoda	<i>Ferrissia petterdi</i>	2	p	L
Gastropoda	<i>Isidorella sp</i>			L
Gastropoda	<i>Glyptophysa aliciae</i>			L
Hemiptera	<i>Agraptocorixia eurynome</i>	2	bil	
Hemiptera	<i>Ranatra sp</i>	1	bil	L
Hemiptera	<i>Sigara sp</i>			L
Hemiptera	<i>Enithares</i>	1	el	L
Hemiptera	<i>Paranisops sp</i>			L
Hemiptera	<i>Microvelia sp</i>			L
Hemiptera	<i>Micronecta sp</i>	1	ph	L
Hydrozoa	<i>Hydra sp</i>	1	rgr	L
Isopoda	Phreatoicidae			L
Isopoda	<i>Janiridae</i>	1	wr	L
Megaloptera	<i>Archichauloides sp</i>	1	r	U
Nematoda		1	p	L
Odonata	<i>Austroaeshna unicornis unicornis</i>		rgs,r	L
Odonata	<i>Austrogomphus sp C</i>		r	L
Odonata	<i>Dipblebia lestoides</i>		rgr	L
Odonata	<i>Hemicordulia tau</i>		bil	L
Odonata	<i>Ischnura aurora aurora</i>		bil	L
Odonata	<i>Ischnura heterosticta</i>		bil	L
Odonata	<i>Isosticta simplex</i>	1	bil	L
Odonata	<i>Austroaeshna subapicalis</i>	1	r	U

APPENDIX 3: MACROINVERTEBRATES

Odonata	<i>Hemigomphus heteroclytus</i>	1	r	U
Oligochaeta		2	bb,wr	L
Ostracoda		1	wr	L
Plecoptera	<i>Leptoperla neboissi</i>		wr,rg	L
Plecoptera	<i>Illiesoperla sp</i>	1	wr	L
Plecoptera	<i>Leptoperla sp</i>	1	wr	L
Trichoptera	<i>Costora ramosa</i>			L
Trichoptera	<i>Asmicridea sp 1</i>	2	rg,wr	L
Trichoptera	<i>Cheumatopsyche sp 4</i>	1	rg	L
Trichoptera	<i>Cheumatopsyche sp 5</i>	1	rg	L
Trichoptera	<i>Diplectrona sp</i>		r	U,L
Trichoptera	<i>Ecnomus pansus</i>	1	rg,bil	L
Trichoptera	<i>Ecnomus turgidus</i>	1	rg,bil	L
Trichoptera	<i>Leptorussa sp</i>			L
Trichoptera	<i>Oecetis sp</i>	1	wr	L,U
Trichoptera	<i>Taschorema complex</i>	1	r	L,U
Trichoptera	<i>Triaenodes sp</i>			L
Trichoptera	<i>Triplectides australis</i>	2	r	U
Trichoptera	<i>Triplectides similis</i>	2	r	U
Trichoptera	<i>Ulmerochorema</i>	1	r	U
Trichoptera	<i>Aphilorheithrus sp</i>	1	bil	L

APPENDIX 4: VERTEBRATE FAUNA OF TARCUTTA CREEK CATCHMENT

FISH

Status: e = extinct, 1 = uncommon, 2 = common, 3 = very common

Habitat: LC = lowland creek, UC = upland creek, BIL = Billabong

Species	Common Name	Status	Habitat
<i>Cyprinus carpio</i>	European Carp	3	BIL,LC
<i>Gambusia affinis</i>	Mosquito Fish	3	BIL,LC
<i>Perca fluviatilis</i>	Redfin	2	BIL,C
<i>Salmo gairneri</i>	Rainbow Trout	1	UC
<i>Salmo trutta</i>	Brown Trout	1	UC
<i>Bidyamus bidyanus</i>	Silver Perch	1	LC
<i>Gadopsis marmoratus</i>	River Blackfish (Slippery Jack)	1	UC
<i>Galaxias olidus</i>	Marbled Galaxias	e?	UC
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon	3	BIL, LC
<i>Maccullochella peeli</i>	Murray Cod	1	LC
<i>Macquaria ambigua</i>	Golden Perch	1	LC
<i>Macquaura australasica</i>	Macquarie Perch, Black Bream	e?	C
<i>Nematolosa erebi</i>	Bony Bream	e?	BIL, LC
<i>Tandanus tandanus</i>	Catfish	e?	BIL, LC

APPENDIX 4: VERTEBRATE FAUNA OF TARCUTTA CREEK CATCHMENT

1=sclerophyll forest

2=rock

3=floodplain open forest

4=riparian vegetation or aquatic habitats

REPTILES

Habitat

Family Chelidae

<i>Emydura macquarii</i>	Murray Short-neck Turtle	3
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Family Gekkonidae

<i>Diplodactylus intermedius</i>	Eastern Spiny-tailed Gecko	1,2
<i>Diplodactylus vittatus</i>	Wood Gecko	1,2
<i>Phyllodactylus marmoratus</i>	Marbled Gecko	1,2
<i>Underwoodisaurus milii</i>	Thick-tailed Gecko	1,2

Family Pygopodidae

<i>Delma inornata</i>		1
<i>Lialis burtonis</i>	Burton's Snake-lizard	1
<i>Pygopus lepidopodus</i>	Common Scaly-foot	1
<i>Pygopus nigriceps</i>	Hooded Scaly-foot	1

Family Agamidae

<i>Amphibolurus barbatus</i>	Bearded Dragon	1,2
<i>Amphibolurus muricatus</i>	Jacky Lizard	1,2

Family Varanidae

<i>Varanus varius</i>	Lace Monitor	1,3
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Family Scincidae

<i>Ctenotus taeniolatus</i>	Copper-tailed Skink	1,2
<i>Sphenomorphus quoyii</i>	Eastern Water Skink	3
<i>Tiliqua occipitalis</i>	Western Blue-tongued Lizard	1,2
<i>Tiliqua scincoides</i>	Eastern Blue-tongued Lizard	1,2
<i>Trachydosaurus rugosus</i>	Shingle-back	1,2

Family Elaphidae

<i>Austrelaps superbis</i>	Copperhead	1,2
<i>Pseudechis porphyriacus</i>	Red-bellied Black Snake	3
<i>Pseudonaja textilis</i>	Eastern Brown Snake	1,2

AMPHIBIANS

Family Myobatrachidae

<i>Limnodynastes interioris</i>	Giant Banjo Frog	3
<i>Limnodynastes tasmaniensis</i>	Spotted Grass Frog	3
<i>Pseudophyrne bibronii</i>	Brown Toadlet	3
<i>Crinia parinsignifera</i>	Common Eastern Froglet	1,3

Family Hylidae

<i>Littoria peronii</i>	Peron's Tree Frog	1,3
<i>Littoria verreauxii</i>		3
<i>Littoria raniformis</i>		3

MAMMALS

		Habitat
Monotremata		
Family Tachyglossidae		
<i>Tachyglossus aculeatus</i>	Echidna	1,3
Family Ornithorhynchidae		
<i>Ornithorhynchus anatinus</i>	Platypus	4
Marsupialia		
Family Dasyuridae		
<i>Antechinus flavipes</i>	Yellow-footed Marsupial Mou	1,2
<i>Antechinus stuartii</i>	Brown Marsupial Mouse	1,2
<i>Antechinus swainsonii</i>	Dusky Marsupial Mouse	1,2
<i>Dasyurus maculatus</i>	Tiger Cat	1,3
Family Vombatidae		
<i>Vombatus ursinus</i>	Common Wombat	1
Family Phascolarctidae		
<i>Phascolarctos cinereus</i>	Koala	1,3
Family Phalangeridae		
<i>Trichosurus caninus</i>	Mountain Possum	1,3
<i>Trichosurus vulpecula</i>	Common Brushtail Possum	1,3
Family Petauridae		
<i>Petaurus breviceps</i>	Sugar Glider	1,3
<i>Pseudocheirus peregrinus</i>	Ring-tailed Possum	1,3
Family Macropodidae		
<i>Macropus giganteus</i>	Eastern Grey Kangaroo	1,3
<i>Macropus rufogriseus</i>	Red-necked Wallaby	1,3
<i>Wallabia bicolor</i>	Swamp Wallaby	1,3
Eutheria		
Chiroptera		
Family Molossidae		
<i>Tadarida australis</i>	White-striped Mastiff-bat	1,3
Family Vespertilionidae		
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	1,3
<i>Chalinolobus morio</i>	Chocolate Wattled Bat	1,3
<i>Eptesicus regulus</i>	King River Eptesicus	1,3

APPENDIX 4: VERTEBRATE FAUNA OF TARCUTTA CREEK CATCHMENT

<i>Eptesicus sagittata</i>	Large Forest Eptesicus	1,3
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat	1,3
<i>Nyctophilus gouldii</i>	Gould's Long-eared Bat	1,3
Rodentia		
Family Muridae		
<i>Hydromys chrysogaster</i>	Australian Water Rat	4
<i>Rattus fuscipes</i>	Southern Bush Rat	1,2
<i>Rattus rattus</i> *	Black Rat	1,2,3
<i>Mus musculus</i> *	House Mouse	1,2,3
Lagomorpha		
Family Leporidae		
<i>Lepus capensis</i> *	European Hare	3
<i>Oryctolagus cuniculus</i> *	Rabbit	1,3
Carnivora		
Family Canidae		
<i>Vulpes vulpes</i> *	Fox	1,2,3
Family Felidae		
<i>Felis catis</i> *	Feral Cat	1,2,3

APPENDIX 4: VERTEBRATE FAUNA OF TARCUTTA CREEK CATCHMENT

BIRDS		Habitat
Family Podicipedidae		
<i>Podiceps cristatus</i>	Great Crested Grebe	4
<i>Tachybaptus novaehollandiae</i>	Australian Little Grebe	4
<i>Poliocephalus poliocephalus</i>	Hoary-headed Grebe	4
Family Pelecanidae		
<i>Pelecanus conspicillatus</i>	Australian Pelecan	4
Family Anhingidae		
<i>Anhinga melanogaster</i>	Darter	4
Family Phalacrocoridae		
<i>Phalacrocorax melanoleucos</i>	Little Pied Cormorant	4
<i>Phalacrocorax varius</i>	Pied Cormorant	4
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant	4
<i>Phalacrocorax carbo</i>	Black Cormorant	4
Family Ardeidae		
<i>Ardea pacifica</i>	Pacific Heron	3,4
<i>Ardea novaehollandiae</i>	White-faced Heron	3,4
<i>Ardeola ibis</i>	Cattle Egret	3,4
<i>Nycticorax caledonicus</i>	Nankeen Night Heron	3,4
<i>Ixobrychus minutus</i>	Little Bittern	3,4
<i>Botaurus poiciloptilus</i>	Australian Brown Bittern	3,4
Family Plataleidae		
<i>Threskiornis molucca</i>	White Ibis	3,4
<i>Threskiornis spinicollis</i>	Straw-necked Ibis	3,4
<i>Platalea regia</i>	Royal Spoonbill	3,4
<i>Platalea flavipes</i>	Yellow-billed Spoonbill	3,4
Family Anatidae		
<i>Cygnus atratus</i>	Black Swan	4
<i>Stictonetta naevosa</i>	Freckled Duck	4
<i>Tadorna Tadornoides</i>	Mountain Duck	3,4
<i>Anas supercilliosa</i>	Pacific Black Duck	4
<i>Anas gibberifrons</i>	Grey Teal	4
<i>Anas castanea</i>	Chestnut Teal	4
<i>Anas rhynchotis</i>	Blue-winged Duck	4
<i>Anas platyrhynchos</i>	Mallard	4
<i>Malacorhynchus membranaceus</i>	Pink-eared Duck	4
<i>Chenonetta jubata</i>	Wood Duck	4
<i>Oxyura australis</i>	Blue-Billed Duck	4

APPENDIX 4: VERTEBRATE FAUNA OF TARCUTTA CREEK CATCHMENT

<i>Biziura lobata</i>	Musk Duck	4
Family Acciptridae		
<i>Elanus notatus</i>	Black-shouldered Kite	1,3
<i>Elanus scriptus</i>	Letter-winged Kite	1,3
<i>Haliastur sphenurus</i>	Whistling Kite	1,3
<i>Accipiter cirrhocephalus</i>	Collared Sparrowhawk	1,3
<i>Accipiter novaehollandiae</i>	Grey Goshawk	1,3
<i>Accipiter fasciatus</i>	Brown Goshawk	1,3
<i>Aquila audax</i>	Wedge-tailed Eagle	1,3
<i>Circus aeruginosus</i>	Swamp Harrier	1,3
Family Falconidae		
<i>Falco longipennis</i>	Little Falcon	1,3
<i>Falco subniger</i>	Black Falcon	1,3
<i>Falco berigora</i>	Brown Falcon	1,3
<i>Falco cenchroides</i>	Australian Hobby	1,3
Family Phasianidae		
<i>Coturnix pectoralis</i>	Stubble Quail	3
<i>Coturnix australis</i>	Brown Quail	3
<i>Coturnix ypsilphora</i>	Swamp Quail	3
Family Rallidae		
<i>Rallus philippenis</i>	Buff Banded Rail	3,4
<i>Porzana fluminea</i>	Spotted Crake	3,4
<i>Porzana pusilla</i>	Marsh Crake	3,4
<i>Gallinula ventralis</i>	Black-tailed Native Hen	3,4
<i>Gallinula tenebrosa</i>	Dusky Moorhen	3,4
<i>Rallus pectoralis</i>	Lewin Water Rail	3,4
<i>Porzana tabuensis</i>	Spotless Crake	3,4
<i>Porphyrio porphyrio</i>	Swamphen	3,4
<i>Fulica atra</i>	Common Coot	3,4
Family Charadriidae		
<i>Vanellus tricolor</i>	Banded Plover	3,4
<i>Vanellus miles</i>	Masked Plover	3,4
<i>Charadrius melanops</i>	Black-fronted Dotterel	4
Family Scolopacidae		
<i>Rostratula benghalensis</i>	Painted Snipe	4
<i>Gallinago hardwickii</i>	Japanese Snipe	4
<i>Calidris cicutinata</i>	Sharp-tailed Shearwater	4
<i>Burhinus magnirostris</i>	Bush Thick-knee	1,3

APPENDIX 4: VERTEBRATE FAUNA OF TARCUTTA CREEK CATCHMENT

Family Columbidae

<i>Columba livia</i>	Domestic Pigeon	1,3
<i>Geopelia striata</i>	Peaceful Dove	1,3
<i>Phaps chalcoptera</i>	Common Bronzewing	1,3
<i>Ocyphaps lophotes</i>	Crested Pigeon	1,3

Family Cacatuidae

<i>Calyptrorhynchus funereus</i>	Yellow-tailed Black Cockatoo	1,3
<i>Callocephalon fimbriatum</i>	Gang Gang Cockatoo	1,3
<i>Cacatua roseicapilla</i>	Galah	3
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1,3
<i>Cacatua sanguinea</i>	Little Corella	3

Family Polytelidae

<i>Alisterus scapularis</i>	King Parrot	1,3
<i>Polytelis swainsonii</i>	Superb Parrot	1,3
<i>Nymphicus hollandicus</i>	Cockatiel	1,3

Family Platycercidae

<i>Lathamus discolor</i>	Swift Parrot	1,3
<i>Platycercus elegans</i>	Crimson Rosella	1,3
<i>Platycercus eximius</i>	Eastern Rosella	1,3
<i>Psephotus haematonotus</i>	Red-rumped Parrot	1,3
<i>Neophema pulchella</i>	Turquoise Parrot	1,3
<i>Neophema chrysostoma</i>	Blue-winged Parrot	1,3

Family Cuculidae

<i>Cuculus variolosus</i>	Brush Cuckoo	1,3
<i>Cuculus pallidus</i>	Pallid Cuckoo	1,3
<i>Cuculus pyrrhophanus</i>	Fan-tailed Cuckoo	1,3
<i>Chrysococcyx osculans</i>	Black-eared Cuckoo	1,3
<i>Chrysococcyx basalis</i>	Horsfields Bronze Cuckoo	1,3
<i>Chrysococcyx iucius</i>	Golden Bronze Cuckoo	1,3

Family Strigidae

<i>Ninox novaeseelandiae</i>	Boobook Owl	1,3
<i>Ninox connivens</i>	Barking Owl	1,3

Family Tytonidae

<i>Tyto alba</i>	Barn Owl	1,3
<i>Tyto novaehollandiae</i>	Masked Owl	1,3

Family Podagidae

<i>Podargus strigoides</i>	Tawny Frogmouth	1,3
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APPENDIX 4: VERTEBRATE FAUNA OF TARCUTTA CREEK CATCHMENT

Family Aegothelidae		
<i>Aegotheles cristatus</i>	Owlet Nightjar	1,3
Family Caprimulgidae		
<i>Caprimulgus mystacalis</i>	Whitte-throated Nightjar	1,3
Family Apodidae		
<i>Hirundapus caudacutus</i>	Spine-tailed Swift	3
<i>Apus pacificus</i>	Fork-tailed Swift	3
Family Alcedinidae		
<i>Dacelo gigas</i>	Kookaburra	1,3
<i>Ceyx azureus</i>	Azure Kingfisher	3,4
<i>Halcyon sancta</i>	Fork-tailed Swift	3,4
Family Meropidae		
<i>Merops ornatus</i>	Rainbow Bee-eater	1,3
Family Coraciidae		
<i>Eurystomus orientalis</i>	Dollar-bird	1,3
Family Hirundinidae		
<i>Hirundo neoxena</i>	Welcome Swallow	3
<i>Cecropis nigricans</i>	Tree Martin	3
<i>Cecropis ariel</i>	Fairy Martin	3
Family Motacillidae		
<i>Anthus novaeseelandiaa</i>	Richard's Pipit	1,3
Family Camphephagidae		
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	1,3
<i>Lalage sueri</i>	White-winged Triller	1,3
<i>Alauda arvensis</i>	Skylark	1,3
Family Turdidae		
<i>Turdus philomelos</i>	Song Thrush	1,3
<i>Turdus merula</i>	Blackbird	1,3
Family Muscapidae		
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	1,3
<i>Eopsaltria australis</i>	Eastern Yellow Robin	1,3
<i>FaLCunculus frontatus</i>	Crested Shrike-tit	1,3
<i>Microeca leucophaea</i>	Jacky Winter	1,3

APPENDIX 4: VERTEBRATE FAUNA OF TARCUTTA CREEK CATCHMENT

<i>Pachycephala olivaceae</i>	Olive Whistler	1,3
<i>Pachycephala pectoralis</i>	Golden Whistler	1,3
<i>Pachycephala rufiventris</i>	Rufous Whistler	1,3
<i>Petroica goodenovii</i>	Hooded Robin	1,3
<i>Petroica multicolor</i>	Red-capped Robin	1,3
<i>Petroica phoinicea</i>	Flame Robin	1,3
<i>Petroica rodinogaster</i>	Pink Robin	1,3
<i>Petroica rosea</i>	Rose Robin	1,3
<i>Rhipidura fuliginosa</i>	Grey Fantail	1,3
<i>Rhipidura leucophrys</i>	Willie Wagtail	1,3
Family Orthonychidae		
<i>Psophodes olivaceus</i>	Eastern Whipbird	1,3
Family Timaliidae		
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler	1,3
<i>Pomatostomus superciliosus</i>	White-browed Babbler	1,3
Family Sylviidae		
<i>Acrocephalus stentoreus</i>	Clamorous Reed Warbler	1,3
<i>Cisticola exilis</i>	Golden-headed Cisticola	1,3
Family Maluridae		
<i>Malurus cyaneus</i>	Superb Blue Wren	1,3
Family Acanthizidae		
<i>Sericornis frontalis</i>	White-browed Scrub Wren	1,3
<i>Acanthiza pusilla</i>	Brown Thornbill	1,3
<i>Acanthiza lineata</i>	Striated Thornbill	1,3
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	1,3
Family Neosittidae		
<i>Daphoenositta chrysoptera</i>	Varied Sittela	1,3,4
Family Climacteridae		
<i>Climacteris leucocephala</i>	White-throated Treecreeper	1,3
<i>Climacteris picummus</i>	Brown Treecreeper	1,3
Family Meliphagidae		
<i>Anthochaera chrysoptera</i>	Little Wattlebird	1,3
<i>Athochaera carunculata</i>	Red Wattlebird	1,3
<i>Philemon corniculatus</i>	Noisy Friarbird	1,3
<i>Philemon citreogularis</i>	Little Friarbird	1,3
<i>Manorina melanocephala</i>	Noisy Miner	1,3
<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater	1,3

APPENDIX 4: VERTEBRATE FAUNA OF TARCUTTA CREEK CATCHMENT

<i>Lichenostomus melanops</i>	Yellow-tufted Honeyeater	1,3
<i>Lichenostomus leucotis</i>	White-eared Honeyeater	1,3
<i>Melithreptus gularis</i>	Black-chinned Honeyeater	1,3
<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater	1,3
<i>Melithreptus lunatus</i>	White-naped Honeyeater	1,3
Family Dicaeidae		
<i>Dicaeum hirundinaceum</i>	Mistletoe Bird	1,3
Family Pardalotidae		
<i>Pardalotus punctatus</i>	Spotted Pardalote	1,3
<i>Pardalotus striatus</i>	Striated Pardalote	1,3
Family Zosteropidae		
<i>Zosterops lateralis</i>	Silvereye	1,3
Family Carduelidae		
<i>Carduelis carduelis</i>	Goldfinch	1,3
Family Passeridae		
<i>Passer montanus</i>	Tree Sparrow	1,3
<i>Passer domesticus</i>	House Sparrow	1,3
Family Estrildidae		
<i>Emblema temporalis</i>	Red-browed Finch	1,3
<i>Emblema guttata</i>	Diamond Firetail	1,3
<i>Poephila bichenovii</i>	Double-barred Finch	1,3
Family Sturnidae		
<i>Sturnus vulgaris</i>	Starling	1,3
Family Oriolidae		
<i>Oriolus sagittatus</i>	Olive-backed Oriole	1,3
Family Corcoridae		
<i>Corcorax melanorhamphus</i>	White-winged Chough	1,3
<i>Struthidea cinerea</i>	Apostle Bird	1,3
Family Grallinidae		
<i>Grallina cyanoleuca</i>	Magpie-lark	1,3
Family Artamidae		
<i>Artamus personatus</i>	Masked Woodswallow	1,3
<i>Artamus superciliosus</i>	White-browed Woodswallow	1,3
<i>Artamus leucorhynchus</i>	White-breasted Woodswallow	1,3

APPENDIX 4: VERTEBRATE FAUNA OF TARCUTTA CREEK CATCHMENT

<i>Artamus cyanopterus</i>	Dusky Woodswallow	1,3
Family Cracticidae		
<i>Cracticus torquatus</i>	Grey Butcherbird	1,3
<i>Cracticus nigrogularis</i>	Pied Butcherbird	1,3
<i>Gymnorhina tibicen</i>	Australian Magpie	1,3
<i>Strepera graculina</i>	Pied Currawong	1,3
<i>Strepera versicolor</i>	Grey Currawong	1,3
Family Corvidae		
<i>Corvus coronoides</i>	Australian Raven	1,3
<i>Corvus mellore</i>	Little Raven	1,3

APPENDIX I EIGHT PART TEST

APPENDIX I

EIGHT PART TEST

The '8 part test'

The Tarcutta Truck Interchange does not cross land that is defined in the *Threatened Species Conservation Act 1995* (TSC Act) as critical habitat for any threatened species. It is the responsibility of consent authority, under Part 4 of the EP&A Act, to determine whether "the action proposed is likely to significantly affect threatened species, populations or ecological communities, or their habitats" (TSC Act, 1995). This responsibility is outlined in section 90 of the Environment Planning and Assessment Act. For that purpose, the consent authority must take into account the eight-points listed in Section 5A of the Environment Planning and Assessment Act.

No species of flora or fauna listed in the TSC Act were identified as potentially occurring at either site.

The following factors have been assessed to determine whether there is a likely significant impact.

a) *"in the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction"*

No threatened species will have their life-cycle disrupted such that a viable local population of the species will be placed at risk of extinction because there are no threatened species known to occur or potentially occurring on the site.

b) *"in the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised"*

No endangered populations will be impacted upon by the proposed works.

c) *"in relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed"*

The regional distribution of the habitat of threatened species will not be modified or removed because there are no threatened species known to occur or potentially occurring on the site.

d) *"whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community"*

The habitat of threatened species will not become isolated because there are no threatened species known to occur or potentially occurring on the site.

e) *"whether critical habitat will be effected"*

No critical habitat has been listed on the TSC Act.

f) *"whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region"*

Any threatened species that do occur in this region are likely to be confined to remnant bushland, which is most likely to be tied up in conservation reserves or state forests.

g) *"whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process"*

The proposed works are not listed in the *Threatened Species Conservation Act 1995* as a threatening process.

h) *"whether any threatened species, population or ecological community is at the limit of its known distribution"*

As no threatened species, populations or ecological communities have been recorded in the study site, none are at the limit of their distribution.

APPENDIX J THREATENED SPECIES LIST

APPENDIX J THREATENED SPECIES LIST

Table 1 Threatened Flora of the South-west Slopes

Family	Genus	Species	Risk Code	Conservation Reserve Name	Discussion
Mimosaceae	<i>Acacia</i>	<i>phasmoides</i>	2VC-	Unconserved	Found to south of Tarcutta
Asteraceae	<i>Ammobium</i>	<i>craspedioides</i>	2V	Unconserved	Found near Yass
Poaceae	<i>Amphibromus</i>	<i>pithogastrus</i>	3K	Unconserved	Presumed extinct in this region.
Rosaceae	<i>Aphanes</i>	<i>pumila</i>	1K	Unconserved	Occurs on rocks in moss mats in forests – not found
Asteraceae	<i>Brachyscome</i>	<i>muelleroides</i>	3VCa	Unconserved	South of Wagga on claypans – not found
Cabombaceae	<i>Brasenia</i>	<i>schreberi</i>	3RC-+	Unconserved	
Orchidaceae	<i>Caladenia</i>	<i>concolor</i>	3VCi	Unconserved	South of Bethungra in clay loams or gravel beds – not found
Orchidaceae	<i>Caladenia</i>	<i>rosella</i>	2E	Unconserved	Presumed extinct in this region.
Orchidaceae	<i>Diuris</i>	<i>tricolor</i>	3K	Unconserved	Occurs in sclerophyll forest – not found.
Goodeniaceae	<i>Goodenia</i>	<i>macbarronii</i>	3VC-	Unconserved	Grows in damp sandy soils – not found.
Scrophulariaceae	<i>Gratiola</i>	<i>pumilo</i>	3K	Unconserved	Inundated damp ground – not in region according to Harden (1993)
Proteaceae	<i>Grevillea</i>	<i>iaspicula</i>	2E	Unconserved	Limestone outcrops from Wee Jasper to Burrinjuck.
Fabaceae	<i>Psoralea</i>	<i>parva</i>	3ECi	Unconserved	Presumed extinct in this region
Orchidaceae	<i>Pterostylis</i>	<i>petrosa</i>	2KC-	The Rock NR	Rocky areas in sclerophyll forest – not found
Asteraceae	<i>Senecio</i>	<i>garlandii</i>	3VC-	Tabletop NR The Rock NR Ulandra NR	Sheltered slopes on rocky outcrops – not found
Asteraceae	<i>Stemmacantha</i>	<i>australis</i>	3V	Unconserved	Presumed extinct in this region
Fabaceae	<i>Swainsona</i>	<i>murrayana</i>	3VCi	Unconserved	Grows on heavy soils in depressions – not found
Fabaceae	<i>Swainsona</i>	<i>recta</i>	3ECi	Unconserved	Presumed extinct in this region but grows on grasslands on stony hillsides – not found
Asteraceae	<i>Taraxacum</i>	<i>aristum</i>	3RC-	Unconserved	Presumed extinct in this region

From Briggs and Leigh 1996.

KEY

DISTRIBUTION

- 1 - Known from one collection only
- 2 - Geographic range in Australia less than 100 kilometres
- 3 - Geographic range in Australia greater than 100 kilometres

CONSERVATION STATUS

- K - Poorly Known
- E - Endangered (at serious risk of disappearing in the wild in 10-20 years)
- V - Vulnerable (at risk of becoming extinct over a period of 20-50 years)

C - Reserved with at least one population within a conservation reserve in Australia

SIZE OF ALL RESERVED POPULATIONS

i - Less than 1,000 plants are known to occur in conservations reserves

- - Reserved population size is not accurately known

+ - Occurs overseas

NR - Nature Reserve

APPENDIX K VISUAL ASSESSMENT



Geoffrey Britton
Heritage & Design Consultant

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Proposed Truck Interchange
Tarcutta, NSW

Visual Assessment

Report prepared for
SMEC Australia Pty Ltd

October 1998

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1 Executive Summary

Both proposed site options for a truck interchange would entail visible changes to the existing rural landscape setting. In both cases the introduction of various structures would be noticeable from parts of the Hume Highway and the township of Tarcutta. Such changes would include acoustic shields, light standards, nightlighting effects, new sign structures and new buildings - apart from the short term initial construction phase.

Of the two options the proposed town centre site offers more scope to visually absorb development associated with the proposed interchange. This is because it is of relatively low elevation and is mostly behind the mainstreet buildings and screened by vegetation along Tarcutta Creek to the west as well as the elevated spur to the north along Archer Street.

Residences on the elevated land to the immediate north-east of the site would be potentially the most affected by visual impacts. These impacts would include the construction of the facility; new structures for noise reduction, lighting and facility amenities; the concentration of a large number of trucks within the site; and, with the planting of screen vegetation along the northern boundary, the possible loss of some existing distant views to the Keajura area to the south-west. A nightlight haze - in addition to that from the existing highway and street illumination - may be apparent from parts of the township on both sides of the highway.

If the employment of noise reduction measures is restricted to the site area it would likely require the construction of relatively high acoustic fences which, as a source of visual impact, would necessitate extensive screen planting. Where noise reduction measures could be implemented at both the site and the potentially affected residences the heights of the acoustic fences could be substantially reduced. This would enable the development to be more easily integrated within the existing landscape.

Owing to the open and partly elevated nature of the proposed northside site it is anticipated that changes to this landscape would be more apparent. An aspect of significance of the Tarcutta townscape is the abrupt transition between the town and the surrounding expansive pastoral land. The development of the northside site would detract from an appreciation of this transition and compromise an important part of the traditional setting of the township.

The prominence of the northside site means that new development within the site would be highly visible. Such development would include:-

- * Structures such as a food, fuel and amenities building (not needed at the town centre site) - together with its necessarily prominent road signs,
- * A separate building for truck driver amenities,
- * The concentration of large vehicles within the site.

The introduction of screen planting along the highway frontage would not offer a satisfactory solution as this would still obscure the function of this area as a part of the landscape setting for Tarcutta. For commercial and safety reasons also the extensive use of screen planting along the highway would not be desirable.

On balance, while both sites would contribute various visual impacts within the context of their respective existing landscape settings, and assuming the recommended mitigatory measures are implemented the town centre site would entail less overall visual impact potential than the northside site.

2 Introduction

This report includes a consideration of the main visual issues relating to the proposed construction and operation of a truck interchange on either of two sites at Tarcutta, NSW. The report is one of a number of specialist studies as part of an overall environmental and comparative study by SMEC Australia.

The visual assessment is based on an understanding of the two optional sites, the township and local area landscape context and an indicative conceptual design for each site. As this assessment is a part of the early planning for the project developed designs and details for the various proposed new structures were not available for consideration.

3 Approach

Over the last several decades numerous approaches have been devised in an attempt to assess the visual landscape resource. However in NSW no single visual assessment technique has been either recommended or adopted by planning or development authorities.

The approach taken for this report has involved:-

- * A consideration of the existing landscape resource at both specific site and broader scales;
- * A review of the extent to which the sites are visible;
- * A review of the aspects of the interchange proposal with the potential to introduce changes to the existing landscape;
- * A consideration of various mitigatory measures to reduce or eliminate potential visual impacts; and
- * A description of the anticipated visual effects with the incorporation of the various mitigatory measures.

The form of the report follows the sequence of this approach.

4 Existing Landscape

4.1 General Landscape Setting of Tarcutta

The township of Tarcutta is sited over a series of low hills across which the Hume Highway passes. Surrounding the township to the south, west and north is the floodplain associated with Tarcutta Creek which flows generally to the north then west before joining the Murrumbidgee River to the east of Wagga Wagga. A location plan and town layout plan are included as **Figure 1** and **Figure 2** respectively of the main SMEC Australia report.

Lines of undulating hills, with sparse to scattered woodland vegetation, form the skyline enclosure of the area with the cleared One Tree Hill prominent to the north-west. Together with the varied topography the sheep and cattle-grazing land around Tarcutta provides a traditional and pleasant rural setting.

The two main Hume Highway approaches to the township offer quite different opportunities to appreciate the form and townscape character of Tarcutta. Arriving from the south-west broad views across the Tarcutta Creek bridge enable an immediate appreciation of the cluster of mainstreet commercial buildings on the low-lying land as well as the residential areas spreading over the more elevated land beyond. Notable features of the cultural landscape on the fringes of the township include the old Mate family buildings with their historic curtilages - the Hambledon group and the former Tarcutta Inn - and the vegetation along the creek.

The approach from the north-eastern side of the town offers a more restricted and gradual prospect of the place. After emerging from the long cutting to the north of Mate Street the remnant roadside vegetation encloses the road corridor such that only small parts of the town are revealed at a time. Views of the town centre are only apparent after reaching the main ridge in the vicinity of Prospect Street.

4.2 Description of Proposed Town Centre Site

The proposed town centre interchange site lies on generally flat, low-lying land to the north of the Hume Highway between Tarcutta Creek, to the immediate west, and the line of commercial buildings with frontage to the highway to the east. An easement for College Street - part of which has no formed roadway - defines the northern boundary while the flood-labile town recreation reserve lies to the south of the site.

The site is an irregular shaped basin of improved pasture enclosed by the long, elevated spur to the north, the dense Creekside vegetation to the west and the buildings to the east. Within the site there are several existing buildings including cottages and a large, metal panel-clad storage shed near the College Street boundary. Apart from the Eucalypts and Willows fringing Tarcutta Creek there are almost no trees on the site. A solitary Date Palm (*Phoenix* sp.) is the most conspicuous of the planted vegetation.

Adjoining the site to the north is Tarcutta's oldest surviving schoolhouse with its south-facing veranda addressing the site and remnant plantings including Monterey Pine, Cypress, Oak and Kurrajong. Opposite this - and across the unformed easement for King Street - is a low-profile recent brick residence near the top of the Archer Street spur with some old orchard trees and young wattles partly screening it from the site.

4.3 Description of Proposed Northside Site

To the immediate north of the town is the site of the other proposed interchange option. Compared with the previous site this is a more open area of largely cleared pastureland contained by the spur

to the south along which Prospect Street is located and the long ridge to the north through which there is a cutting for the highway.

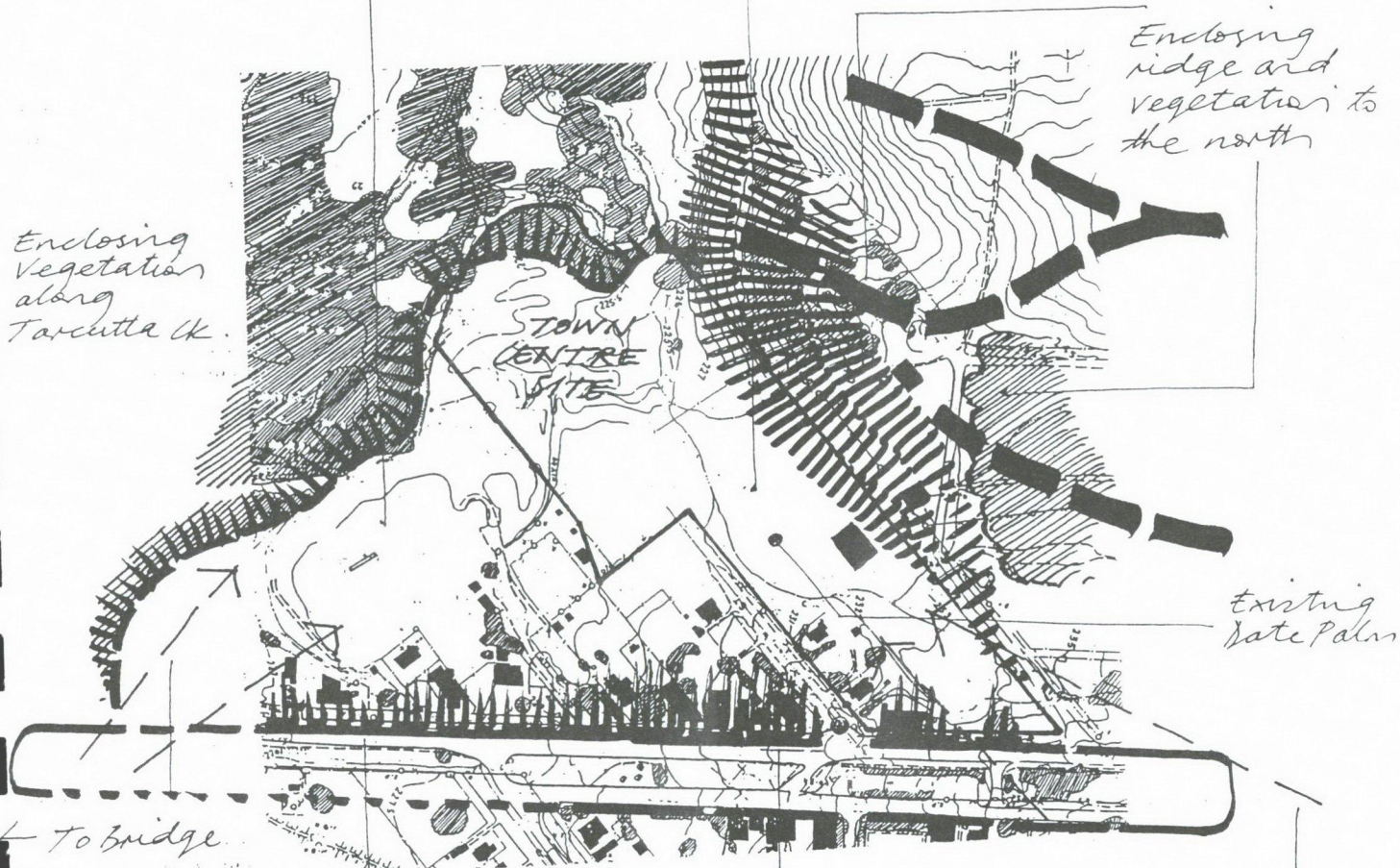
The highway forms the eastern edge of the site; the northern boundary is indicated by a fence that extrapolates the alignment of Mate Street; and the western boundary follows another fenceline part of which also provides one of the edges for the Tarcutta General Cemetery. Although this too is a largely cleared area the few trees it has are almost all mature and add to the sense of depth of views across the site.

Buildings in the near vicinity of the site include several adjacent residences and a motel on the eastern side of the highway and the northern-most residence off Myrtle Street. The cemetery is also mostly clear of vegetation with some recent regeneration of indigenous plants in the corners and a group of mature trees in the area between the cemetery and the proposed interchange site. Both sites are currently readily visible from one another.

The open character of this site enables good views across it to attractive rural scenery including the line of hills to the west featuring one of the local landmarks, One Tree Hill. A pleasant contrast occurs between the relatively confined spatial corridor along the highway - defined by the groups of mature remnant Eucalypts and road cuttings - and the broad open space of this visually prominent site.

As the last such large open space before entering the more enclosed environment of the township the site psychologically heightens the experience of reaching Tarcutta from this direction. This contrast is also appreciated when travelling in the other direction with the effect of leaving the township near Prospect Street and immediately entering the environment of broad pastoral land. These poignant landscape contrasts are an important part of the traditional setting of Tarcutta and are useful in understanding the character of the place.

Town Centre Site is a relatively flat, low-lying basin largely contained on most sides



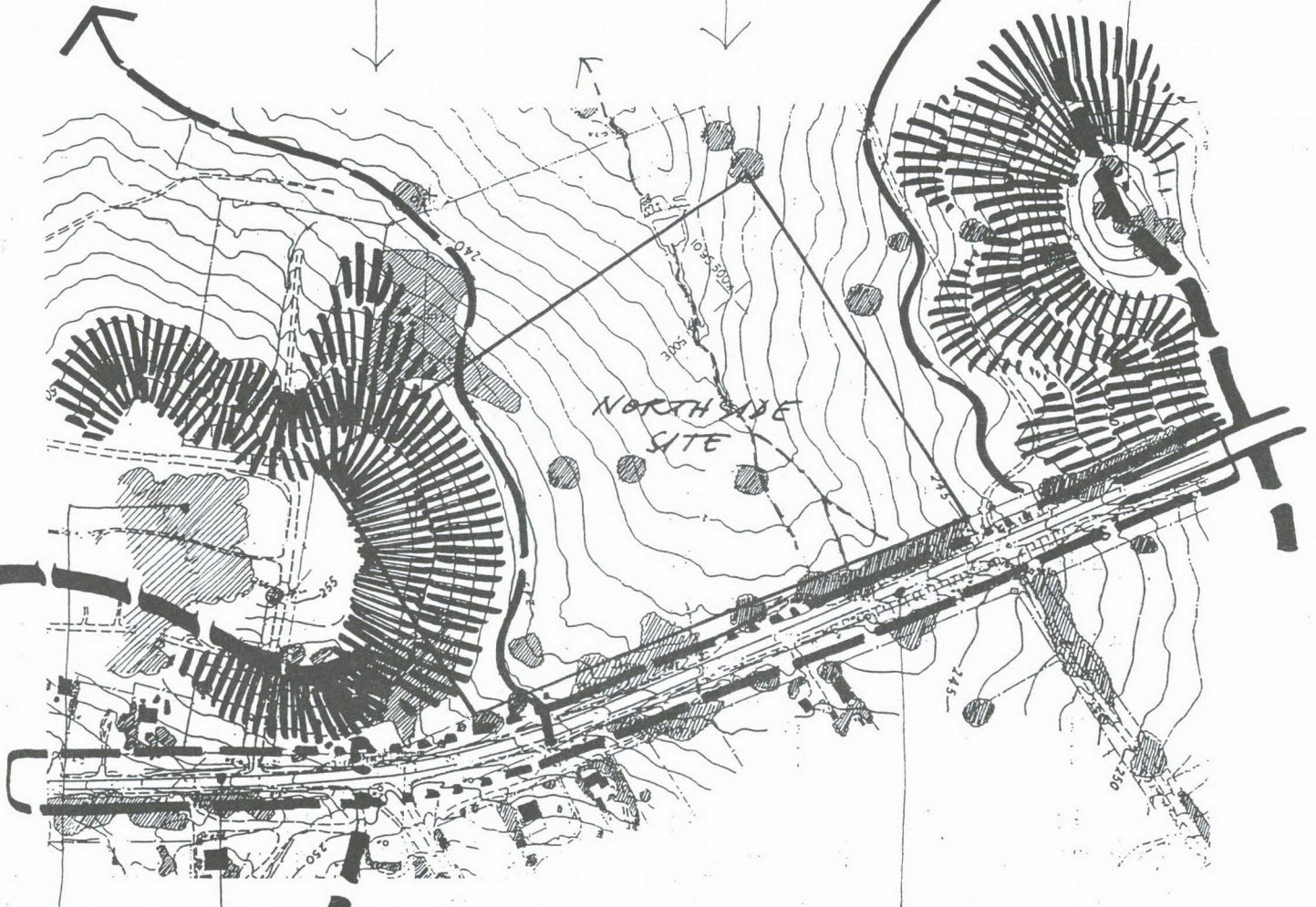
Commercial buildings forming the edge of the mainstreet of Tarcutta also provide an effective screen for the proposed Town Centre site beyond. Where openings occur, additional plantings - to reinforce existing peripheral vegetation - would effectively screen the interchange development.

Site is more exposed at sides - northern & southern edges

Figure 1 Contextual Analysis : Town Centre Site
Proposed Truck Interchange,
Tarcutta, NSW
Reduced Scale from RTA Base Survey
Visual Assessment, 1998

This ridge screens the Northside site from the north-east

The Northside Site is perceived as part of a much broader area of open space culminating further to the west. The space is defined by the elevated spurs to the north & south.



The vegetated ridge to the south reinforces the smaller spaces within the township

Cuttings and roadside trees define a long and narrow spatial corridor for this part of the Hume Highway. This contrasts with the broad space beyond (part of which is the Northside site). As this narrow spatial corridor continues into the township the views of the broader space before entering the 'urban' area are important. They reinforce part of the traditional rural landscape setting of Tarcutta.

Figure 2 Contextual Analysis : Northside Site
 Proposed Truck Interchange, Tarcutta, NSW
 Visual Assessment 1998
 Reduced Scale from RTA Base Survey

5 View Survey

Refer to SMEC main report for photographic survey of sites.

5.1 Viewer Perception

Beyond a basic survey of site views from particular vantage points various environmental, cultural and psychological factors may impinge on the perception of proposed changes to the landscape. These variables include viewer distance, elevation, aspect, quality of light, duration of view, weather conditions, the extent to which existing cultural landscape elements and vistas are appreciated and even the bias of the viewer in relation to the proposed development.

Although difficult to gauge the extent to which it may be relevant to these considerations it should be taken into account that there is already - and has been for some decades - a form of truck interchange within the township of Tarcutta. It is likely that this longstanding association, which has cultural value in both historical and social terms, has been accepted to some extent as a normal function within the town.

5.2 Views to Town Centre Site

From the south-west this site is first visible from the vicinity of the Tarcutta Creek bridge in front of the old Tarcutta Inn. Vistas of the low-lying creek flats including the existing recreation area are possible, however, if noticed at all from a moving vehicle, these views are likely to be glimpses only. The next obvious views into the site from the highway are opposite Hay Street and in the vicinity of the junction with College Street. In each of these cases views are from an elevation level with that of the site.

Direct views into the site from College and Archer Streets (including the other vantage points along this spur) are from more elevated positions which expose more of the area of the site. There are limited vistas of the site from along Myrtle Street and the main entry side of the St Mark's Anglican Church.

5.3 Views to Northside Site

The most direct and extensive views of the northside site are from the Hume Highway. Other views include those from Prospect Street to the south and towards the entry to the cemetery from along Gresham Street as well as from within the cemetery.

Views from private property include the various residences along the highway and off Myrtle Street, the motel site and from along the entrance road to 'Tara'. In almost all cases these views are from positions that are either level with the site or at a higher elevation.

The most exposed edge of the site is from the north and east

Buildings along Archer Street ridge have direct views to site as well as pleasant views to the distant lines of hills near the Keajura area.

Limited views of the site are possible from the area to the south of the St. Mark's Anglican Church.

* Sweet vista to site from along Myrtle Street

* Intermittent views of site from Hume Highway in the vicinity of the bridge and the former Tarcutta Inn

Although at about the same elevation as the site these parts of the Hume Highway, near the junction with College Street, offer direct views into the site.

Figure 3 View Analysis: Town Centre Site
Proposed Truck Interchange, Tarcutta, NSW
Reduced Scale from RTA Base Survey

Visual Assessment
1998

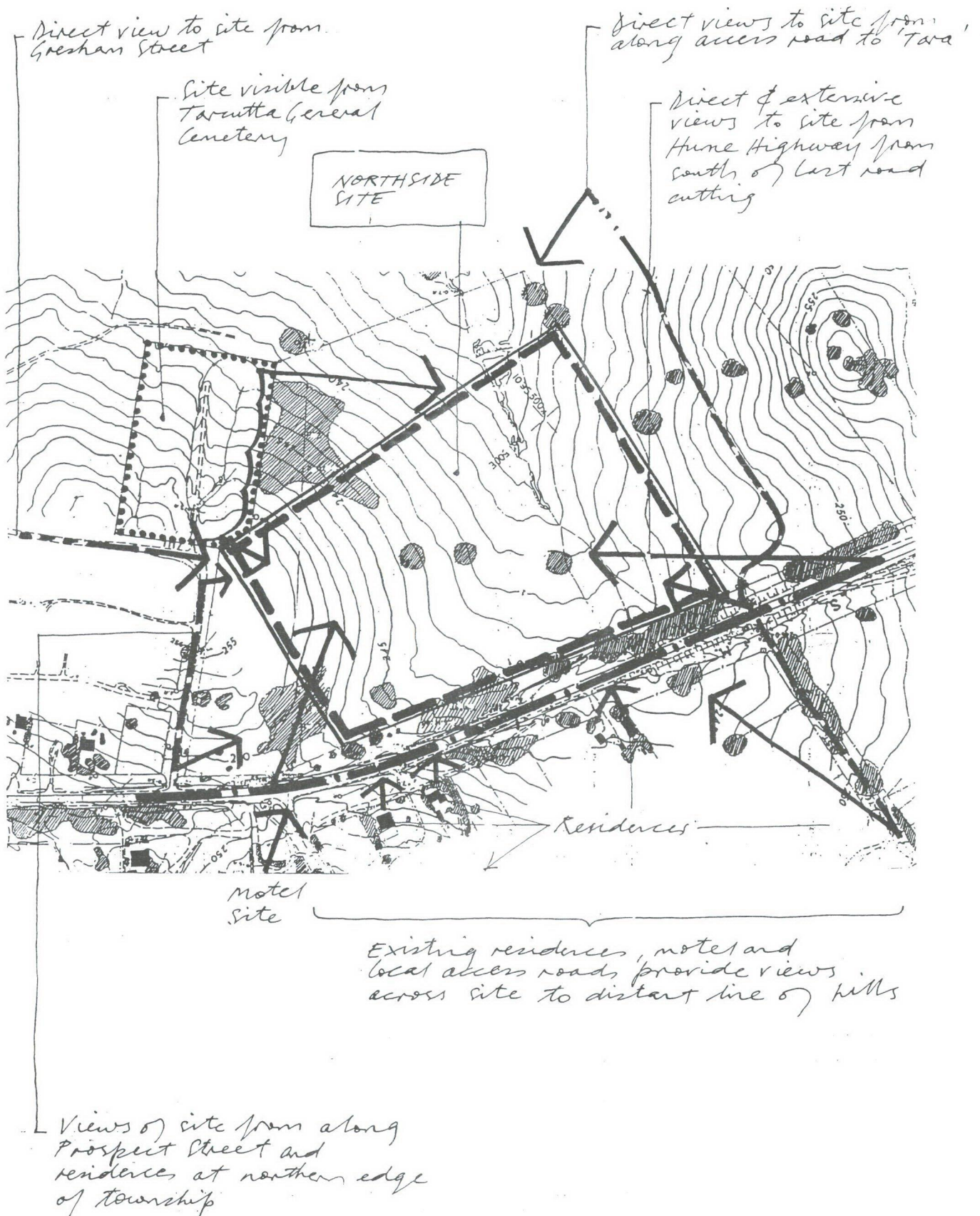


Figure 4 View Analysis: Northside Site
 Proposed Truck Interchange, Tarcutta, NSW
 Reduced Scale from RTA Base Survey

Visual Assessment
 1998

6 Interchange Proposals and Visual Implications

The construction and operation of the truck interchange will require various changes to the existing landscape. The following list outlines the main components of the interchange with the capacity to detract from the quality of the existing landscape setting.

6.1 Access and Hardstanding

Apart from the main entry into the facility which would require adequate space for manoeuvring and safe sightlines, the internal circulation and truck parking areas of the interchange would entail large expanses of pavement. An additional car park would be required for the northside site.

6.2 Earthworks

Some basic earthworks may be required for the town centre site however the greatest amount of earthworks would be for benching and possibly ramping within the northside site.

Benching would be most likely for the southern part of the northside site which would increase visual impact potential with the exposure of banks or retaining walls to the highway.

6.3 Lighting

In addition to the existing illumination of the highway the interchange would require new lighting at the facility entrance as well as within the site for parking areas, circulation and amenity areas. The town centre site may also require lighting for any access links between the facility and some of the mainstreet commercial buildings.

6.3.1 Nightlighting Effects

Assuming the internal illumination of the facility is chiefly by way of tall, multiple lamp towers to about 20m high the collective effect of the site lighting would be to produce a general light haze over the site. Intermittent views of headlights would also be apparent for the northside site.

6.3.2 Lighting Structures

During the day the tallest lighting towers would be most visible projecting above even the tallest trees near the site.

6.4 Acoustic Structures

One of the site structures with the capacity to contribute a high level of visual impact is the perimeter acoustic barrier which in this case would likely be a fence rather than an earth bund. The height of the fence may vary around the site and could be substantially reduced in height if noise reduction measures could be implemented within potentially affected residences.

If noise reduction measures are restricted to the town centre site some of the acoustic fences may need to be about 6.5m high - equivalent to the roof height of a two storey building. For the northside site an acoustic fence to about 5m high would be needed around the southern part of the site.

6.5 Screening provision

Irrespective of the height of acoustic fences for the town centre site some form of screen planting would be both necessary and readily accommodated within the existing landscape context. Screen planting for the northside site, while reducing or removing some visually obtrusive aspects of the

development, would itself potentially contribute to other forms of visual impact by obscuring desirable views of the surrounding landscape and dramatically changing the existing spatial context.

6.6 Service Structures

New site amenity and service buildings also have considerable visual impact potential depending on their standard of architectural design and detailed siting. The northside site offers a greater level of visual impact potential on account of the two large additional service and amenity structures at least one of which would need to be prominently sited for commercial reasons.

6.7 Signs

Similarly new signs indicating the entry for the facility would have some visual impact potential - particularly for the northside site.

7 Mitigatory Measures

7.1 Generally

The overall principle for reducing potential visual impacts is to minimise the perceived changes to existing landscape. This can be achieved by either introducing new elements in a way that respects the existing visual context or, where there is insufficient scope to do this, by ensuring the new elements are not seen.

7.2 Town Centre Site

Appropriate measures to reduce or eliminate the potential visual impacts from development within the town centre site include:-

- * Using the existing junction of Hay Street and the Hume Highway as the site entry,
- * Limiting roadwidening for access lanes along the mainstreet,
- * Minimising the height of acoustic fences as much as possible,
- * Planting along the acoustic fences using vegetation appropriate to the context including fast-growing species with a mature height that would screen as much of the internal site area as possible but not obscure existing desirable views from adjacent residences,
- * Devising an illumination design for the site that minimises potential light spillage and the number of structures,
- * Siting new structures, including buildings and signs, so as to avoid undue prominence,
- * Designing new structures, including buildings and lighting supports, to be visually subservient to the site context,
- * Through appropriate landscape design reducing the extent of internal paving to a safe minimum,
- * Ensuring existing vegetation along, and north of, College Street and creekside vegetation both within and beyond the site is retained,
- * Reinforcing the creekside vegetation with compatible plantings to extend the screen around to the south of the site,
- * Where possible incorporating the existing Date Palm within the site layout,
- * Allowing for the future development, where appropriate, of more buildings along the mainstreet frontage.

7.3 Northside Site

- * Retaining all mature site trees and incorporating them within the site layout,
- * Ensuring trees adjoining the site, along the highway, Prospect Street and the cemetery, are retained,
- * Minimising earthworks within the site by restricting the amount and type of development on

the steeper land to the south of the site,

- * As much as possible minimising the height and extent of acoustic fences,
- * Using appropriate screen planting on both sides of the acoustic fences,
- * Reinforcing screen planting between the site and the cemetery and along the northern boundary,
- * Implementing a high standard of architectural design for the all aspects of the site buildings including siting,
- * Devising an illumination design for the site that minimises potential light spillage and the number of structures,
- * Through appropriate landscape design reducing the extent of internal paving to a safe minimum.

8 Review of Visual Impact Potential

The following discussion assumes that the mitigatory measures above have been implemented for the respective sites.

8.1 Town Centre Site

Anticipated visual impacts would include:-

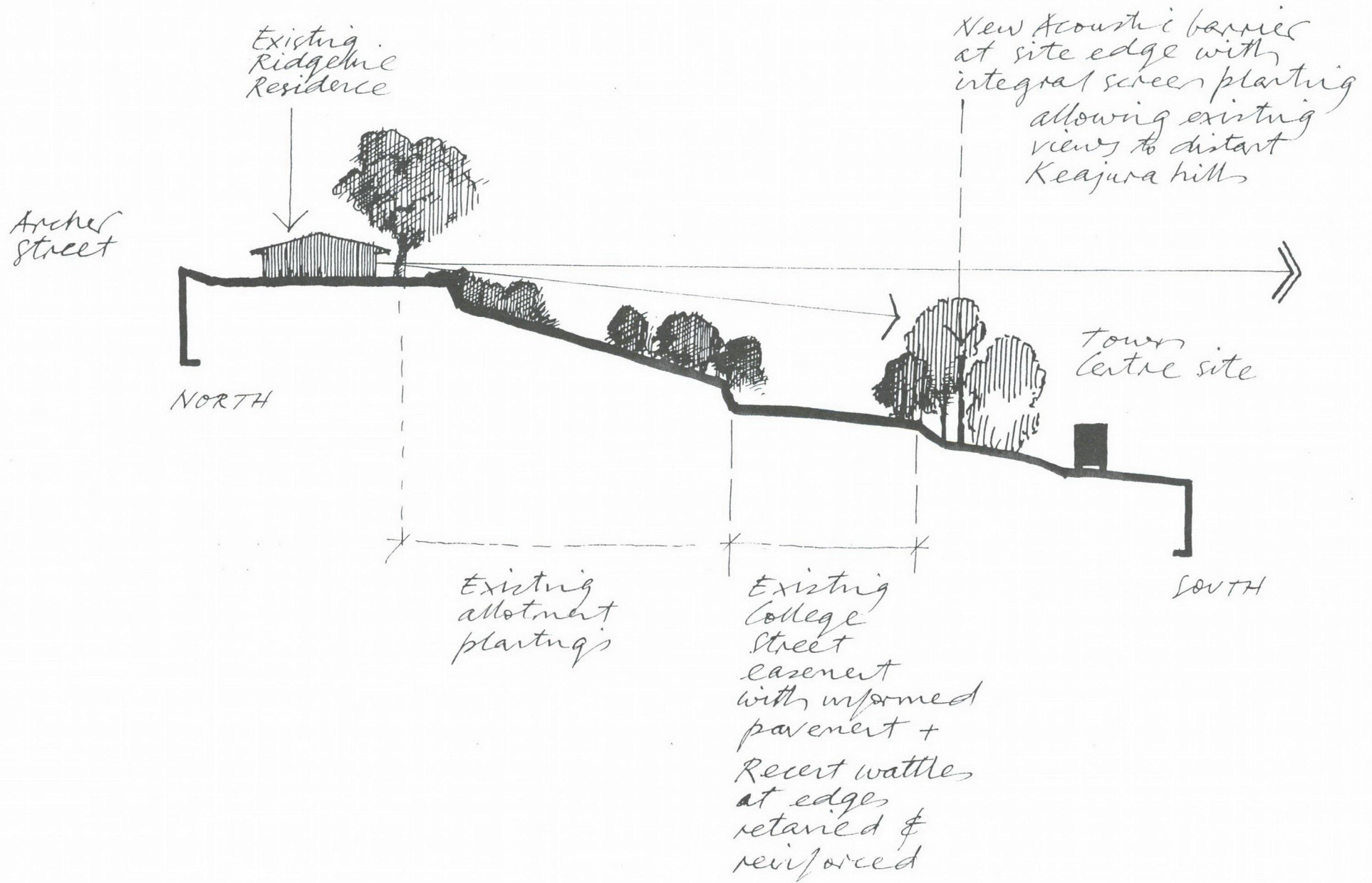
- * The construction of the facility - although this would entail a high level of visual impact from many vantage points it would only be short term,
- * Initially extensive views of acoustic structures until screening vegetation had matured - up to about 5 to 8 years depending on the species and the final heights of the structures,
- * The upper parts of the tallest lighting towers - though as a result of design controls for the surface treatment of the structures actual impacts would be reduced,
- * General nightlight haze over site,
- * Views into the site - of a concentration of trucks, amenity structures and areas of pavement - from the more elevated residences of Archer Street until the perimeter and internal site planting had matured sufficiently.

8.2 Northside Site

Anticipated visual impacts would include:-

- * The construction of the facility - although this would entail a high level of visual impact from many vantage points it would only be short term,
- * High level visibility from the highway over long term for various site buildings, signs, concentrations of trucks and lighting structures,
- * Initially extensive views of acoustic structures until screening vegetation had matured - up to about 3 to 5 years depending on the species and the final heights of the structures,
- * General nightlight haze over site,
- * New diverge and deceleration lanes along the highway,
- * Site development highly visible from the cemetery until screen planting and existing regeneration has matured sufficiently,
- * Short term views of the site from Gresham and Prospect Streets until screen planting is effective.

Figure 5 Indicative Section to Northern Edge of Town Centre Site
Not to Scale



9 Comparison of Options

9.1 Basis of Comparison

This final section compares the overall development opportunities for each site in relation to the existing landscape context. In order to effectively review each site the following criteria were considered:-

- * General level of visibility or exposure of the site - including relative viewer elevation, intrinsic openness of the site and number of direct vantage points,
- * Relative number of viewers for each site,
- * Whether viewers are permanent residents or only travelling through the town,
- * Context of a traditional landscape curtilage,
- * Ease with which the site layout could be extended in the future without exacerbating visual impacts,
- * Extent to which recommended mitigatory measures can be implemented.

9.2 Discussion

In relation to the town centre site the residences on the elevated land to the immediate north-east of the site would be potentially the most affected by visual impacts. These would include:-

- * The construction of the facility;
- * New structures for noise reduction, lighting and facility amenities;
- * The concentration of a large number of trucks within the site;
- * And, with the planting of screen vegetation along the northern boundary, the possible loss of some existing distant views to the Keajura area to the south-west.

A nightlight haze - in addition to that from the existing highway and street illumination - may be apparent from parts of the township on both sides of the highway.

If the employment of noise reduction measures is restricted to the site area it would likely require the construction of relatively high acoustic fences (up to about 6.5m high) which, as a source of visual impact, would necessitate extensive screen planting. Where noise reduction measures could be implemented at both the site as well as the potentially affected residences the heights of the acoustic fences could be substantially reduced. This would enable the development to be more easily integrated within the existing landscape.

While both sites have direct frontage to the Hume Highway as a high volume travel route the town centre site has limited exposure compared to the northside site. The town centre site also has the capacity to be more effectively screened from the highway.

Owing to the open and partly elevated nature of the proposed site to the north of the township it is anticipated that changes to this landscape would be more apparent. An aspect of significance of the Tarcutta townscape is the abrupt transition between the town and the surrounding expansive pastoral land. The development of the northside site would detract from an appreciation of this

transition and compromise an important part of the traditional setting of the township.

The prominence of the northside site means that new structures would be highly visible. The new structures would include a food, fuel and amenities building (not needed at the town centre site) - together with its necessarily prominent road signs - and a separate building for truck driver amenities. The concentration of large vehicles within the site would also be highly visible. The introduction of screen planting along the highway frontage would not offer a satisfactory solution as this would still obscure the function of this area as a part of the landscape setting for Tarcutta. For commercial and safety reasons also the extensive use of screen planting along the highway would not be desirable.

While the northside site would potentially have more exposure for large numbers of travelling viewers both sites have similar potential to be viewed by permanent residents. The northside site, mostly because of its particular commercial context, likely also has less opportunity for all of the recommended mitigatory measures to be implemented.

The relatively peaceful pastoral land surrounding the Tarcutta General Cemetery is an important part of its traditional curtilage. The construction and operation of the interchange within the northside site would change this setting at least in the short term until screen vegetation had matured. However there would still be a noticeable reduction in the amount of traditional open grazing land next to the cemetery. Most potential conflict between the two land uses would likely arise from unabated noise from the interchange site disturbing a funeral service or visitors at the cemetery.

The town centre site would offer better potential for possible future extensions to the layout without causing further visual impacts as the area of the present playing field could easily be screened from the south. Such screen planting would be readily perceived as an extension of the existing creekside vegetation.

Of the two options the proposed site within the township offers more scope to visually absorb new development associated with the proposed interchange. This is because it is of relatively low elevation and is mostly behind the mainstreet buildings and screened by vegetation along Tarcutta Creek to the west as well as the elevated spur to the north along Archer Street.

APPENDIX L ARCHAEOLOGICAL SURVEY

Survey for Aboriginal Archaeological Sites
State Highway No 2-Hume Highway
Proposed Truck Changeover Facility
Tarcutta NSW

Report to
SMEC Australia Pty Ltd
May 1998

Bobbie Oakley

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Survey for Aboriginal Archaeological Sites
State Highway No 2-Hume Highway
Proposed Truck Changeover Facility
Tarcutta NSW

1. Introduction

This report presents the findings of a survey for Aboriginal archaeological sites at two truck changeover facility options, Tarcutta, NSW (**figure 1**).

Tarcutta is located mid-way between Sydney and Melbourne on the Hume Highway and is used by a large and increasing number of transport drivers for parking, trailer exchange, rest, food and fuel etc. The existing truck parking facilities are inadequate and investigations have been conducted to determine the type of facility required at Tarcutta to service road transport industry needs. Two options for the truck facility have been identified, the "Town Centre" Option and the "Northside" Option (**figure 2**). Further investigations are required to assist in the selection of a preferred option.

The investigations will be in the form of an environmental study and in addition to satisfying environmental issues and constraints, including economic impacts, the study will devote special attention to any concerns of residents and owners of the local businesses.

The Roads and Traffic Authority Wagga Wagga commissioned SMEC Australia to undertake an environmental assessment and a comparative study of two sites for the above project. This study was commissioned by SMEC Australia for inclusion in the environmental study.

1.1 The Nature of the Development

Study Area 1 "Northside" Option, a stand-alone facility adjacent to the Hume Highway on the northern outskirts of Tarcutta. The proposed development area measuring approximately 400 metres x 300 metres, will contain 157 B-Double parking bays, a food and fuel amenities outlet, additional toilets, washrooms and shelter, and a pollution control pond (see **Appendix B, Concept Plan 1**)

Study Area 2 The "Town Centre" Option, an in-town truck parking area serviced by existing business. The proposed development area, which includes vacant land and some commercial and residential properties is located to the west of the Hume Highway within Tarcutta Village. The study area measuring approximately 300 metres x 200 metres, will contain parking bays for 52 semi trailers and 72 B-Doubles, three toilet and washroom blocks, a pollution control pond, a 10m wide allowance for an all round sound barrier (see **Appendix B, Concept Plan 2**).

1.2 The Consultancy Brief

The consultant was required to assess whether the proposed development would affect any Aboriginal archaeological sites or relics. As part of this process the consultant was required to:

- * Conduct a review of archaeological literature applicable to the area describing likely conditions for site location.
- * Consult with the relevant Aboriginal Land Council.
- * Conduct a field study, accompanied by a member of the Aboriginal Land Council, of the proposed options and identify potential surface sites which may be of significance.
- * Identify other potential sites, including sub-surface material, and make recommendations as their treatment.
- * Present a written report summarising the findings of the above. The report should discuss the value of the sites and the likely effect of the proposal on the sites and make recommendations in relation to preservation, recording and/or destruction of sites. Relevant plans or diagrams should be included. The report should generally satisfy National Parks and Wildlife Service (NPWS) requirements.

1.3 Summary of Results

Study Area 1 "Northside" Option

- * No Aboriginal archaeological sites listed with the NPWS Aboriginal Site Register are located within the "Northside Option" impact area.
- * One site, a possible Aboriginal scarred tree, **North Tarcutta Scarred Tree [NTST]** was found during the survey. The scarred tree is located within the proposed impact area and is potentially affected by the truck facility.
- * The archaeological potential of the "Northside Option" study area is assessed to be low. The area has a low probability of containing sub-surface Aboriginal archaeological sites.

Study Area 2 "Town Centre" Option

- * No Aboriginal archaeological sites listed with the NPWS Aboriginal Site Register are located within the "Town Centre" Option impact area.
- * No Aboriginal archaeological sites were found during the survey
however,
- * The survey identified several archaeological sensitive areas with the potential to contain sub-surface deposits within the study area. The archaeological potential of the sensitive area is assessed to be low to moderate.

1.4 Summary of Recommendations

Study Area 1 "Northside" Option

It is recommended that:

- * If it is not possible for the Roads and Traffic Authority to design the changeover facility to avoid the scarred tree site **NTST**, the RTA should apply for a consent to destroy site **NTST** under Section 90 of the **National Parks and Wildlife Act 1974**.
- * Should it be possible to avoid site **NTST**, the site must be preserved and protected from damage before and after construction works.
- * There are no further constraints on archaeological grounds to the proposed development within Study Area 1.

Study Area 2 "Town Centre" Option

- * The Roads and Traffic applies to the NPWS for a preliminary research permit [PRP] to carry out sub-surface testing of potential archaeological deposits within Study Area 2.

2. Aboriginal Consultation

The study area is located within the boundary of the Wiradjuri Regional Aboriginal Land Council (WRALC). Mr Roley Williams, WRALC site officer, has been consulted regarding the proposed development and participated in the field survey. In addition, on site discussions were held regarding the recommendation made in this report. The WRALC has been sent a draft copy of relevant sections of this report for comment. A final copy of the report will be forwarded to the WRALC on completion of the study.

3. Methodology

3.1 Research

Research was carried out at the NSW National Parks and Wildlife Service (NPWS) Aboriginal Site Register to obtain a list of all recorded sites within a 10 kilometre radius of the study area(s) and all relevant archaeological reports were reviewed.

3.2 Field Survey

The survey was carried out on Tuesday, 28 April 1998, by the consultant and Mr Roley Williams, Wiradjuri Regional Aboriginal Land Council.

3.3 Field Survey Strategy

The field study examined two Study Areas:

Study Area 1 "Northside" Option: the survey strategy was to conduct a total survey of the study area on foot. All exposures and mature trees were thoroughly examined and probable archaeologically sensitive areas were identified and assessed.

Study Area 2 "Town Centre" Option: the survey strategy was to conduct a total survey of the study area on foot. Exposures (very few) were examined and probable archaeologically sensitive areas were identified and assessed.

4. Environmental Context

4.1 Location, Geology and Landform

The study areas at Tarcutta are both located between the Hume Highway (to the east) and Tarcutta Creek (to the west). Tarcutta is approximately: 40 kilometres southeast of Wagga Wagga; 40 kilometres southwest of Gundagai; and 10 kilometres north east of Albury. The Hume Highway crosses Tarcutta Creek approximately 1 kilometre south of Study Area 2. The western boundary of Study Area 1 is located in gently undulating granite terrain approximately 700 metres east of Tarcutta Creek and the western boundary of Study Area 2 is only about 200 metres east of the Creek. A small section of the proposed impact area in Study Area 2 is located on the Tarcutta Creek floodplain and the remainder is located on a low rise and hill slope adjacent to the floodplain.

The bedrock within the undulating terrain bordering the floodplain consists of Lower Devonian Granite and the floodplain consists of deep clay sediments of Quaternary age. The active floodplain along Tarcutta Creek is subjected to periodic inundation intervals, and marked by a variety of subdued topographic features, including low alluvial ridges, shallow channels, and billabongs, resulting from lateral movement of the creek during floods. Areas adjacent to the floodplain are also periodically inundated but less often than the floodplain.

The main feature in the locality is Tarcutta Creek which meanders through an aggraded valley cut into a gently undulating granite terrain.

Vegetation along Tarcutta Creek consists mainly of remnant and regrowth river red gum however, Study Area 2, adjacent to the flood plain contains no old or regrowth trees. Study Area 1 supports only 15 old stringy bark trees. With the exception of land adjoining Tarcutta Creek the entire local area has been cleared for farming: grazing (cattle and sheep) and cropping. Before European settlement, river red gums would have formed woodlands on the alluvial flats of the drainages and the granite country would have supported of open woodland containing various boxes with acacia understorey.

4.2 Description of the Study Areas

4.2.1 Study Area 1

The study area consisted of approximately 400 metres (max length) by 300 metres (maximum width) of gently undulating granite terrain between 240 metres and 255 metres above sea level [asl], within an existing public reserve (Crown Land) (**photograph 1**). The study area is bounded by Prospect Street in the south, the Hume Highway in the east (**photograph 1**), a private property boundary fence in the north (**photograph 3**), and a cemetery and the remainder of the public reserve in the west. The western boundary of the study area is approximately 700 metres east of Tarcutta Creek at 220 metres asl. The entire area has been cleared and contains a remanant stand and several isolated old Eucalyptus trees (stringy bark). The reserve is currently used for grazing (cattle) and contains a small dam constructed across a small intermittent water course.

Disturbance

Disturbance was high for about 90% of the study area. The ground surface has been modified by the removal of large tree stumps which has resulted in an uneven surface and grazing has resulted in erosion along the water course above a small dam (**photographs 1 and 3** show water course).

Visibility and Effective Survey Coverage

Exposures accounted for 23% of the study which measured 120,000sq metres. Visibility within the exposures was between 90-100%. The effective survey coverage of the study area was calculated and is presented in the **Results** section below.

Archaeological Potential:

A) The hill slope which accounted for 95% of the study area: low for sub-surface archaeological deposits as the depth of deposit overlying the granite bedrock was shallow and degrading for 95% of the study area.

B) The water course/gully. Low as although deposit is aggrading, it is assessed to be the result of European land clearing. Also, the water course is minor depression, not a creek, and would therefore not have been a preferred camping place. More suitable places are located on rises and hills closer to Tarcutta Creek.

4.2.2 Study Area 2

The study area consisted of approximately 300 metres (max length) by 200 metres (maximum width) of low lying land between the Hume Highway and the flood plain adjoining Tarcutta Creek. Approximately 30% of the study area contains residential and commercial buildings and with the exception of one large shed on the northern boundary (**photograph 4**), the buildings are located along the southern boundary. A small section of the study area measuring approximately 50m x 50m is located on the flood plain surrounding a billabong, and the remainder of 'vacant' land is located on a low rise and slope above the floodplain (**photograph 5**). However, although most of the study area is located above the flood plain, more than 50% of the area was damp and "swampy" as it is cut by a water course/drain which runs from the Hume Highway across the land to the flood plain (**photograph 6**). The only areas not subjected to water runoff were the rise along the northern boundary of the study area; a low rise adjacent to the floodplain on the southwestern side of the study area and the residential/commercial development.

Disturbance

Disturbance was high for about 90% of the study area. Approximately 30% of the study area contains buildings and the remainder has been cleared of vegetation and currently supports a dense cover of introduced grasses. Although grass obscured the visibility of the ground surface it was obvious from the irregular surface that most of the study area has been disturbed. The vacant land contains evidence (bricks and tin etc) of demolished structures (eg houses or sheds, and gardens).

About 10% of the study area appeared to be only moderately disturbed and there is a moderate probability that undisturbed deposits are present. One area is a low rise adjacent to the flood plain and the other area is a narrow strip on a rise and slope along the northern boundary of the study area (see **photograph 5**).

Visibility and Effective Survey Coverage

Exposures accounted for only 1% of the study which measured 60,000sq metres. Visibility within the exposures was no more than 10%.

Archaeological Potential:

Low within floodplain.

Zero and moderate within the rise above floodplain.

Low to moderate within the slope above the rise and the floodplain. See **Appendix B Concept Plan 2.**

5. Archaeological Context

5.1 Regional Context

A number of systematic surveys and test excavations have been carried out in the Wagga Wagga region. The surveys, most of which were linear in nature, resulted in locating surface scatters of stone artefacts and scarred trees (Witter 1980; Witter and Hughes 1983; Hiscock 1983; Silcox 1986; and Oakley 1997) and several test excavations have revealed sub-surface sites containing stone artefacts, hearths and midden shell (Silcox 1986; 1987; and Kelly 1980).

Surveys

Witter (1980) carried out a survey for a natural gas pipeline route between Bomen near Wagga Wagga to Young, a distance of 134.4 km. The survey found 14 Aboriginal occupation sites (several of which contained hearths), 21 definite isolated finds (including hearths), a scarred tree, a possible Aboriginal rock well and 18 sensitive areas. The results also showed that the majority of the stone artefacts were made of quartz.

The results of the survey found that the most conspicuous form of cultural patterning was the apparent boundary of burnt clay hearths associated with the Murrumbidgee River. The distribution of the hearths ended by about Junee, and all the sites and definite isolated finds in this area were associated with alluvial flats. Witter proposed that in the region between Wagga Wagga and Junee occupation was probably concentrated amongst the red gum woodland along the drainages.

Witter and Hughes (1983) carried out surveys for electricity transmission lines between Murrumburrah-Yass and Murrumburrah-Wagga, a total distance of 20.1 kilometres. The survey found three Aboriginal stone artefact scatters, two European historic sites, and one possible Aboriginal scarred tree, as well as thirteen isolated stone artefacts. The majority of the stone artefacts at the sites were made of quartz and the majority of the artefacts (sites and isolated finds) were "located on the valley flanks rather than on the plateau", which, according to Witter et al (1983:10) "probably reflects more than simply access to drinking water" as the valleys have the greatest vegetational diversity and contain a variety of aquatic food plants.

Hiscock (1983) carried out a survey for an electricity transmission line between Wagga Wagga and Darlington Point. The survey, which ran roughly parallel to the Murrumbidgee River, at a minimum distance of 7km from the river, formed a transect across inland NSW from the western slopes of the Great Divide at Wagga Wagga out onto the flat riverine plains at Darlington Point. The survey located 18 scarred trees and 13 isolated stone artefacts, all found in ploughed

paddocks. No open artefact scatters, shelter sites, art sites or historic sites were found. Analysis of the location of the scarred trees found no obvious pattern to their distribution. Of interest is the finding that all the stone artefacts were found in ploughed fields and there were relatively more artefacts found near Wagga Wagga than further west. Also of interest is the finding that there was a "striking absence of artefacts in areas of good exposure near seasonal water channels" (Hiscock 1983:16). An analysis to test whether the proportion of vegetation cover affected the number of artefacts found, found that more artefacts were found in areas of low vegetation than in areas of high vegetation cover. However, the results also indicated that "although the discovery of artefacts is dependent on visibility of the ground this cannot be used as an explanation of the absence of material in the west" which had less vegetation cover than near Wagga Wagga, where the majority of the sites were found. Hiscock also found that, on the basis of examining large exposures in gullies and erosion features and finding no artefacts, the general paucity of artefacts on the ground surface accurately reflected the lack of material below the ground. (Hiscock 1983)

Oakley (1997) conducted a survey of an optic fibre cable route between Wagga Wagga and Wantabadgery on the northern side of the Murrumbidgee River, a distance of 35 kilometres. The survey found two scarred trees within the road easement; an artefact scatter adjacent to a large permanent lagoon on the floodplain; and three archaeological sensitive areas on the Murrumbidgee River floodplain. No artefact scatters were found in undulating granite terrain away from the river despite fairly good ground surface visibility.

Excavated sites

Kelly 1980 excavated one of the sites first recorded by Witter (1980) in the Wagga-Young survey (BY/4). The site was salvaged through a detailed surface collection and limited excavation. The salvaged assemblage consisted of approximately 80 artefacts which included a total of 8 bipolar artefacts, including 2 cores.

Silcox (1986) carried out a series of surveys in areas between Wagga Wagga and Ungarie, and Jugiong and Kingsvale along sections of replacement pipeline and on a number of construction sites. As a result of these surveys a test excavation was conducted along a new section of water pipeline on the flood plain bordering the Murrumbidgee River at Gumly Gumly, 10 kilometres east of Wagga Wagga. The excavation of **GG1 [NPWS Site #56-1-0009]** covered an area of 450 square metres adjacent to the bank of the Murrumbidgee River and a segment of 820 metres of a new pipeline route across the floodplain and terrace.

The excavations revealed two types of archaeological remains: a total of 52 stone artefacts in a very low density, and a thin intermittent sub-surface layer of shell fragments from fresh water mussel. No artefacts were found below 50cm and most were located within the top 15-25cm of the site. The artefacts consisted of flakes (including 3 bipolar), broken flakes and flaked pieces (78%), between 1-3cm in size; and 9 bipolar cores, 2 single platform cores and 1 multiplatform core, all made on quartz. The highest density of occupation was on the edge of the terrace due to the elevated surface on the edge of the inundation area. In addition to the above, four small lumps of apparently fire-hardened clay were found near the river bank and the deposit of shell fragments. According to Silcox (1986), the deposit of shell fragments appeared to be similar at a general level to other small concentrations of shell discovered adjacent to other large watercourses in western and central NSW. Similarities

with other sites in the region include: the high percentage of quartz artefacts; the small size range of the artefacts; the low numbers of artefacts with R/U; and the generally low artefact density.

Silcox (1993) excavated **GG2 [NPWS site # 56-1-0010]**, and found a total of 135 stone artefacts, the majority of which (98.5%) were quartz. The excavation consisted of 23 shovel pits at the borehole location where a shallow intermittent sub-surface layer of shell fragments was revealed in association with 16 stone artefacts; and a transect consisting of 3 backhoe trenches and 3 sets of shovel trenches. The majority of the assemblage was recovered from one area along the backhoe transect (BT1) at the approximate centre of the north/south transect along the proposed pipeline, and only 2 artefacts were found in the 12 shovel trenches dug along the same transect. No artefacts were found further than 50 metres from the exposed midden shell the edge of the Murrumbidgee Meander Loop.

95% of the artefacts were smaller than 30mm and the assemblage included 5 multiplatform cores, 5 bipolar cores, 10 bipolar flakes, 3 backed blades and one flake with R/U. The shell deposit consisted of a thin intermittent layer of shell fragments (fresh water mussel) distributed over an area of 100sq.m.

According to Silcox (1993) GG2 had several general points of similarity with majority of other sites in the region: a prevalence of quartz; the small size range of the artefacts; the low incidence of artefacts with R/U. The most notable difference to the nearby site **GG2** and most of the other sites recorded for the region was the representation of bipolar artefacts, especially in relation to the presence of backed blades. Consent to destroy the site was issued on 23/9/1993.

5.2 Predictions

With the exception of a short section of the Witter's 1980 survey (Bomen and 2 kilometres of transect north east of Bomen) which traverses similar terrain to sections of the current study; the Silcox excavations (1987, 1993); and several sections of the Oakley (1997) survey, none of the above studies were conducted within a similar environment to the current study. However, information regarding site distribution, site visibility, site size and contents from these studies have been noted and form the basis for the following predictions:

The study area could contain the following site types:

- * scarred trees
- * scatters of stone artefacts
- * archaeologically sensitive areas--sub-surface camp sites and/or midden deposit in aggrading areas on, or adjacent to, Tarcutta Creek floodplain
- * isolated stone artefacts

6. Results and Discussion

6.1 Effective Survey Coverage

Study Area 1: A total of 120,000sq metres [TA] was surveyed for Aboriginal sites. Exposures accounted for 30,000sq metres and the visibility within the exposures [VE] was 90% or 27,000sq metres.

Study Area 2: A total of 60,000sq metres [TA] was surveyed for Aboriginal sites. Exposures accounted for only 60sq metres and the visibility within exposures [VE] was 10% or 6sq metres.

The effective survey coverage [ESC]% was calculated for each Study Area by dividing the total area of visible ground surface [VE] by the total survey area x 100.

$$ESC\% = VE : TA \times 100$$

Table 1 presents the effective survey coverage data for Study Area 1

Table 1 Study Area 1

Survey Unit sq. metres [TA]	Total Area Exposures sq. metres	Visibility Exposures sq. metres [VE]	Effective Survey Coverage%	No of sites
120,000	30,000	27,000	22.5%	scarred tree

Table 2 presents the effective survey coverage data for Study Area 2.

Table 2 Study Area 2

Survey Unit sq. metres [TA]	Total Area Exposures sq. metres	Visibility Exposures sq. metres [VE]	Effective Survey Coverage%	No of sites
60,000	60	6	0.01%	nil

6.2 Aboriginal Sites

Study Area 1 "Northside" Option

- * No Aboriginal archaeological sites listed with the NPWS Aboriginal Site Register are located within the "Northside" Option.
- * A possible Aboriginal scarred tree, **North Tarcutta Scarred Tree [NTST]** was found during the survey. The scarred tree is located within the proposed impact area and is potentially affected by the truck facility. NTST is described in detail in **Appendix A** and shown in **photographs 7 and 8**).

- * The archaeological potential of the "Northside" Option study area is assessed to be low. The area has a low probability of containing sub-surface or surface Aboriginal archaeological sites.

Study Area 2 "Town Centre" Option

- * No Aboriginal archaeological sites listed with the NPWS Aboriginal Site Register are located within the "Town Centre" Option impact area.
- * No Aboriginal archaeological sites were found during the survey.
- * However, the survey identified several areas with the potential to contain sub-surface Aboriginal relics. The archaeological sensitive area is confined mainly to low rises surrounding the "billabong" on the floodplain. It was difficult to access the extent of the sub-surface potential as there was no visibility of the ground surface. The assessment was based primarily on the study area's proximity to Tarcutta Creek and what appeared to be several undisturbed areas on, just above, and adjacent to the floodplain. The main areas with archaeological potential that would need testing are:
 - * the proposed pollution control pond area
 - * D 757255 (sections of)
 - * D 215285 (sections of)
 - * land north of and adjoining present extent of oval

Areas with no potential:

- * D 330491, *D 614281, *D 758953, *D 330490, *D 309524, and
- * D 227896

Appendix B Concept Plan 2 shows the locations of the sensitive areas and the D's.

6.3 Discussion

The ground surface visibility in the gently undulating granite terrain within Study Area 1 was high and it was expected, given the relative proximity to Tarcutta Creek, that stone artefact scatters would be found. The lack of artefact scatters would not be due to the noted disturbance, namely land clearing/grazing, as this type of disturbance and resulting erosion, could (would) increase the visibility of artefact scatters. Farming practices, and the small size of the study area would however account for scarcity of scarred trees.

The study identified an archaeological sensitive area within the "Town Option" study area despite the highly disturbed nature of the land which is surrounded by residential/commercial development. The study area may contain remnant in-situ archaeological deposits on the rise adjacent to the floodplain as previous studies in the region have found sites in similar terrain (eg Oakley 1997, Silcox 1986, 1993) and test excavations have revealed undisturbed archaeological deposits in locations with high ground surface disturbance (ie beneath the plough zone) (see Silcox 1993). It has therefore been recommended that test excavations are carried out before development works begin.

7. Significance Assessment

The significance of cultural items can be assessed according to a range of criteria including the following:

1. Heritage values. A value placed by the general community on the site which demonstrates history or an historic theme.
2. Importance to the Aboriginal community.
3. Scientific or archaeological value. This value is dependent on the ability of a site to answer questions on current and projected areas of research in archaeological investigation. The research potential of a site is dependent on the:
 - * physical condition of the site (disturbance to a site will affect its research value);
 - * ability of a site to generate statistically viable quantities of data on artefacts;
 - * representativeness of a site or its rarity; and
 - * complexity of a site or the range of behaviour it could represent. For example, large complex stratified sites and large in situ open campsites with a variety of activity areas have greater research potential.
4. Educational values. The educational value of cultural resources vary according to their accessibility, how well they represent a past activity and can serve to illustrate concepts and events.

Site **NTST** has been assessed in terms of items 1, 3 and 4 of the criteria. Mr Roley Willams will consult the Aboriginal community regarding the Aboriginal significance of the site.

On the basis of the above criteria archaeological site **NTST** is assessed as having very low heritage value, very low educational value and very low scientific value. See **Table 3** for significance assessment details.

Table 3 Significance Assessment Site **NTST**

Assessment criteria	Level of significance	Reasons/ comments
heritage values	very low	Not a locally/regionally listed historic or Aboriginal site; no known history or historic theme. Theories re origin of scar only testable by destruction of relic. Theories re origin of steel axe mark not testable. So no conclusive evidence that European or Aboriginal relic. The tree however is a relic as the scar was made by man and from the regrowth would appear to be more than 50 years old. The site is in poor condition.
scientific	very low	As any theories regarding the origin of the scar can not be tested without destroying the site (removing the regrowth bark to see whether there are stone axe marks), it only has low scientific value. Any theories regarding the origin of the steel axe marks can not be tested. Aboriginal scarred trees are not rare in the region. The site is in poor condition.
educational	very low	The site is accessible however as theories regarding the scars origin are not testable it has very little educational value and the site is in poor condition.

8. Recommendations

The following recommendations are based on:

- * The terms of the **National Parks & Wildlife Act (NSW) 1974**; and
- * The findings of this study as documented in this report.

Study Area 1 "Northside" Option

It is recommended that:

- * If it is not possible to design the changeover facility to avoid scarred tree **NTST**, the Roads and Traffic should apply for a consent to destroy site **NTST** under Section 90 of the **National Parks and Wildlife Act 1974**.
 - * If it is possible to avoid site **NTST**, measures must be taken to preserve and protect the tree:
 - * as the tree is in poor condition the tree should be inspected by a "tree doctor" to ascertain whether it can be preserved.
- If the tree can be preserved:
- * it must be protected during construction works by enclosing it in a protective fence; and
 - * after the construction phase a permanent protective fence with an interpretive sign should be erected around the tree to ensure it is not damaged by truck stop activities.
- * There are no further constraints on archaeological grounds to the proposed development within Study Area 1.

Study Area 2 "Town Centre" Option

- * The Roads and Traffic applies to the NPWS for a preliminary research permit [PRP] to carry out sub-surface testing of potential archaeological deposits within Study Area 2.

In addition it is recommended that:

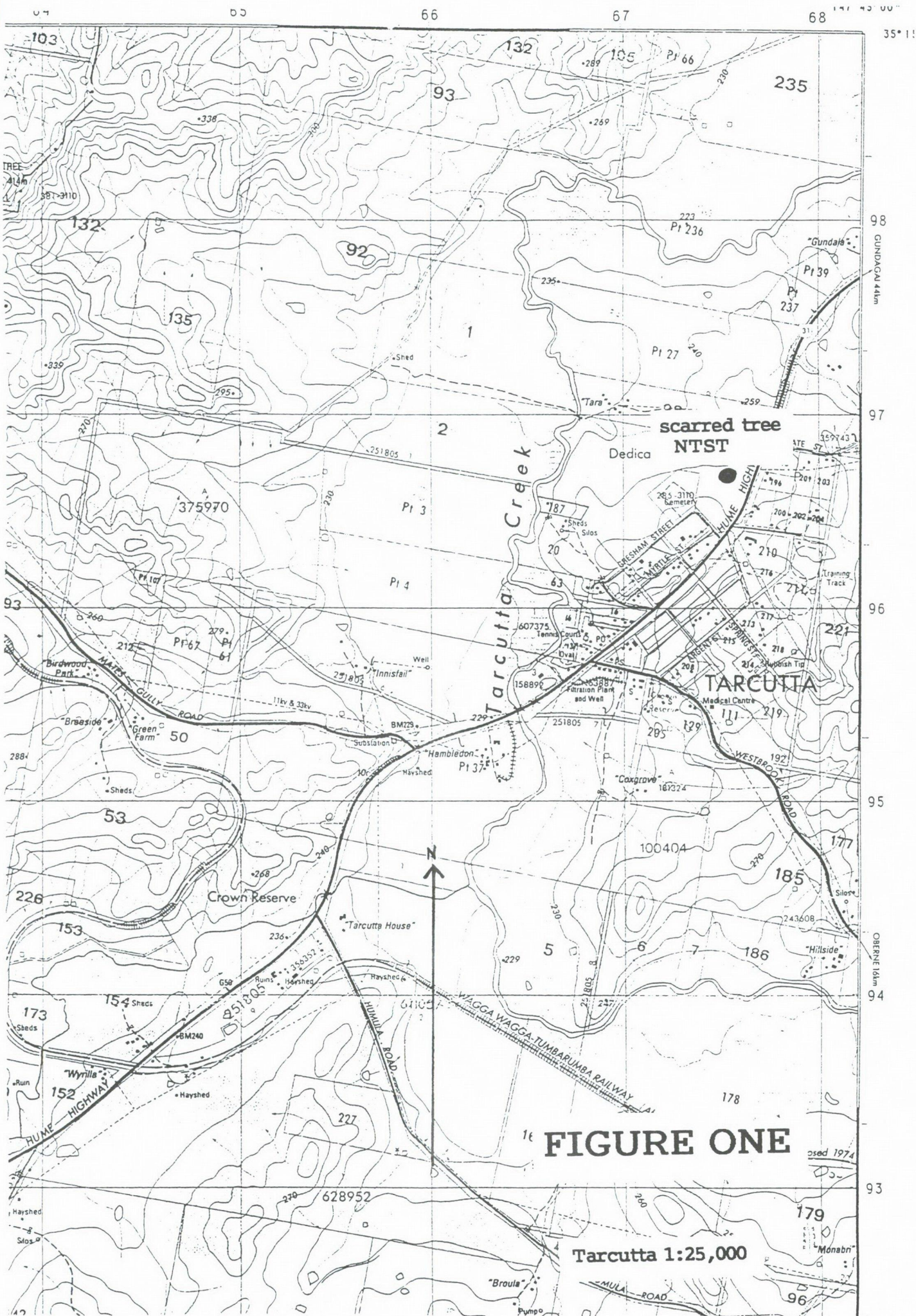
- * If the location(s) proposed impact area(s) are changed, an archaeologist be commissioned to survey the new area(s).
- * If archaeological relics are found within Study Area 1 during the construction works, work must cease and the NPWS contacted to inspect the finds.
- * Three copies of this report be sent to the NPWS Zone Archaeologist, Western Zone, NPWS. PO Box 1007. Dubbo. 2830.
- * One copy of this report be sent to Roley Williams, Wiradjuri Regional Aboriginal Land Council, 153 Docker Street, Wagga Wagga. 2650.

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FIGURES



APPENDIX A

APPENDIX A

Description of Possible Aboriginal Scarred Tree

North Tarcutta Scared Tree [NTST]

Photographs: 7 and 8 **Figures** 1 and 2

location

Topographic Map Sheet: Tarcutta 1:25,000

Grid Reference: 567510.6096680

description of tree

Circumference of tree: 4.2 metres

Height of tree: c.25 metres

Species: Eucalyptus sp -- Stingy Bark

Condition: not very healthy as most of the crown is dead
(drought affected and old)

description of scar

aspect: south

Length of scar (max)

 inside length: 1.20 metres

 total length : not known

Width of scar (max)

 inside width: 13cm

 outside width: not known

scar height above ground

 from base of scar: 75cm

axe marks:

steel axe marks are visible on dead sap wood.

Origin: the scar is old and it is probable that it is of Aboriginal origin and that the regrowth bark now covers the original axe marks which may have been made with a stone axe. The steel axe mark could also have been made by an Aboriginal person. The scar could represent two separate events e.g. the original scar could have been made by an Aboriginal, and the visible steel axe marks could have been made later by an Aboriginal or a European. Theories regarding the origin of the scar can only be tested by destroying the site. Theories regarding the origin of the steel axe marks are not testable.

Significance: low scientific value, low educational value, low Aboriginal value, low historic value.

Context: Tree in cleared paddock with only two other large trees nearby.

Relationship to proposed development: in centre of proposed impact area. Potentially affected by proposed development.

Recommendation: If it is not possible for the proposed development to avoid the tree, the RTA should apply to the NPWS for a consent to destroy the tree. If the tree can be avoided, it must be inspected by a "tree doctor" so that it can be preserved, and it must be protected by a fence so that it is not damaged during or after construction works.

Photographic Record

1. Northside Option. Scarred tree **NTSC** is tree in centre [taken facing north].
2. Northside Option showing Hume Highway [taken facing southeast].
3. Northside Option showing swampy low land adjacent to watercourse and boundary fence [taken facing north].
4. Town Centre Option showing swampy low land and shed [taken facing west].
5. Town Centre Option showing low rise and slope above floodplain--archaeological sensitive area [taken facing west].
6. Town Centre Option showing Tarcutta Creek floodplain [taken facing east].
7. Possible Aboriginal scarred tree **NTST** [taken facing north].
8. Possible Aboriginal scarred tree **NTST** [taken facing north].



2.



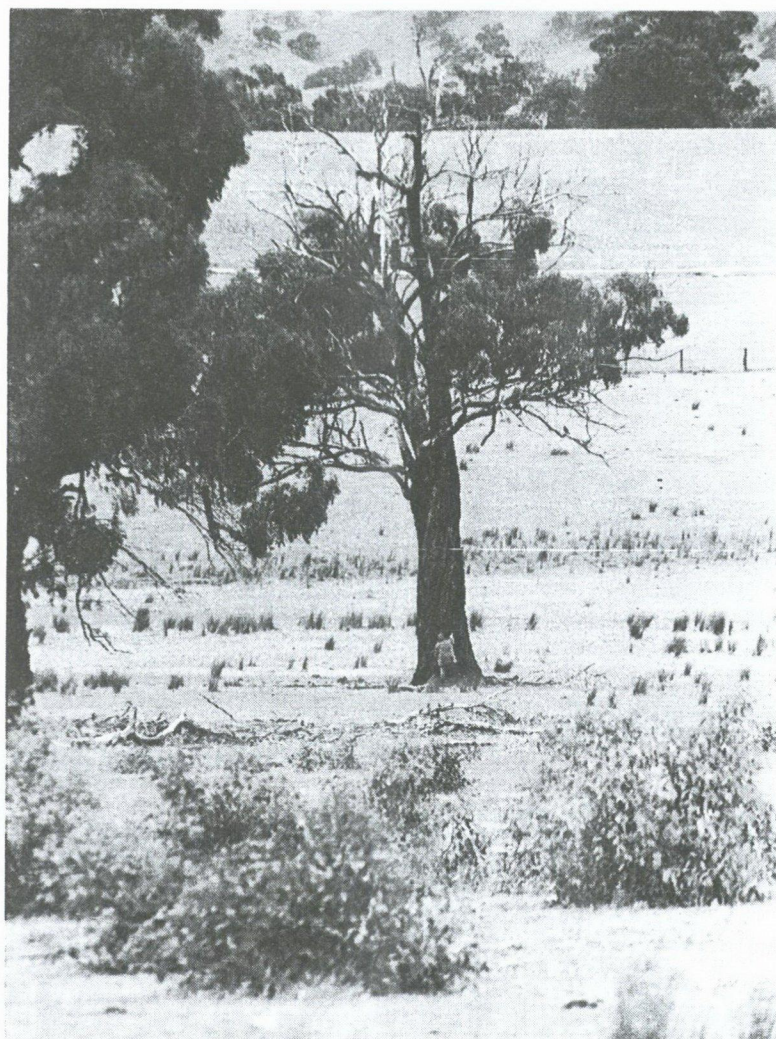
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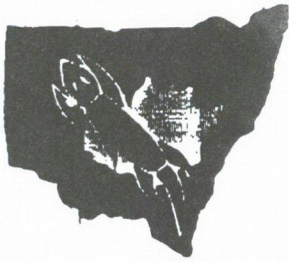


8.



APPENDIX M

CONSULTATION WITH LOCAL ABORIGINAL LAND COUNCIL



Wiradjuri Branch
New South Wales Aboriginal Land Council

153 Docker Street, Wagga Wagga 2650. P.O. Box 5515, Wagga Wagga 2650
Telephone: (069) 21 6544 - 21 6339, Fax: (069) 21 7903

Bobbie Oakley & Associates Heritage Consultants
"MILLPOST"
NIMMITABEL NSW 2631

Dear Bobbie

RE: PROPOSED TRUCK CHANGEOVER FACILITY AT TARCUTTA

I have read your Draft Report of the above survey which we carried out on 28 April 1998 and I concur with the Survey Results and Recommendations contained therein, which we also discussed while in the field.

Please do not hesitate to contact me should you wish to discuss this matter further.

Yours sincerely

R. Williams

Roland Williams
SITES CURATOR
14 July 1998

APPENDIX N NOISE REPORT



Quality
Endorsed
Company

ISO 9001 Lic 3236
Standards Australia

REPORT 8049-R1
(Revision 2)

**TARCUTTA TRUCK CHANGEOVER FACILITY
ASSESSMENT OF NOISE IMPACTS**

Prepared for

**SMEC Australia Pty Ltd
Level 5, 77 Pacific Highway
NORTH SYDNEY NSW 2060**

24 February 1999

RICHARD HEGGIE ASSOCIATES PTY LTD

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REPORT 8049-R1

(Revision 2)

TARCUTTA TRUCK CHANGEOVER FACILITY ASSESSMENT OF NOISE IMPACTS

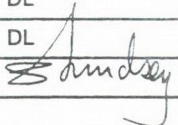
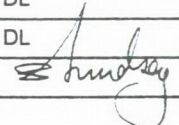
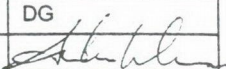
Quality System

Richard Heggie Associates Pty Ltd operates under a Quality System which has been certified by Quality Assurance Services Pty Limited to comply with all the requirements of ISO 9001:1994 "Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation and Servicing" (Licence No 3236).

This document has been prepared in accordance with the requirements of that System.

Association of Australian Acoustical Consultants - AAAC

Richard Heggie Associates is a Member Firm of the Association of Australian Acoustical Consultants.

Reference	Status	Date	Prepared	Checked	Authorised
N181\8049R1	Revision 0	22.7.98	DL	DL	DG
N181\8049R1R1	Revision 1	3.8.98	DL	DL	DG
N189\8049R1R2	Revision 2	24.2.99			

TARCUTTA TRUCK CHANGEOVER FACILITY ASSESSMENT OF NOISE IMPACTS

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TARCUTTA TRUCK CHANGEOVER FACILITY ASSESSMENT OF NOISE IMPACTS

SMEC AUSTRALIA PTY LTD

1 INTRODUCTION

The town of Tarcutta is situated approximately midway between Melbourne and Sydney on the Hume Highway.

The township is used by the Road Transport Industry as a convenient destination for parking, a trailer changeover facility, rest stops, food and fuel, etc. Currently, truck parking is limited to the areas adjacent to the Hume Highway and in side streets. This arrangement results in some traffic congestion and increases the possibility of pedestrian and/or motor vehicle accidents.

Richard Heggie Associates has been commissioned by SMEC Australia to assess the acoustical impact arising from a dedicated truck changeover facility located either near the centre of town or immediately north of the town.

2 PROJECT DESCRIPTION

2.1 Proposed Site Layout

Two alternative sites have been identified as potential locations at which to construct a truck changeover facility. These locations are referred to as the "Town Centre" option, which is an area within the town serviced by existing business or the "Northside" option, which would be a stand-alone facility on the northern outskirts of Tarcutta.

The final relative levels (RL) of the hard stand areas are subject to engineering design. This report assumes that the prevailing surface profile has been adopted and that no levelling of either site has been incorporated into the preliminary design.

Appendix A presents a site map showing the approximate locations of these two alternative site options.

2.2 Surrounding Land Use

The "Town Centre" option is located close to a number of residential dwellings and commercial businesses to the north, south and east. To the west, there are no nearby significant developments.

The "Northside" option is located on the northern side of a small hill, with the entrance approximately 200 m north of the Halfway Motel. There are scattered residential developments to the south of the site and across the Hume Highway to the east. To the north of the site is a farmhouse.

Existing residential properties located close to both these development sites have been identified and are shown on the site map presented as **Appendix A**.

2.3 Truck Movement Profile

The RTA conducted a traffic volume and classification survey in April 1996 on the Tarcutta Creek Bridge to indicate the hourly and daily profiles of vehicle movements travelling along the Hume Highway.

A summary of the results of the survey showing the hourly traffic flows and daily distribution of truck movements through the town is presented in **Figure 2.3.1** and **Figure 2.3.2** respectively.

Figure 2.3.1 Hourly Distribution of (Long-term) Traffic Flows

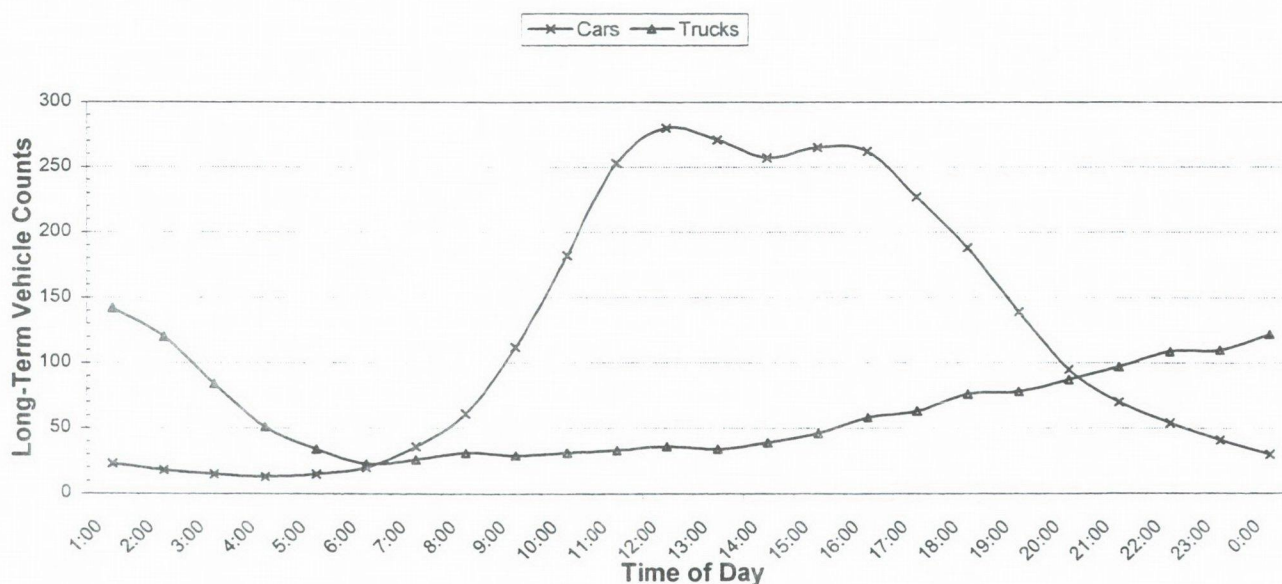
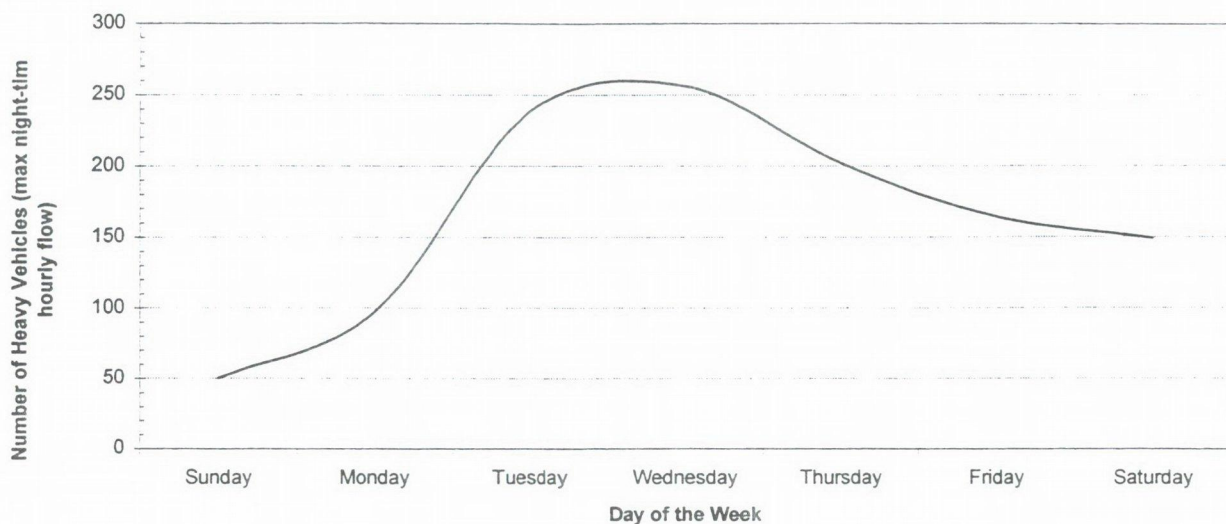


Figure 2.3.2 Average Daily Truck Distribution



This survey indicated that the traffic volumes are highly dependent upon the day of the week and the time of day. The highest car movements occur during daylight hours on the weekends, whilst the highest truck movements occur mid-week, generally between 11.00 pm and 2.00 am. The maximum number of truck movements recorded over a one-hour period during the survey was 256, between 1.00 am and 2.00 am on a Wednesday morning.

The trucks entering the proposed facility may be expected to follow a similar profile to the prevailing heavy vehicle movements that occur along the Hume Highway. The night-time use of the facility is likely to be significantly higher than the daytime usage.

The RTA has estimated that up to a maximum of 80 trucks may use the facility at any time during the night. Given the maximum night-time usage, and examining the daily truck profile, it may reasonably be assumed that up to 20 trucks may simultaneously use the facility during the day.

A survey was conducted by the Taverner Research Company of drivers and transport company representatives to assist in preparing a Value Management Study for a truck changeover facility. Of relevance to this assessment, the Taverner survey determined that nearly 80% of drivers stayed an average of 60 minutes at Tarcutta.

The design of the "Town Centre" site has provision for 124 heavy vehicles (with the potential to expand to 159 heavy vehicles) whilst the "Northside" option has provision for 160 heavy vehicles plus a small allocation for vehicular car parking.

The number of vehicle movements per allocated parking space over the peak daytime and peak night-time one hour periods is therefore:

Location	Vehicle Movements per Parking Space during Peak Hourly Use	
	Daytime ¹	Night-time ²
Town Centre ³	0.13	0.503
Northside	0.13	0.500

Note: 1 Night-time is defined as 10.00 pm to 6.00 am
2 Daytime is defined as 6.00 am to 10.00 pm
3 Based on 159 parking bays

3 AMBIENT NOISE ENVIRONMENT

In order to quantify the ambient noise environment at representative residences near the prospective development sites, two unattended noise loggers were deployed to simultaneously monitor the daily noise level variations between 20 April 1998 and 8 May 1998.

These noise loggers were set to record a series of statistical descriptors, in consecutive 15 minute periods the most relevant of which are the:

- LA1 The noise level exceeded for 1% of the sampling interval (loudest 9 seconds) in a 15 minute period, corresponding to the typically loudest noise event.
- LA10 The noise level exceeded for 10% of the sample period, this is commonly referred to as the average maximum noise level (ie loudest 90 seconds) corresponding to the average maximum noise levels.
- LA90 This is the noise level exceeded for 90% of the sample period and is commonly referred to as the average minimum or background noise level (quietest 90 seconds).
- LAeq The equivalent continuous or energy average noise level occurring over the sample period.

Acoustical monitoring was conducted in accordance with AS 1055-1997 Acoustics - Description and Measurement of Environmental Noise. Part 1: General Procedures" and the guidelines of the NSW Environment Protection Authority (EPA).

Noise loggers were placed at the following residential properties:

- Location 1 Near the Northside option: at a residential property at Lot 7, Myrtle Street, between Spring and Prospect Street.
- Location 2 Near the Town Centre option: Lot 2, Archer Street, on the corner of College Street.

These locations are indicated in **Appendix A** and are considered to be representative of other residences in the immediate area.

The majority of existing residences in the township are located on or close to the Hume Highway and would consequently be subject to higher ambient noise levels than those measured. The results of the ambient surveys are presented graphically in **Appendices B** and **C** for monitoring Locations 1 and 2 respectively.

These unattended noise surveys were supplemented by a number of short-term operator-attended surveys at several other residential locations, at the locations shown in **Appendix A**. The results of these surveys are presented in **Table 3.1**.

Table 3.1 Results of Operator Attended Surveys (dBA)

Location*	Time and Date	LA1	LA10	LA90	LAeq	Comment
Location 3	7.45 pm 20.4.98	55	53	38	50	Traffic – Hume Highway
Location 4	8.15 pm 20.4.98	76	71	55	68	Traffic – Hume Highway
Location 5	9.30 am 21.4.98	54	48	37	45	Distant Traffic

Note: Refer **Appendix A** for Locations

Noise monitoring Location 4 (referred to in **Table 3.1**) is representative of a number of residences in the immediate vicinity of established truck parking bays on the Hume Highway. It was observed that these truck parking spaces and the roads immediately surrounding the area are used for truck parking and interchange operations. The resulting noise levels at nearby or adjacent residences during such events are likely to be in the range 80 dBA to 90 dBA at the facade. This level of noise is significantly higher than the ambient traffic noise level and is likely to be readily noticeable to occupants within the dwellings.

During the noise monitoring exercise, the dock dispute which affected the operation of the Sydney and Melbourne wharfs reduced the amount of heavy vehicles that would normally have been on the Hume Highway. The recorded levels are therefore lower than those normally experienced within the township. The use of measured noise levels therefore represents a conservative basis on which to conduct the assessment.

The EPA currently requires the determination of the "minimum repeated" background (or LA90(15minute)) noise level as the basis for establishing permissible emission limits. These limits are generally expressed as some margin above the background noise level.

Having reviewed the data presented in **Appendices B** and **C**, the minimum repeated LA90(15minute) noise level for each site has been calculated to be:

Table 3.2 Minimum Repeated Background Noise Levels

Location	Average LA10 Levels		Minimum Repeated LA90 Levels	
	Daytime	Night-time	Daytime	Night-time
Location 1 (Northside)	57 dBA	61 dBA	36 dBA	30 dBA
Location 2 (Town Centre)	53 dBA	57 dBA	38 dBA	33 dBA

When assessing the noise emissions from roadways, the NSW Environmental Protection Authority classify "daytime" as 6.00 am to 10.00 pm. This is consistent with the NSW RTA's and the Bavarian EPA's definition. For noise emissions from other sources (eg mechanical plant), the NSW EPA refer to daytime as 7.00 am to 10.00 pm Monday to Saturday and 10.00 pm to 8.00 am Sundays and public holidays.

When assessing traffic noise, the NSW EPA and RTA commonly refer to the LAeq(8hour) and LAeq(24hour) noise indices. Based on the unattended noise surveys conducted at the two sites, these traffic noise indices have been calculated from the results of the unattended monitoring, and are presented in **Table 3.3** below.

Table 3.3 Measured Road Traffic Noise Indices

Location	Road Traffic Noise Indices	
	Daytime - LAeq(24hour)	Night-time - LAeq(8hour)
Location 1 (Northside)	61 dBA	57 dBA
Location 2 (Town Centre)	54 dBA	53 dBA

Measured LA90 noise levels (as presented in **Table 3.2**) are always lower than the road traffic noise descriptors used by the EPA and the RTA (as presented in **Table 3.3**). The LA90 level is the level corresponding to the quietest 90 seconds in any 15 minute period, whilst the road traffic noise indices are weighted to the louder noise events, such as those associated with truck movements etc. The substantial difference between the LAeq and the LA90 terms is an indication of the significance of existing road traffic on the relatively rural environment of Tarcutta.

4 NOISE CRITERIA

4.1 General

Responsibility for the control of noise emission in NSW is vested in Local Council and the Environment Protection Authority which administers the Noise Control Act, 1975.

The proposed development is not a Scheduled Premise as defined under the Noise Control Act, therefore the EPA is not required to grant an Approval or issue a Licence for the operations on the site.

The Environmental Noise Control Manual (ENCM) does not provide any specific criteria for assessing the noise emissions associated with parking facilities of any type.

4.2 EPA's Criteria for Intermittent Traffic Flows

Under an agreement between the agencies, the RTA has agreed to adopt the new (draft) Environmental Criteria for assessing the noise impact from roadways. For "new land use developments with the potential to create additional traffic on local roads", the draft criteria suggests an $L_{Aeq}(1\text{hour})$ level of 50 dBA during the night-time.

In situations, where the ambient L_{Aeq} exceeds this 50 dBA level (as in the case presented in **Table 3.3**) an overall increase of the existing L_{Aeq} of 2 dBA or less is usually considered acceptable.

4.3 EPA's Criteria for Industrial/Commercial Noise Emissions

The Environment Protection Authority (EPA) attempts to balance the possible adverse effects on individuals with the potential benefits to the broader community (arising from infrastructure development and resource use), by drafting a schedule of recommended LA_{90} background noise levels for various land-use categories.

In order that a new noise source in a community is not considered intrusive, the EPA's policy (based on social surveys) is to recommend that the contributed "average maximum" or LA_{10} noise level of the new noise source does not exceed the existing background by more than 5 dBA.

A lower LA_{90} criterion may apply if the prevailing background noise approaches the schedule of recommended LA_{90} background noise levels, as detailed in Chapter 21 of the ENCM. An extract from the schedule relating to the three most stringent classifications is given in **Table 4.3.1**.

Table 4.3.1 EPA Recommended Outdoor Background Noise Levels

Zoning Description	Time Period	Recommended Limit - LA90	
		Preferred	Maximum
Residences in Rural Areas	Day Night	45 dBA 35 dBA	50 dBA 40 dBA
Residences in Residential Areas	Day Night	45 dBA 35 dBA	50 dBA 40 dBA
Residences Near Industrial Areas or on Busy Roads	Day Night	50 dBA 40 dBA	55 dBA 45 dBA

- Notes
- 1 For Monday to Saturday, "day" is defined at 7.00 am to 10.00 pm
 - 2 On Sundays and Public Holidays, "day" is defined as 8.00 am to 10.00 pm
 - 3 The LA90 index corresponds to the sound level exceeded 90% of the measurement or observation period.

The LA90 criterion is usually applied to noise sources which are relatively constant in nature, such as stationary mechanical plant etc, rather than for the noise emissions associated with motor vehicles.

4.4 Sleep Disturbance

The EPA advocates that the LA1 noise level from a noise event should not exceed the background noise level by more than 15 dBA (when measured 1 m external to the building) to avoid the potential of causing sleep disturbance to occupants within the building.

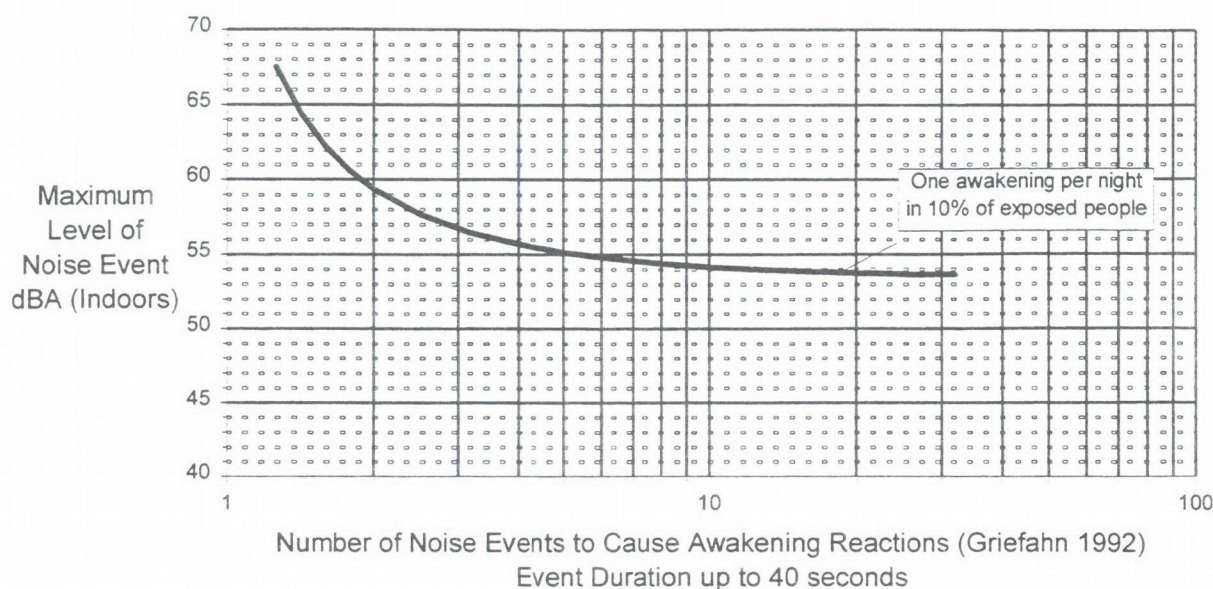
A number of recent studies have since been conducted on the effects of noise on sleep. These studies have sought to define the noise levels required to cause a change in the depth of sleep and/or sleep arousal and have generally been carried out on a relatively small sample of people and often in laboratory or other abnormal surroundings.

A recent study (Griefahn 1992) has reviewed the bulk of sleep disturbance research and gives proposals for continuous and intermittent noise level criteria for minimising sleep disturbance.

This study finds that the LAeq is generally not suitable as a noise descriptor for the prediction of sleep disturbance as people are more disturbed by intermittent noise than by continuous noise. The number and maximum levels of a particular stimulus are best used to assess the impact of intermittent noise.

The conclusion of Griefahn's study is presented in **Figure 4.4.1** which presents the maximum number of permissible noise events per night as a function of the corresponding maximum internal noise level (L_{Amax}).

Figure 4.4.1 Griefahn's Noise Criteria



According to **Figure 4.4.1**, the permissible internal sound pressure levels decrease considerably from 1 to 5 noise events (per night), thereafter it generally approaches 53 dBA. This equates to an external limit of 65 dBA assuming external facade windows are substantially opened.

Figure 4.4.1 presents the awakening reaction (per night) that would occur in 10% of the exposed population. Regular exceedance over several successive nights is not advised.

4.5 Project Specific Criteria

The character of the noise arising from the operation of an interchange facility would be similar to that of the prevailing traffic noise from the Hume Highway, although some residences may consider the truck interchange as a "new" noise source.

Wagga City Council views this site as being consistent with an "industrial or commercial" operation. The implication is that the EPA's "background +5 dBA" rule would therefore apply. On this basis, the average maximum or LA10 emission objectives presented in **Table 4.5.1** would apply.

Table 4.5.1 LA10 Emission Objectives

Location	LA10 Noise Emission Objectives	
	Daytime – LA10	Night-time – LA10
Location 1 (Northside)	41 dBA	35 dBA
Location 2 (Town Centre)	43 dBA	38 dBA

For intermittent events, such as truck start-ups, application of air brakes etc the event may be of sufficiently short duration so that it does not influence the LA10 descriptor. Such events are usually assessed against sleep disturbance criteria, as discussed in **Section 4.5**.

Alternatively, the use of the LAeq index may be adopted. This parameter is an energy based index and is sensitive to short-term, high level noise sources, whereas the LA10 based objective does not cater for the magnitude of any existing noise from heavy vehicles along the Hume Highway.

At both monitoring locations, the night-time ambient LA10 levels are nominally 15 dBA to 20 dBA higher than the corresponding LA10 criteria for the noise emission from the operation of the truck changeover facility. In such circumstances, or where it is not economically or technically feasible to comply with the objective, it is recommended that the allowable increase in the noise environment be limited to 2 dBA. Such small increases are not generally perceivable to people over time.

Based on the ambient night-time LAeq levels presented in **Table 3.3**, **Table 4.5.2** presents the upper LAeq limit, which results in an increase in the ambient night-time LAeq noise level of 2 dBA.

Table 4.5.2 LAeq Based Night-time Criterion

Location	Existing Noise Environment (Hume Highway) LAeq(8hour)	Maximum emission level from Development LAeq(8hour)	Possible New Noise Environment (with development) LAeq(8hour)
1 – Northside	57 dBA	55 dBA	59 dBA
2 – Town Centre	53 dBA	52 dBA	55 dBA

In addition, the maximum noise level (LAmax) should not exceed 65 dBA near the facade of any residence to avoid sleep arousal.

There are already significant variations in the daily traffic flows (and hence noise emissions) along residential properties in the vicinity of the Hume Highway, dependant upon the day of the week and time of the day. The introduction of a truck interchange facility (at either of the proposed locations) would not result in any change in the night-time (or daytime) flow patterns along the Hume Highway.

5 NOISE MODELLING PROCEDURES AND PREDICTIONS

Noise modelling was conducted in order to determine whether the noise emission levels identified in **Table 4.5.1** or **Table 4.5.2** can be achieved.

Calculations to predict the operational noise emission levels from both site options were conducted using the noise prediction techniques contained within the SoundPLAN suite of programs. A commercial noise predictive software program developed by Braunstein + Berndt, GmbH, Germany. Specifically, the following three algorithms were used:

- a) Noise generated from within the facility was calculated using a procedure developed by the Bavarian Environmental Protection Authority (Germany), specifically designed for determining the noise emissions from vehicular parking facilities. This model predicts the 16 hour daytime and 8 hour night-time L_{Aeq} values from the operation of vehicles on a site, taking into account the total number of parking allotments and the number of vehicle movements per parking allotment per hour.
- b) Noise generated by vehicles on the internal road system was calculated using the FHWA algorithms, and
- c) Noise from intermittent events were determined using the CONCAWE procedure.

Throughout the night, the use of the facility will vary considerably according to the prevailing vehicle content on the Hume Highway. This assessment has modelled a "worst case scenario", by assuming:

- The maximum hourly usage of the facility (as discussed in **Section 2.4**) during the night-time period.
- A prevailing wind of 2 m/s blowing from each facility to all residences simultaneously. This situation can never be realised in practice but simulates an overlay of a multitude of separate scenarios in which the wind is blowing to each of the residences in turn.

In converting the calculated L_{Aeq} value to an L_{A10} parameter, a conversion of +3 dBA would apply during the high usage periods throughout the night-time, whilst a conversion of -5 dBA would apply during the day-time, when demand was low.

6 IMPACT AND RECOMMENDATION

6.1 Result of Calculations

Initial calculations indicated the potential for significant exceedances of the noise objectives at nearby residential dwellings presented in **Table 6.1.1** and **Table 6.1.2**.

Table 6.1.1 Result of Calculations – No Acoustic Treatment - Northside Option

Receiver Location	LA10		LAeq(1hour)		LAmax	
	Calculated Level	Criteria	Calculated Level	Criteria	Calculated Level	Criteria
N1	44 dBA	35 dBA	41 dBA	55 dBA	49 dBA	65 dBA
N2	37 dBA	35 dBA	34 dBA	55 dBA	43 dBA	65 dBA
N3	58 dBA	35 dBA	55 dBA	55 dBA	65 dBA	65 dBA
N4	42 dBA	35 dBA	39 dBA	55 dBA	67 dBA	65 dBA
N5	42 dBA	35 dBA	39 dBA	55 dBA	60 dBA	65 dBA

Table 6.1.2 Result of Calculation - No Acoustic Treatment - Town Centre Option

Receiver Location	LA10		LAeq(1hour)		LAmax	
	Calculated Level	Criteria	Calculated Level	Criteria	Calculated Level	Criteria
C1	64 dBA	38 dBA	60 dBA	52 dBA	72 dBA	65 dBA
C2	55 dBA	38 dBA	52 dBA	52 dBA	62 dBA	65 dBA
C3	63 dBA	38 dBA	60 dBA	52 dBA	72 dBA	65 dBA
C4	60 dBA	38 dBA	57 dBA	52 dBA	70 dBA	65 dBA
C5	59 dBA	38 dBA	56 dBA	52 dBA	66 dBA	65 dBA
C6	47 dBA	38 dBA	44 dBA	52 dBA	63 dBA	65 dBA
C7	63 dBA	38 dBA	60 dBA	52 dBA	73 dBA	65 dBA

In order to reduce the magnitude of the exceedances of the LA10 criteria (as detailed in the above tables), noise mitigation measures would be required, so as to achieve a reduction of up to 2 dBA to 23 dBA for the Northside option and 9 dBA to 26 dBA for the Town centre option.

Typically, the maximum noise reductions required for full compliance could not be readily achieved by the use of barriers due to the required height and significant visual impact.

Section 4.5 discusses the use of an alternative criterion based on not increasing the existing ambient LAeq noise level by more than 2 dBA. Exceedances of the LAeq criteria still occur however,

Noise contours from the sites throughout the night-time period are presented in **Appendices D and E**, for the Northside and Town Centre options respectively.

In order to reduce the extent of any noise impact, a range of noise mitigation treatment options need to be considered.

Acoustic Barriers

Calculations indicate that significant height acoustic barriers would be required to comply with the L_{Aeq} and L_{Amax} based criteria. However, the following guideline treatment options are presented, but are highly dependent upon the final layout of the internal roadway, the grade within the facility, parking patterns, and RL of the hard-stand area.

Appendix F presents the location of the following barrier requirements:

- A 6.5 m acoustic barrier around the northern boundary of the "Town Centre" option.
- A 6.0 m acoustic barrier around the southern and south-eastern sides of the "Town Centre" option, extending to and along the southern side of the access road from the Hume Highway.
- A 3 m acoustic barrier around the southern sides of the "Northside" option

These barriers may be earth mounds, walls, or a combination of the two. For example, a 6 m barrier may comprise a 2.5 m wall placed on top of a 3.5 m mound. Walls greater than 2.5 m in height should have a surface density of at least 12 kg/m^2 . The wall should extend down to (or slightly below) ground level, and be solid and continuous.

Table 6.1.3 and **Table 6.1.4** present the predicted emission levels incorporating the barrier requirements detailed above.

Table 6.1.3 Result of Calculations with Acoustic Barriers - Northside Option

Receiver Location	LA10		LAeq(1hour)		LAmax	
	Calculated Level	Criteria	Calculated Level	Criteria	Calculated Level	Criteria
N1	44 dBA	35 dBA	41 dBA	55 dBA	49 dBA	65 dBA
N2	37 dBA	35 dBA	34 dBA	55 dBA	43 dBA	65 dBA
N3	58 dBA	35 dBA	55 dBA	55 dBA	65 dBA	65 dBA
N4	40 dBA	35 dBA	37 dBA	55 dBA	63 dBA	65 dBA
N5	40 dBA	35 dBA	37 dBA	55 dBA	48 dBA	65 dBA

The requirements of the barrier at dwelling N4 are highly dependent upon the final RL of the hard stand area. The southern section of the facility is on the side of a small hill, if the final design were to cut into this slope to produce a more level base, the need for any barriers for the Northside option may be eliminated.

Table 6.1.4 Result of Calculations with Acoustic Barriers - Town Centre Option

Receiver Location	LA10		LAeq(1hour)		LAmax	
	Calculated Level	Criteria	Calculated Level	Criteria	Calculated Level	Criteria
C1	56 dBA	38 dBA	53 dBA	52 dBA	58 dBA	65 dBA
C2	51 dBA	38 dBA	48 dBA	52 dBA	60 dBA	65 dBA
C3	53 dBA	38 dBA	50 dBA	52 dBA	59 dBA	65 dBA
C4	53 dBA	38 dBA	50 dBA	52 dBA	65 dBA	65 dBA
C5	55 dBA	38 dBA	52 dBA	52 dBA	64 dBA	65 dBA
C6	47 dBA	38 dBA	44 dBA	52 dBA	63 dBA	65 dBA
C7	49 dBA	38 dBA	46 dBA	52 dBA	63 dBA	65 dBA

The barriers required for the Town Centre option have been designed to comply with the LAmax and LAeq criteria. However these barrier requirements will need to be verified during the final design phase, taking into account the surveyed RL levels for the most potentially affected receiver locations.

Change of Point of Access

The entrance road from the Hume Highway to the Town Centre site runs relatively close to several existing dwellings. The LAmax and the LAeq parameters at these close dwellings could be reduced by the relocation of this entrance road, in conjunction with the appropriate design of the internal road.

In the Northside option, there would be some benefit in examining the feasibility in relocating the entrance road further towards the north-northeast along the Hume Highway of its current location.

Noise Control Measures to the Residences

Noise control measures for individual residences could effectively be incorporated into the design of the interchange facility to reduce the reliance on the significant height barriers recommended around the Town Centre site.

Acoustic treatment to the to the various facade elements is feasible. Without a detailed design, such measures would typically include:

- Increase of the glazing thickness (or double glazing) on windows
- The provision of a system to supply air into the habitable rooms (not air conditioning)
- The upgrading of perimeter doors
- The sealing of eaves

- The incorporation of acoustical insulation and "wavebar" or other similar material in the roof space, etc.

Should any of the houses in question be constructed from weatherboard, the inherent poor Transmission Loss of the facade may preclude the reliance of a noise control programme to be based on the upgrading of such properties, depending upon their exposure to the facility. In such cases, the construction of a new dwelling may also be considered.

However, the combination of reduced barrier heights and some noise control measures to the residence would be a technically feasible solution

6.2 Benefits to Other Residents

There is a high truck content in the traffic along the Hume Highway with over 80% heavy vehicle during periods of the night-time.

At present, Tarcutta (located halfway between Sydney and Melbourne) is recognised as a convenient and common rest place for drivers.

Without any existing rest facility, drivers pull over along the Hume Highway and/or residential streets within the township.

At some locations, drivers were observed conducting maintenance on their vehicles, only metres from residences. During such times, maximum noise levels in the order of 90 dBA (or more) would result. Such levels would be expected to result in high levels of annoyance and/or sleep disturbance to the occupants.

The creation of a central changeover facility would remove the existing scatter of individual truck noise related events within the town and relocate them in one area, within which suitable noise control measures could be incorporated to minimise any acoustical impact. Significant noise reduction would be experienced at the residences along the Hume Highway (between Centenary Street and Toonga Street) from the creation of a central facility (located either at the proposed Town centre, or Northside site option).

6.3 Changes in the Noise Levels throughout the Week

Figure 2.3.2 presents the average daily truck distribution along the Hume Highway. The mid-week truck usage of the highway is typically 5 times higher than it is over the weekend period. The use of the interchange facility would be expected to follow a similar trend to the prevailing heavy vehicle content on the highway. This assessment is based on site demand data, supplied by the RTA, which predicts that less than 80 heavy vehicles would be expected to use either site at any time. This would apply during the peak-time (midweek) conditions however, during the low demand week-end night-time periods, use of the site would reduce to approximately 20% to 60% of the highest mid-week capacity (based on the data detailed in Figure 2.3.2).

Correspondingly, for the Town Centre Northside option, the night-time L_{Aeq} levels attributable to internal vehicle movements would decrease by between 2 dBA to 7 dBA (during days of relatively lower demand), whilst the L_{Amax} is independent of vehicle numbers and thus generally unaffected by site usage.

6.4 Internal Layout of the Facility

Careful planning should be incorporated into the design of the layout of the facility in order to minimise noise emissions. For example, refrigerated trucks should be not allowed to park in close proximity to residential areas without appropriate consideration of the radiation pattern of the on-board compressors. Other truck drivers may also appreciate this isolation from the refrigerated trucks during their rest periods.

External plant items associated with any convenience store, (compressors, fans etc) may also require acoustic treatment once final selections have been made. This would particularly apply if the plant were roof-mounted.

7 CONCLUSION

The feasibility of constructing a truck interchange facility either within the township of Tarcutta (Town Centre) or alternatively, just north of the township (Northside) is the subject of an EIS. This report presents the predicted noise levels and discussion on the extent of the acoustical impacts associated with the two potential sites.

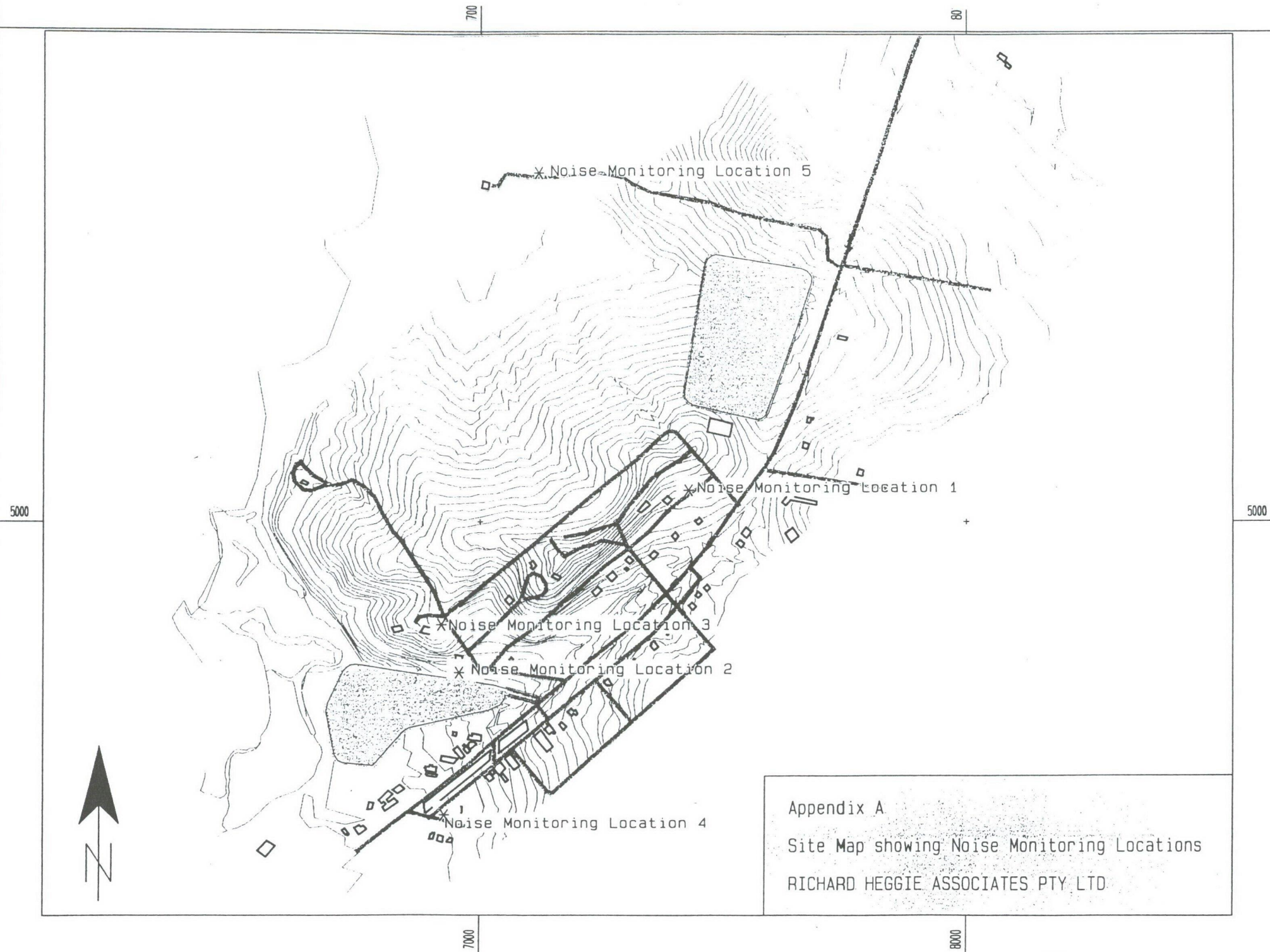
The need for the construction of a facility has resulted from safety factors associated with trucks that currently park along the main road and/or in residential streets for short rests. On occasions, trucks are left idling, maintenance or interchanges are being performed in close proximity to some residential dwellings. The project offers the opportunity to relocate all these noise events occurring throughout the town to one confined area, and to implement the appropriate noise control measures to minimise any acoustical impact.

Various criteria have been discussed for use on the project. The night-time LA_{10} criteria is not considered appropriate since the criteria is nominally 20 dBA below the existing ambient LA_{10} levels, and the LA_{10} descriptor may not be influenced by short-term events. An L_{Aeq} based criteria was adopted, to a level that should not result in any significant increase in the overall night-time noise environment.

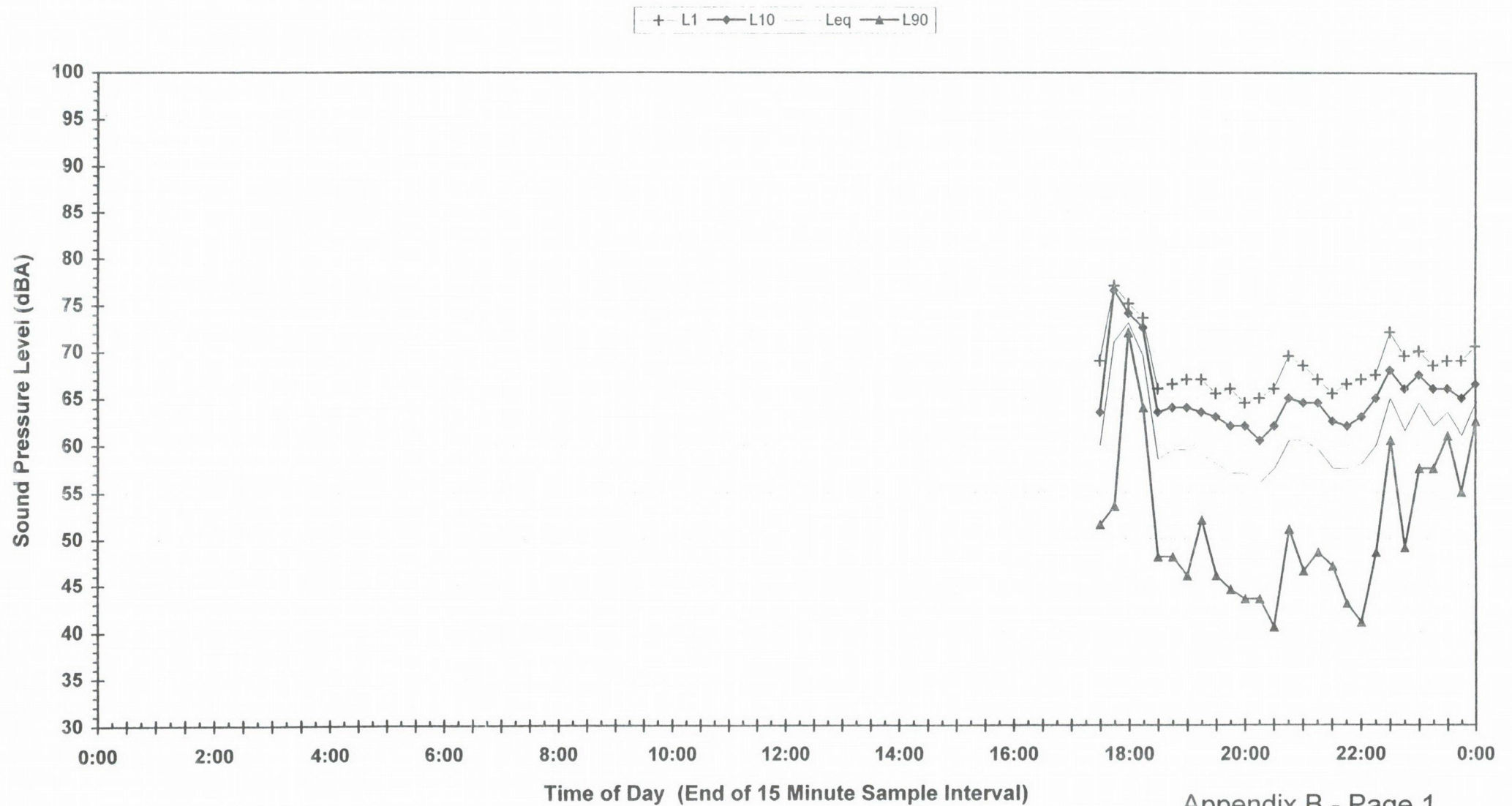
A range of noise control measures is discussed within the report for each site and must be considered in the light of the costs associated with relocation or purchase of the affected properties.

The facility will be used by drivers for a variety of reasons including: eating, trailer interchange operations, toilet facilities, resting etc. In the detailed design phase of the facility, consideration should be given to the internal layout to separate out the resting areas from the interchange area. In order not to inhibit the rest period of drivers, a separate area for refrigerated trucks should also be considered.

The recommended nominal barrier heights are highly dependent upon the RL levels of both the hard stand area and the residences. Once a detailed proposal has been prepared, the accompanying acoustic report should re-examine the barrier requirements, based on surveyed heights of the most potentially affected residences.



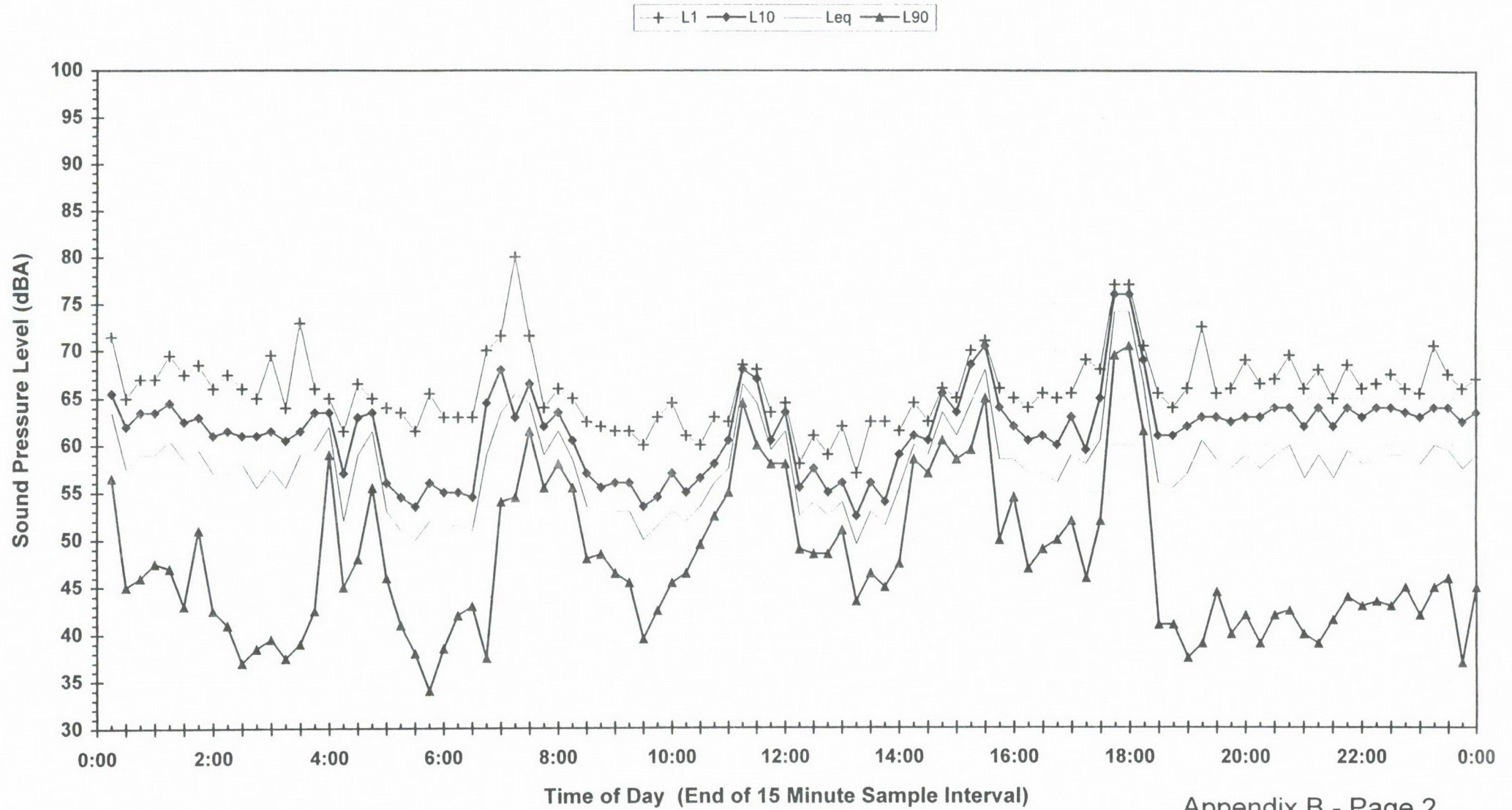
Statistical Ambient Noise Levels - Tarcutta Truck Stop Location 1, Near Northern Option - Monday 20 April 1998



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Statistical Noise Levels
Report 8049

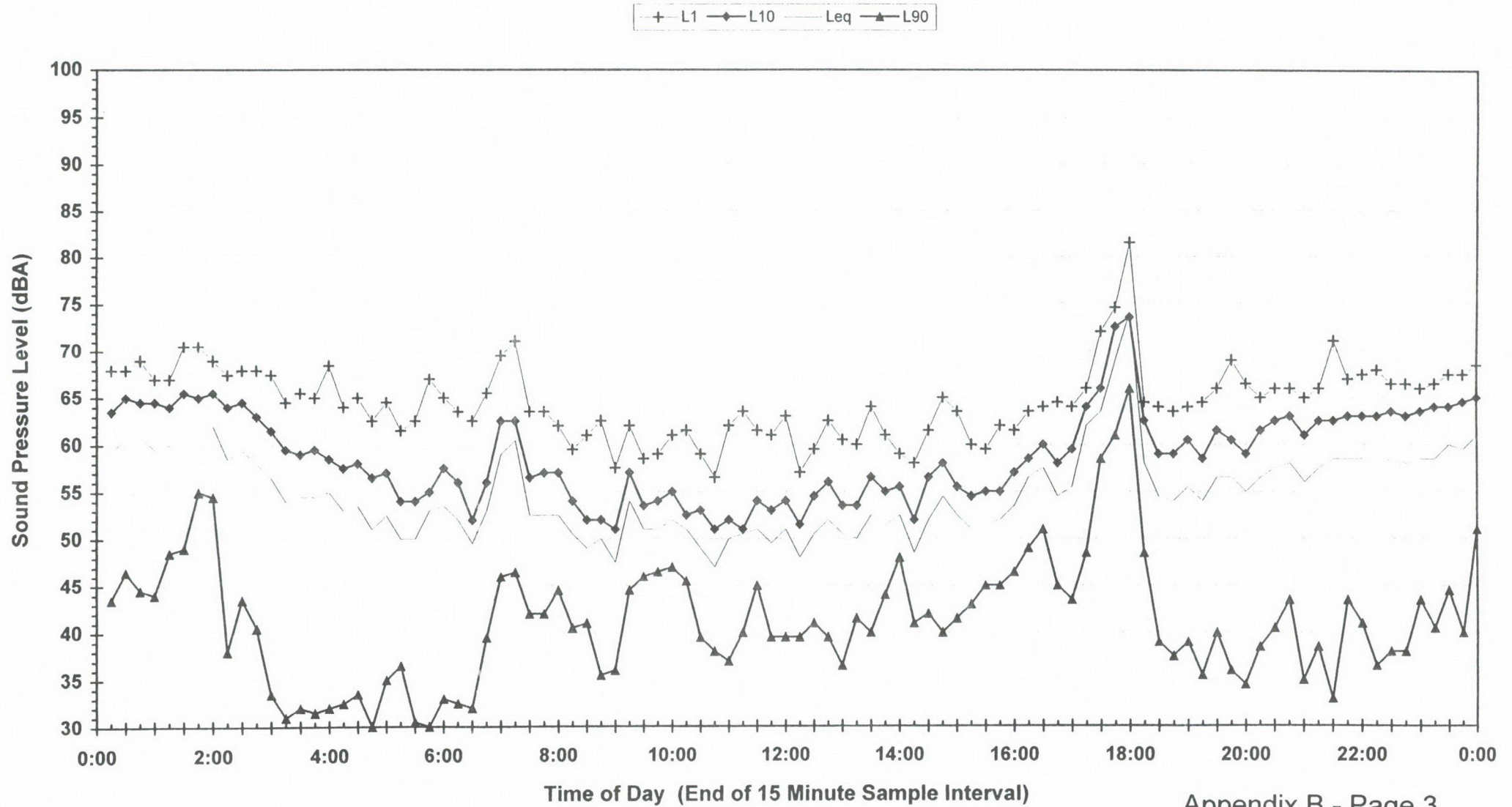
Statistical Ambient Noise Levels - Tarcutta Truck Stop
Location 1, Near Northern Option - Tuesday 21 April 1998



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Statistical Noise Levels
Report 8049

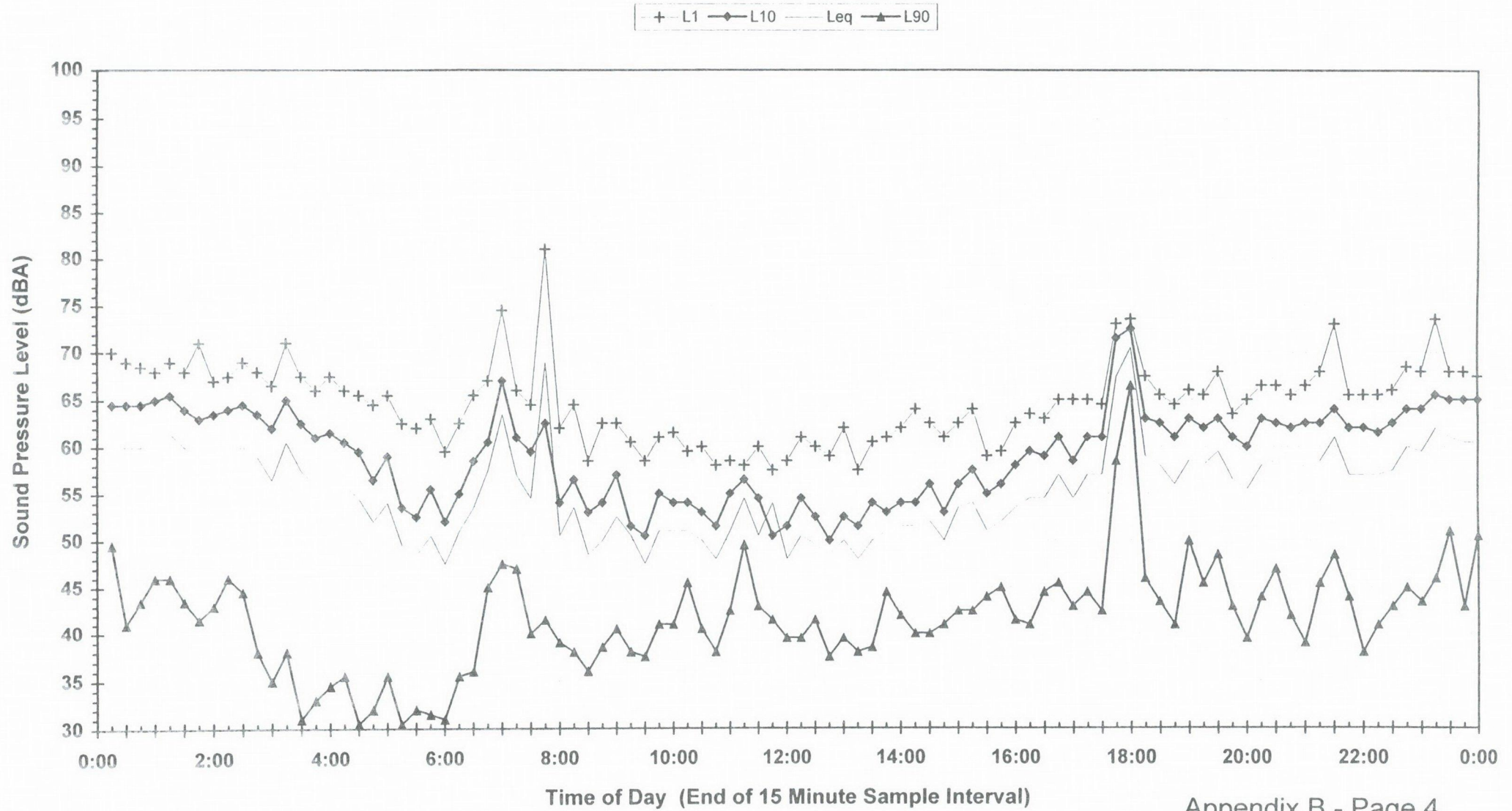
Statistical Ambient Noise Levels - Tarcutta Truck Stop
Location 1, Near Northern Option - Wednesday 22 April 1998



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Statistical Noise Levels
 Report 8049

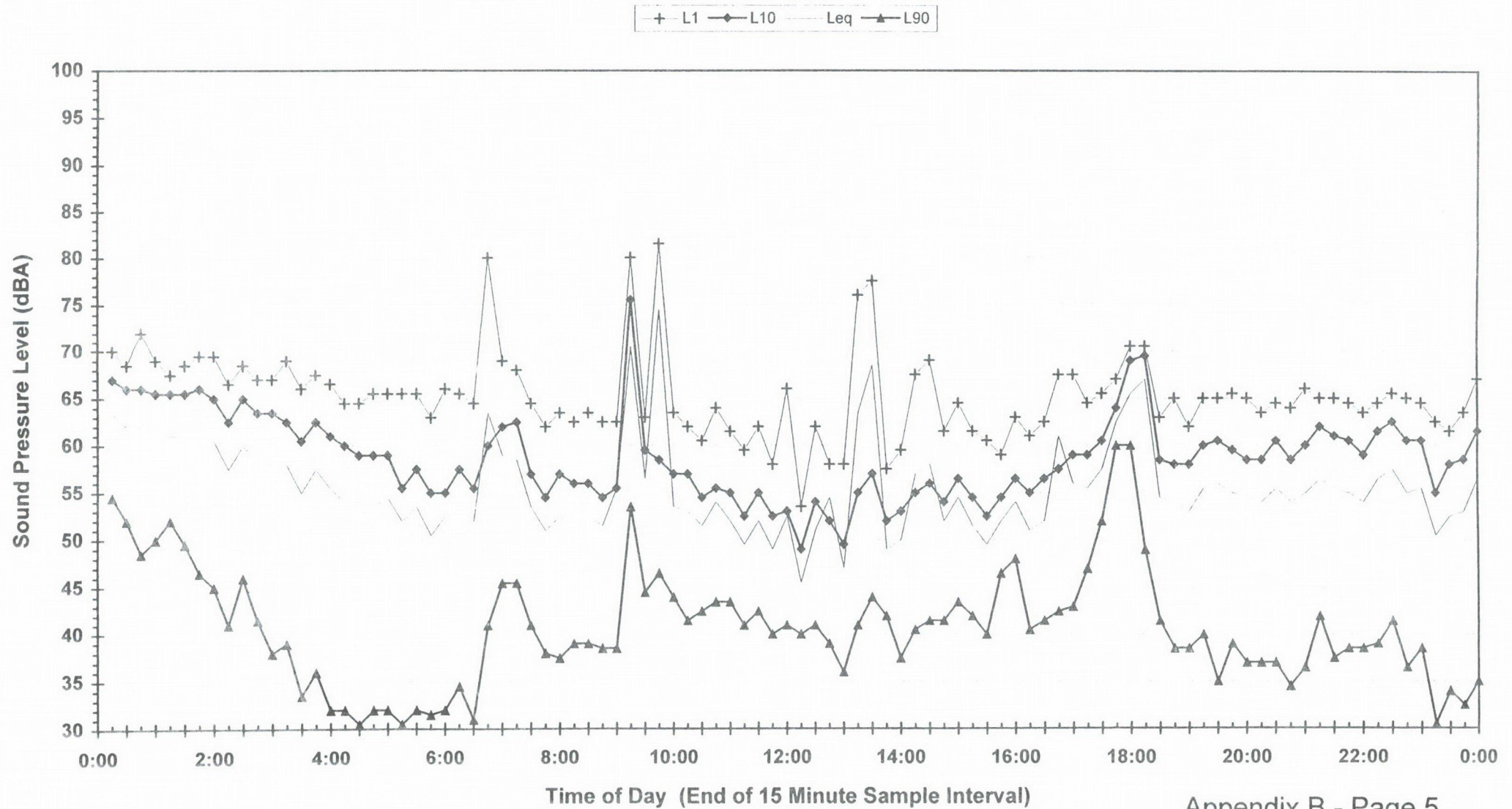
Statistical Ambient Noise Levels - Tarcutta Truck Stop
Location 1, Near Northern Option - Thursday 23 April 1998



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Statistical Noise Levels
 Report 8049

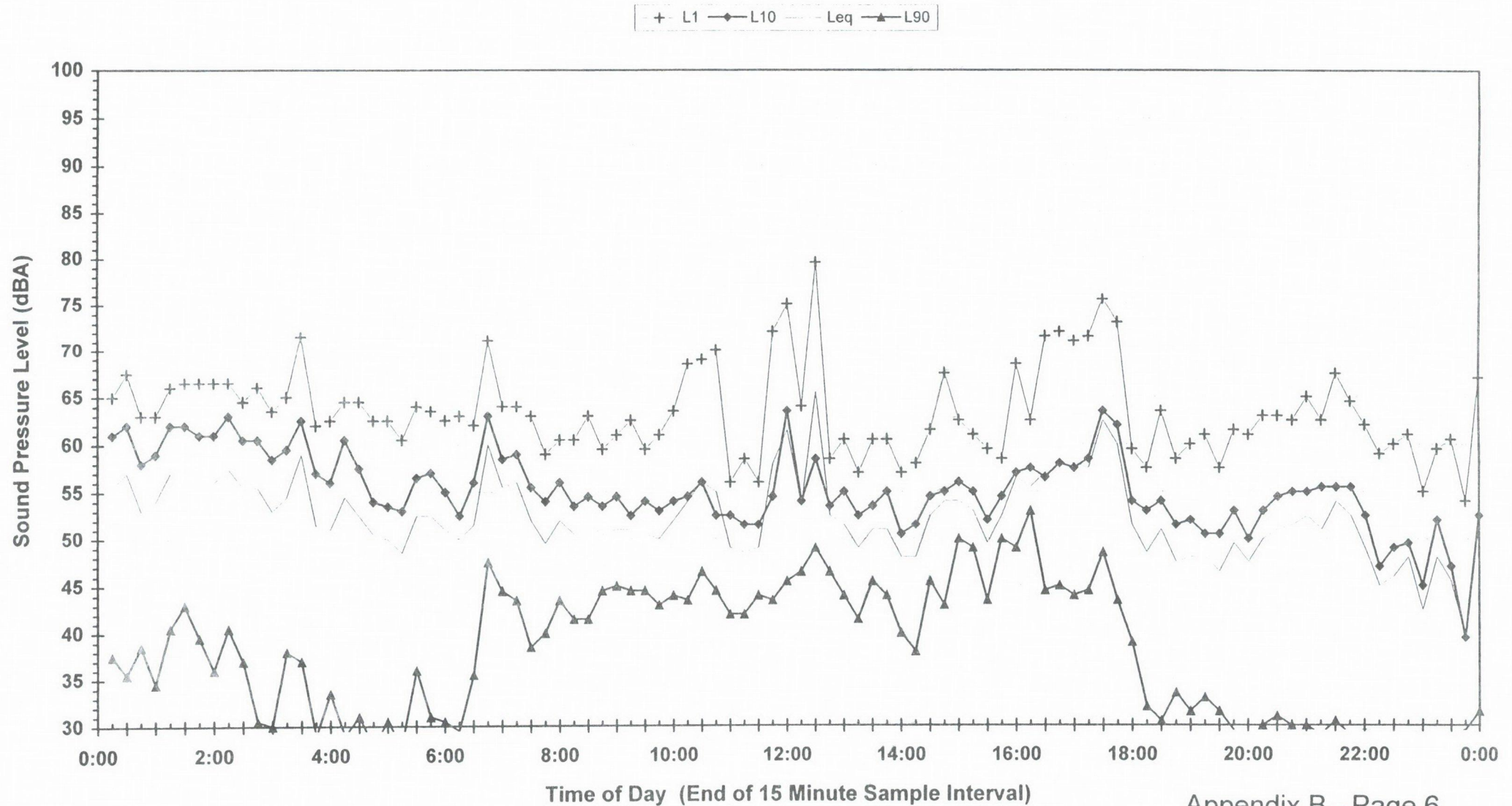
Statistical Ambient Noise Levels - Tarcutta Truck Stop
Location 1, Near Northern Option - Friday 24 April 1998



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Statistical Noise Levels
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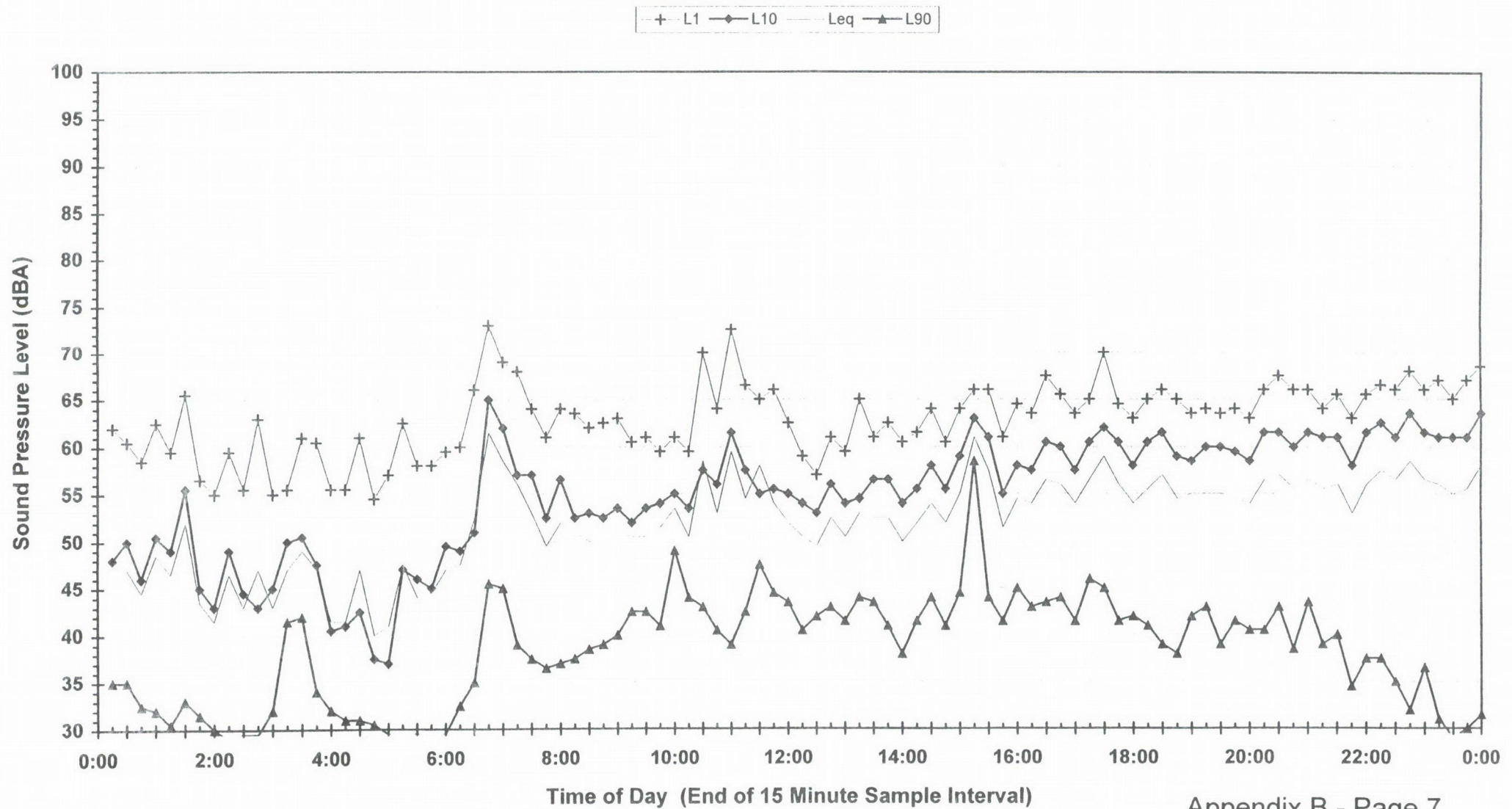
Statistical Ambient Noise Levels - Tarcutta Truck Stop
Location 1, Near Northern Option - Saturday 25 April 1998



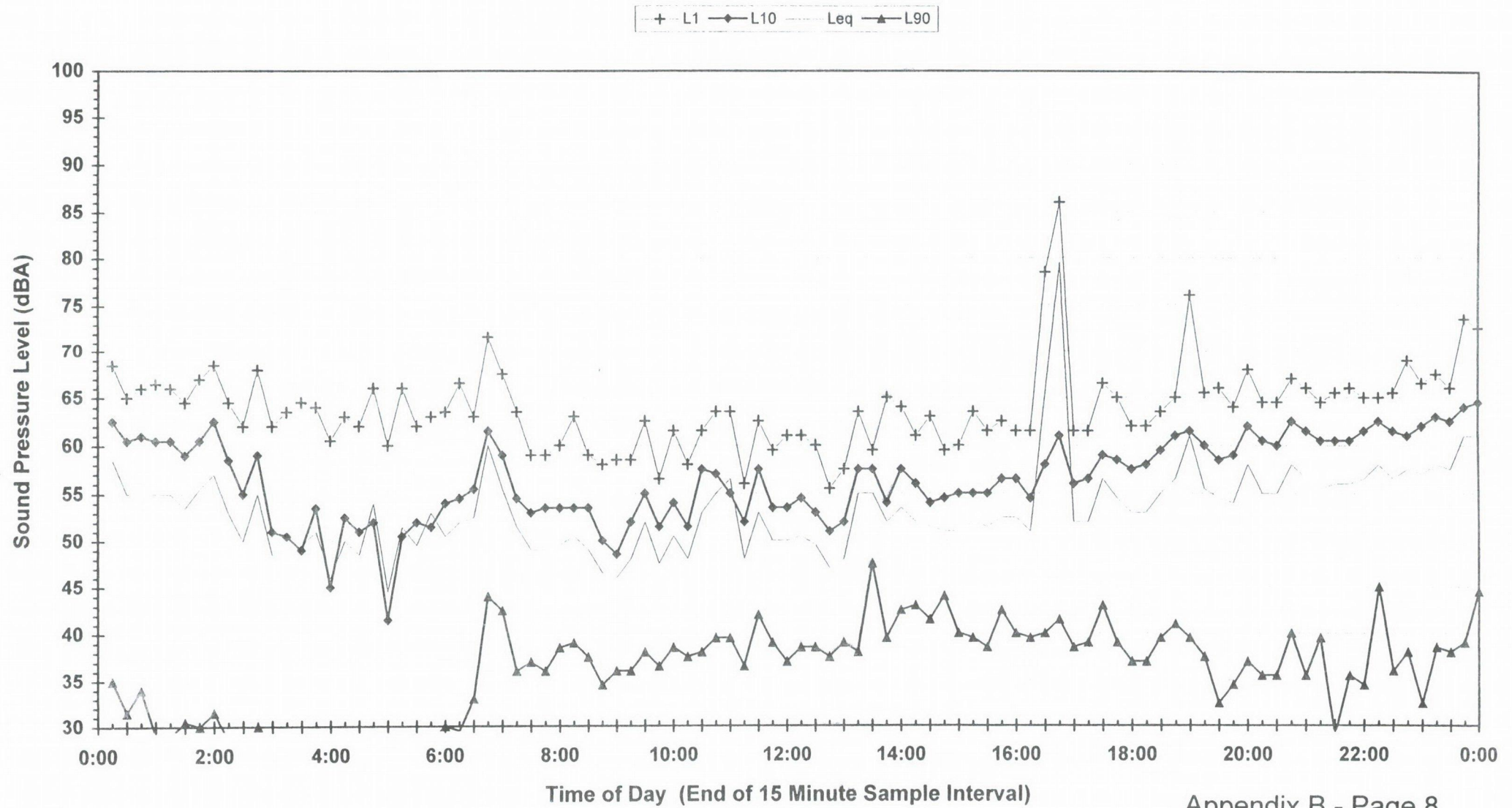
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Report 8049

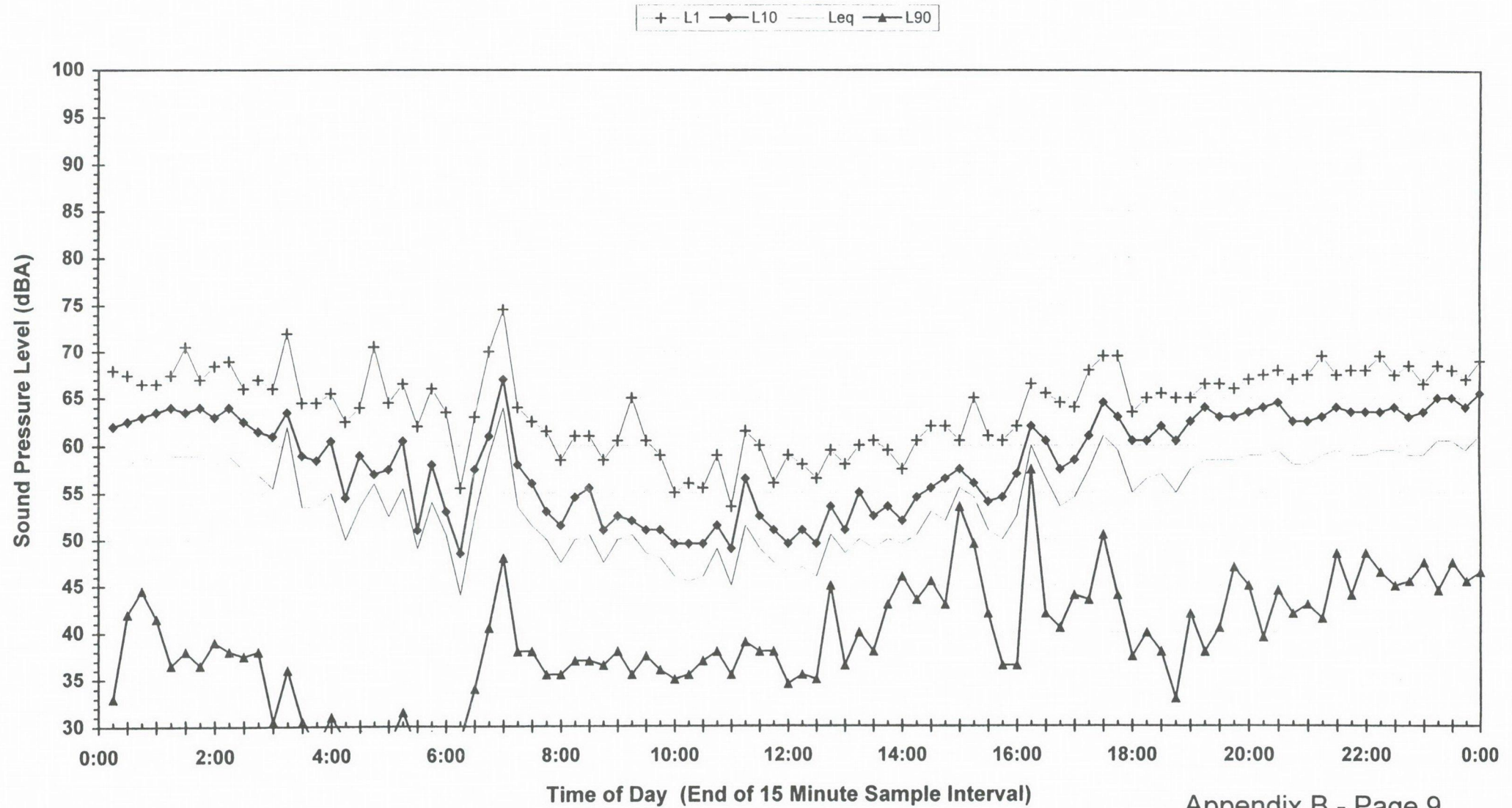
Statistical Ambient Noise Levels - Tarcutta Truck Stop
Location 1, Near Northern Option - Sunday 26 April 1998



**Statistical Ambient Noise Levels - Tarcutta Truck Stop
Location 1, Near Northern Option - Monday 27 April 1998**



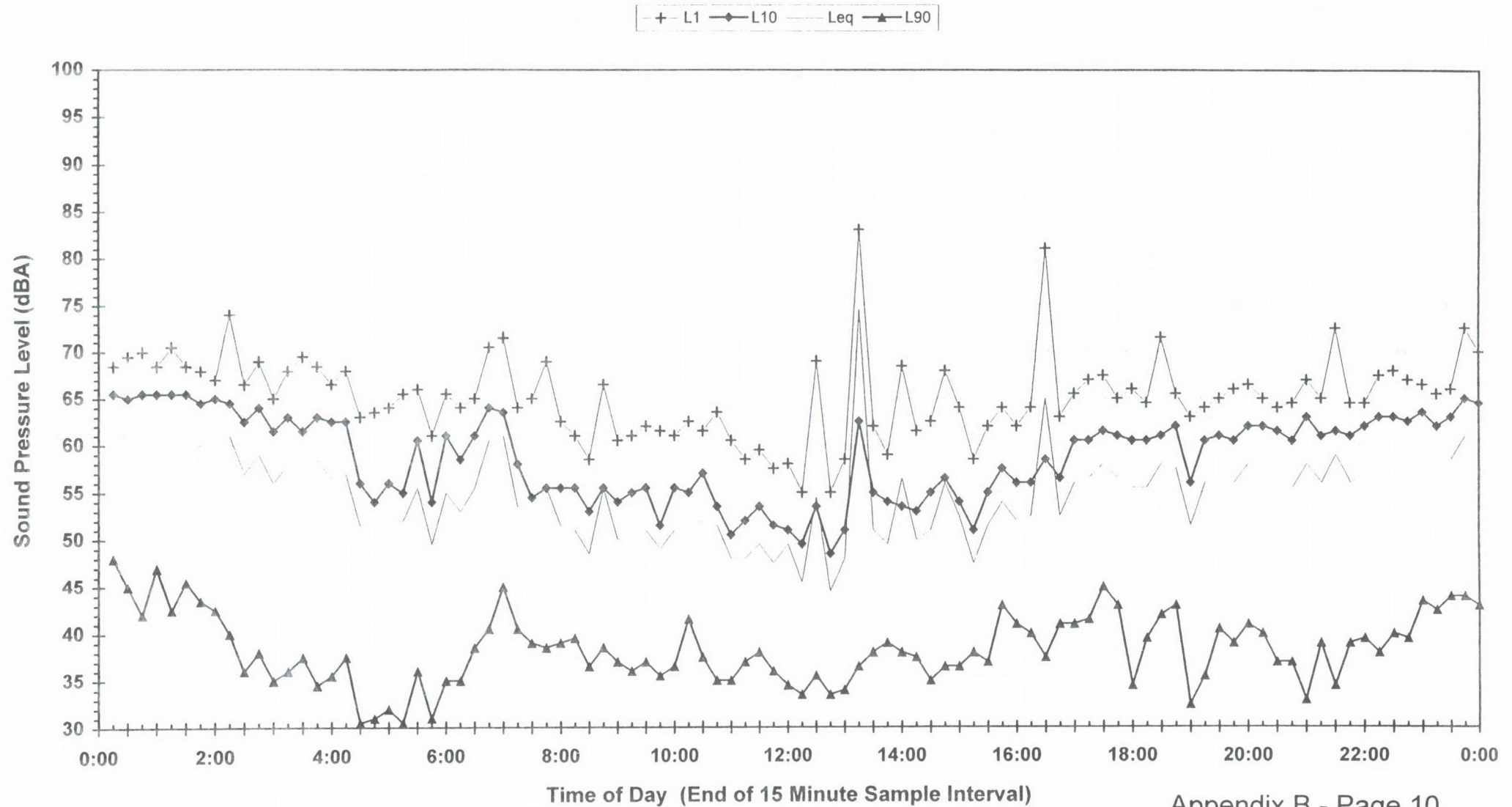
**Statistical Ambient Noise Levels - Tarcutta Truck Stop
Location 1, Near Northern Option - Tuesday 28 April 1998**



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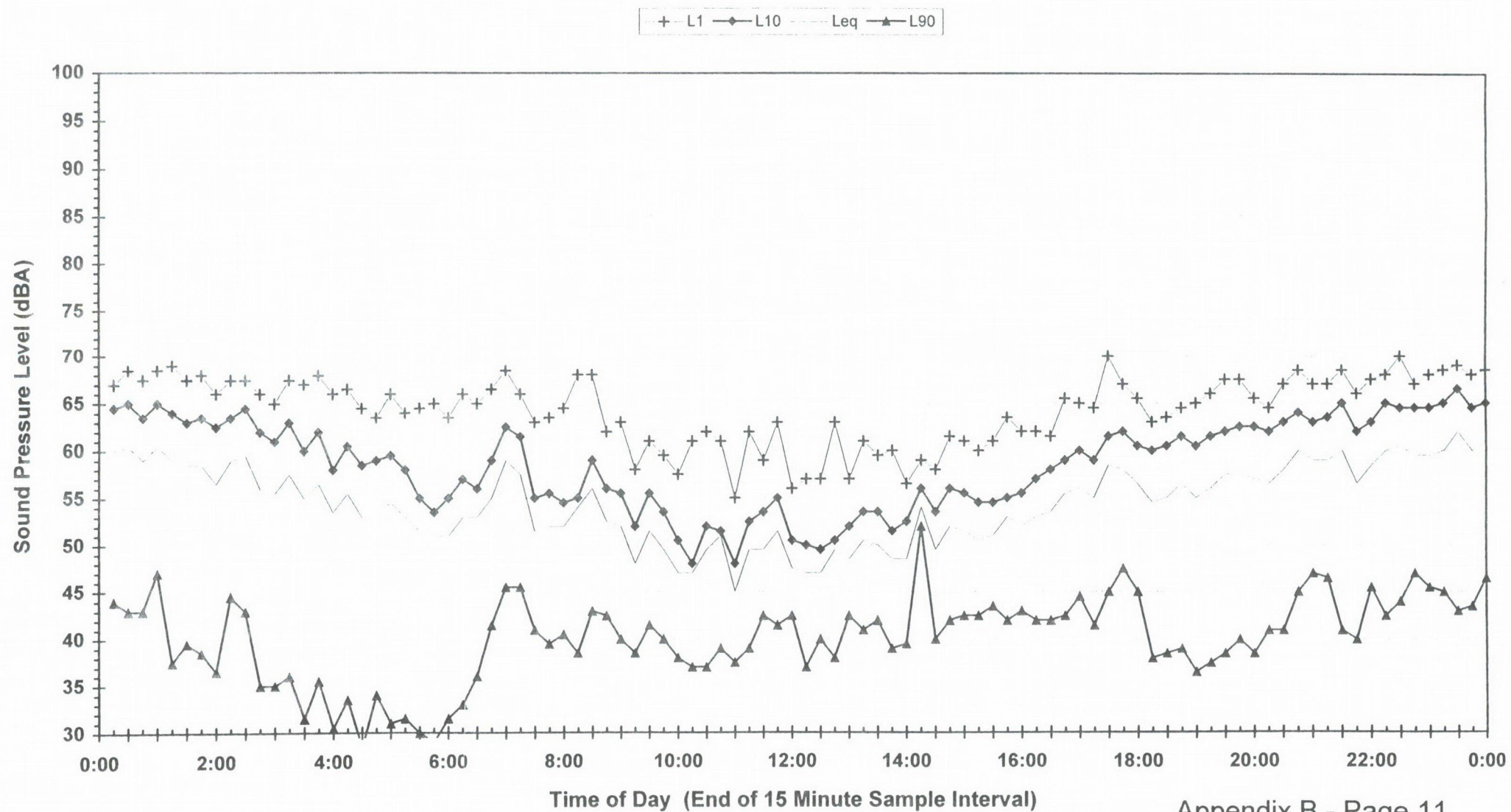
Statistical Ambient Noise Levels - Tarcutta Truck Stop
Location 1, Near Northern Option - Wednesday 29 April 1998



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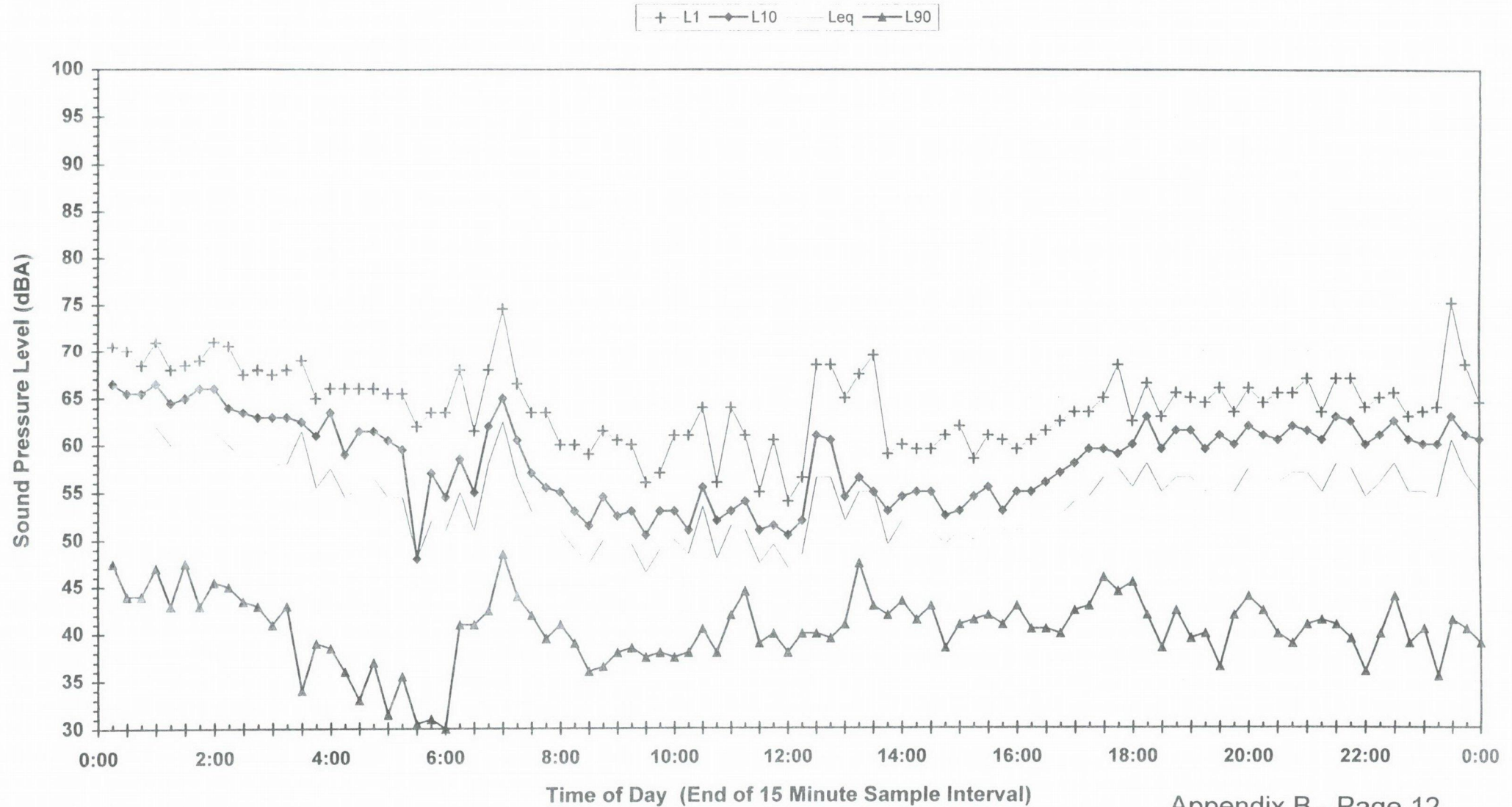
Statistical Ambient Noise Levels - Tarcutta Truck Stop
Location 1, Near Northern Option - Thursday 30 April 1998



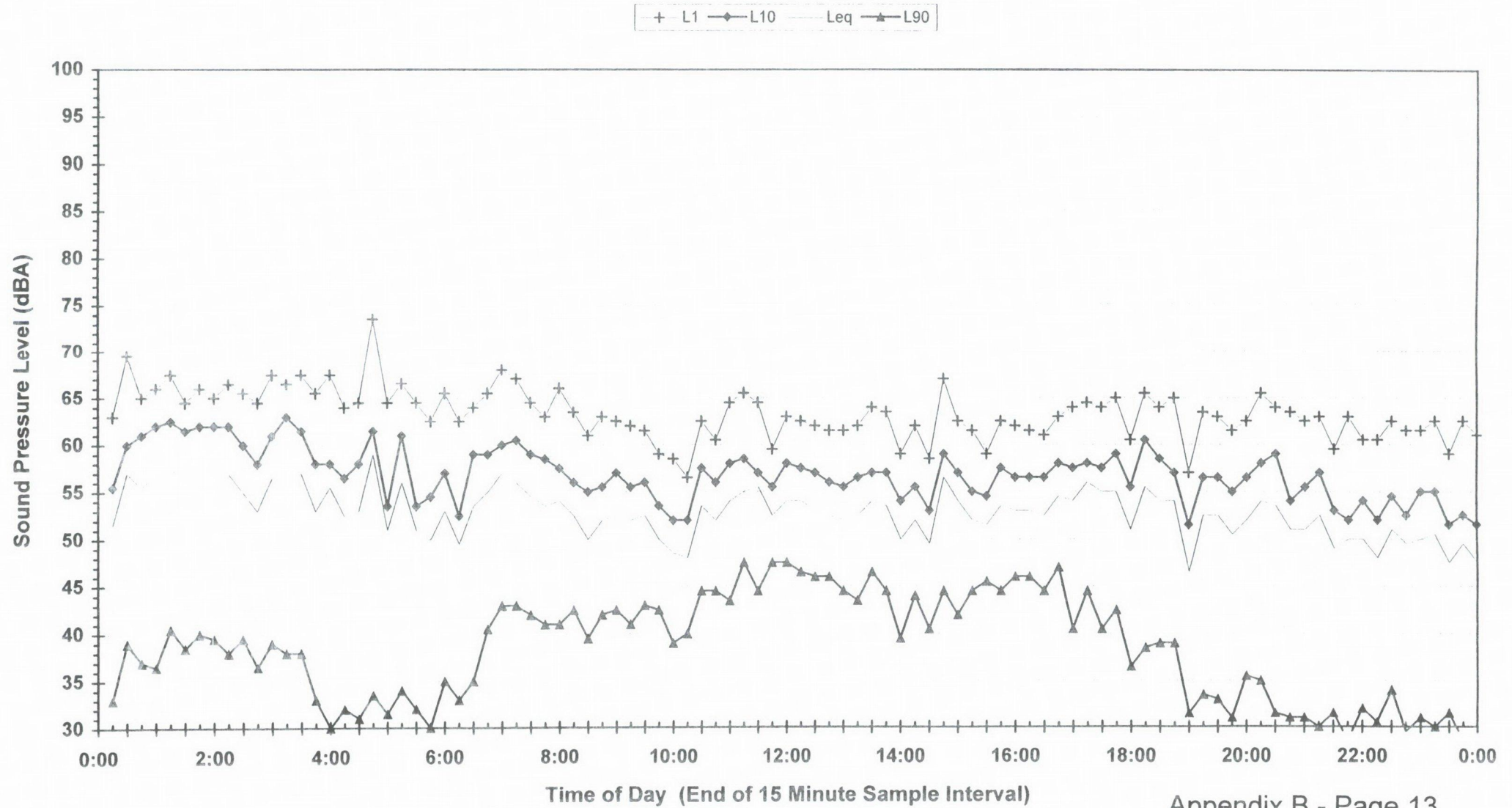
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Statistical Ambient Noise Levels - Tarcutta Truck Stop
Location 1, Near Northern Option - Friday 1 May 1998



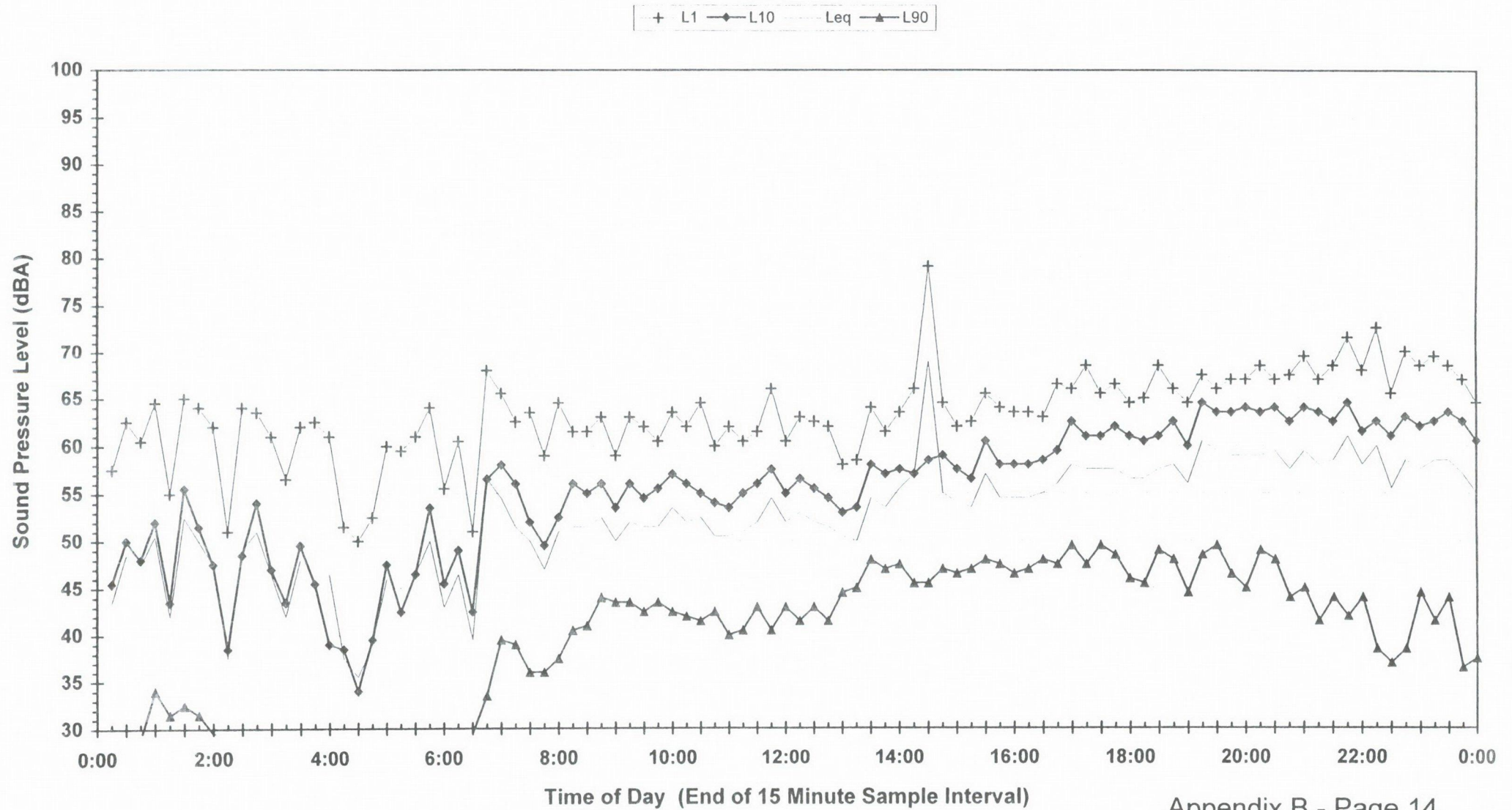
Statistical Ambient Noise Levels - Tarcutta Truck Stop
Location 1, Near Northern Option - Saturday 2 May 1998



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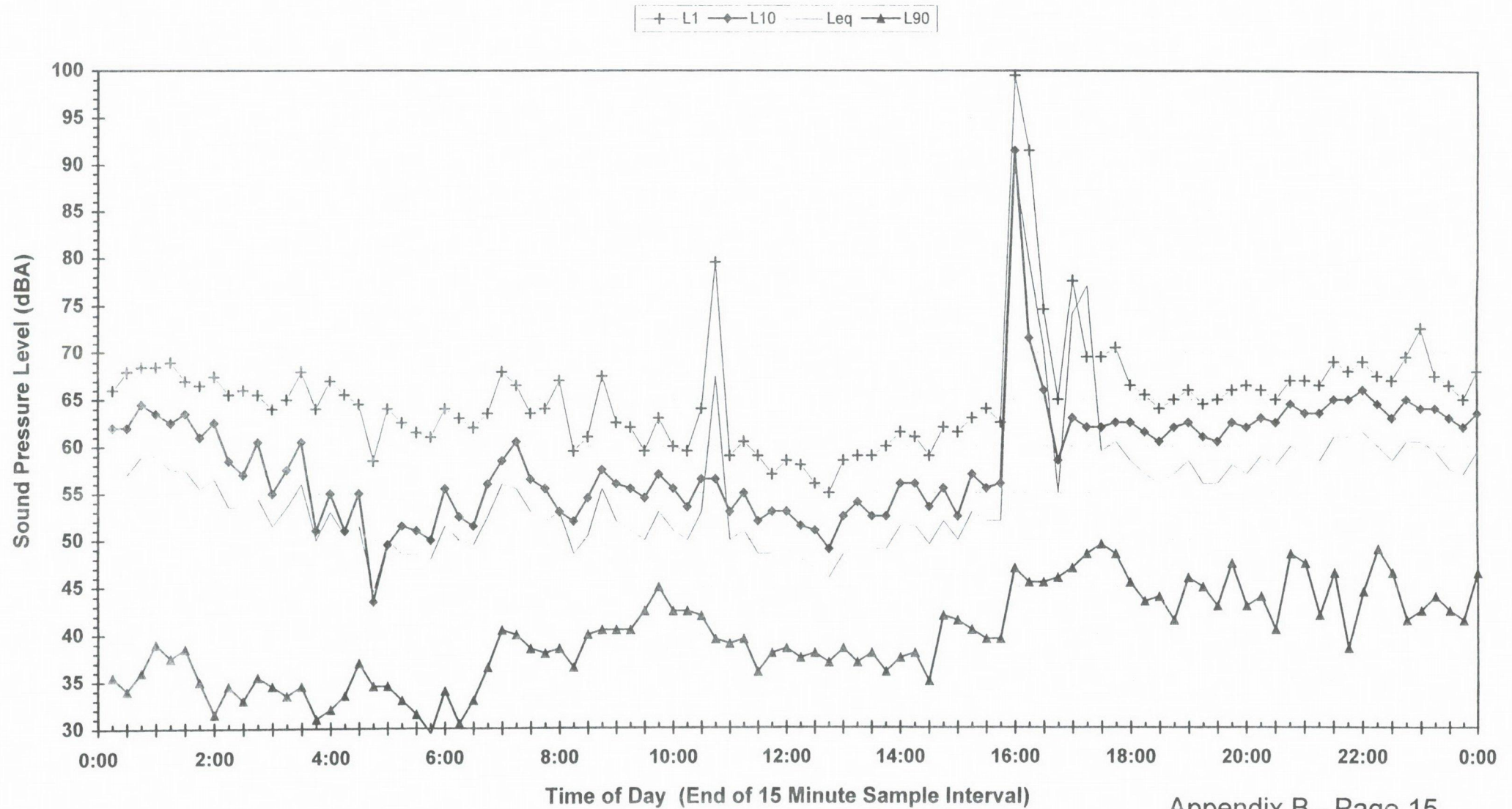
Statistical Ambient Noise Levels - Tarcutta Truck Stop
Location 1, Near Northern Option - Sunday 3 May 1998



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Statistical Noise Levels
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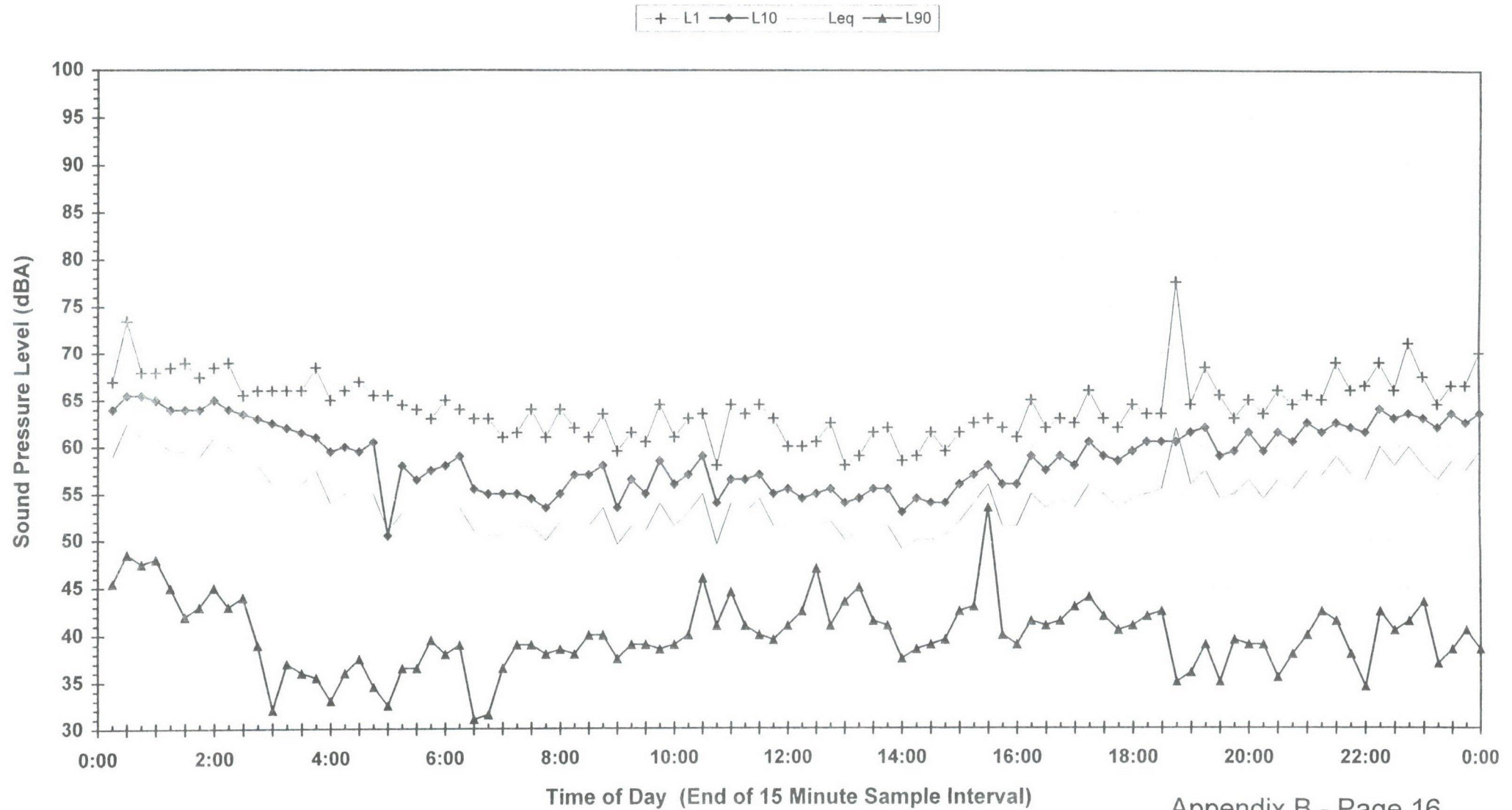
**Statistical Ambient Noise Levels - Tarcutta Truck Stop
Location 1, Near Northern Option - Monday 4 May 1998**



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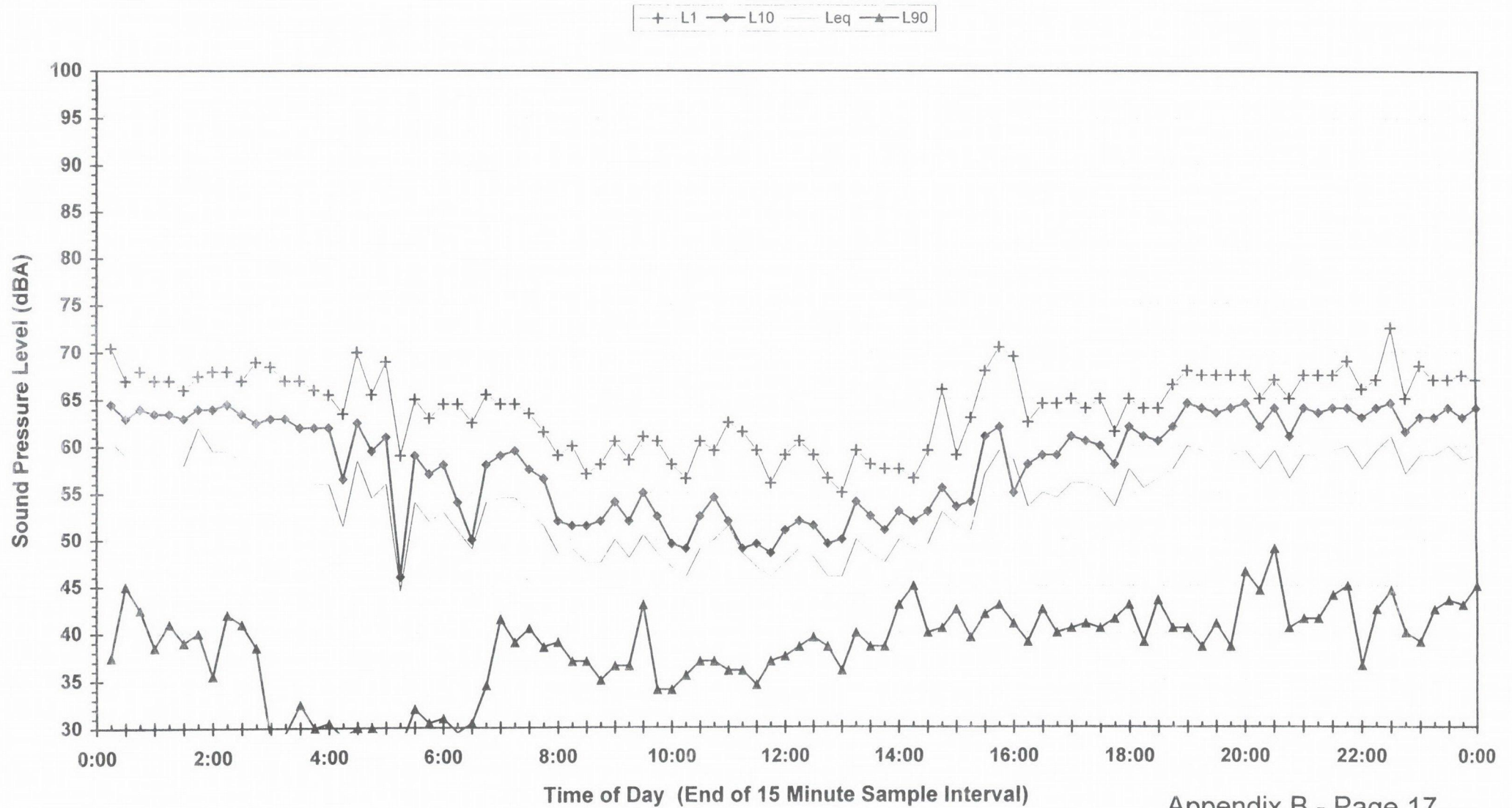
Statistical Ambient Noise Levels - Tarcutta Truck Stop
Location 1, Near Northern Option - Tuesday 5 May 1998



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Statistical Noise Levels
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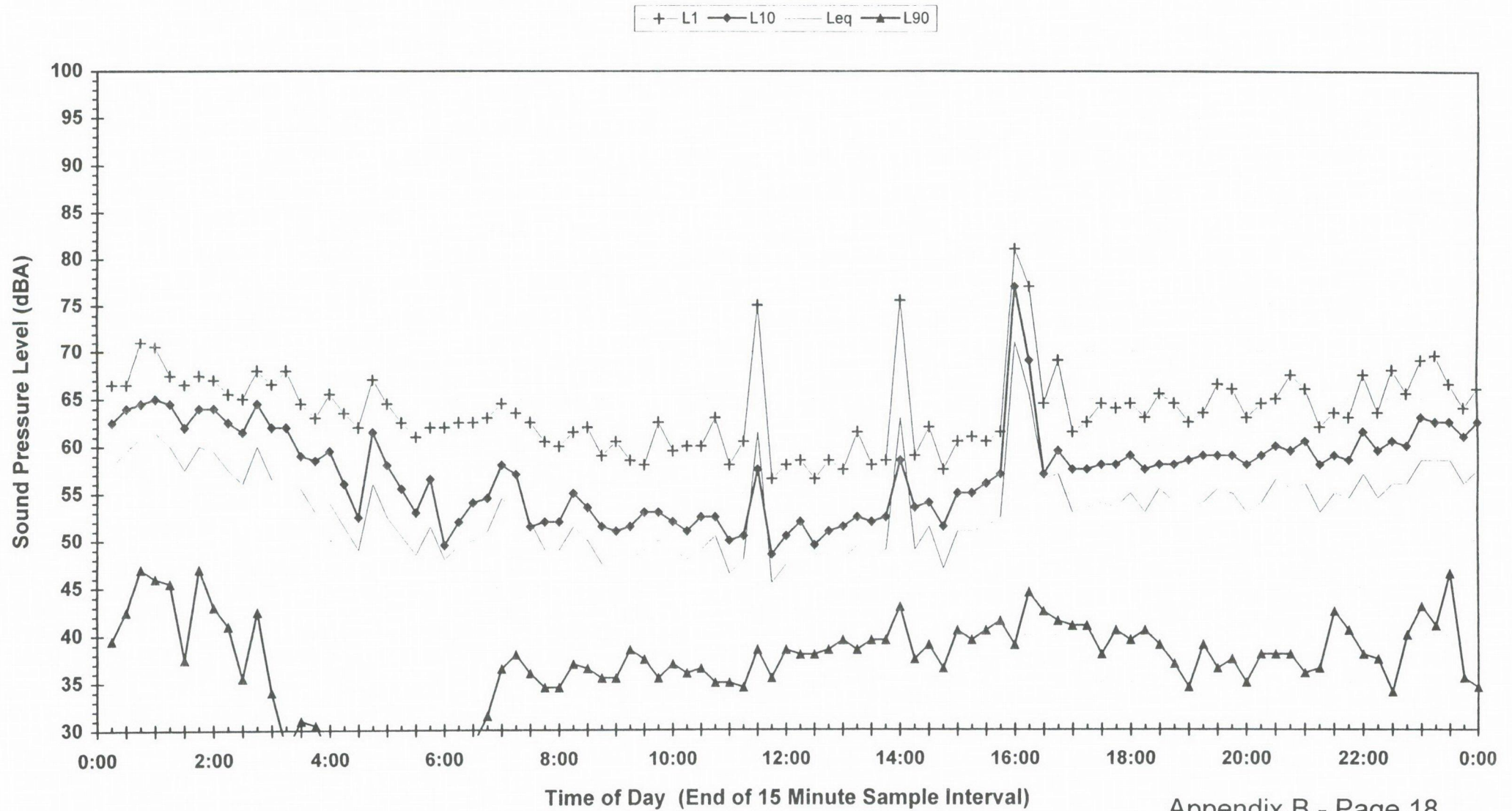
Statistical Ambient Noise Levels - Tarcutta Truck Stop
Location 1, Near Northern Option - Wednesday 6 May 1998



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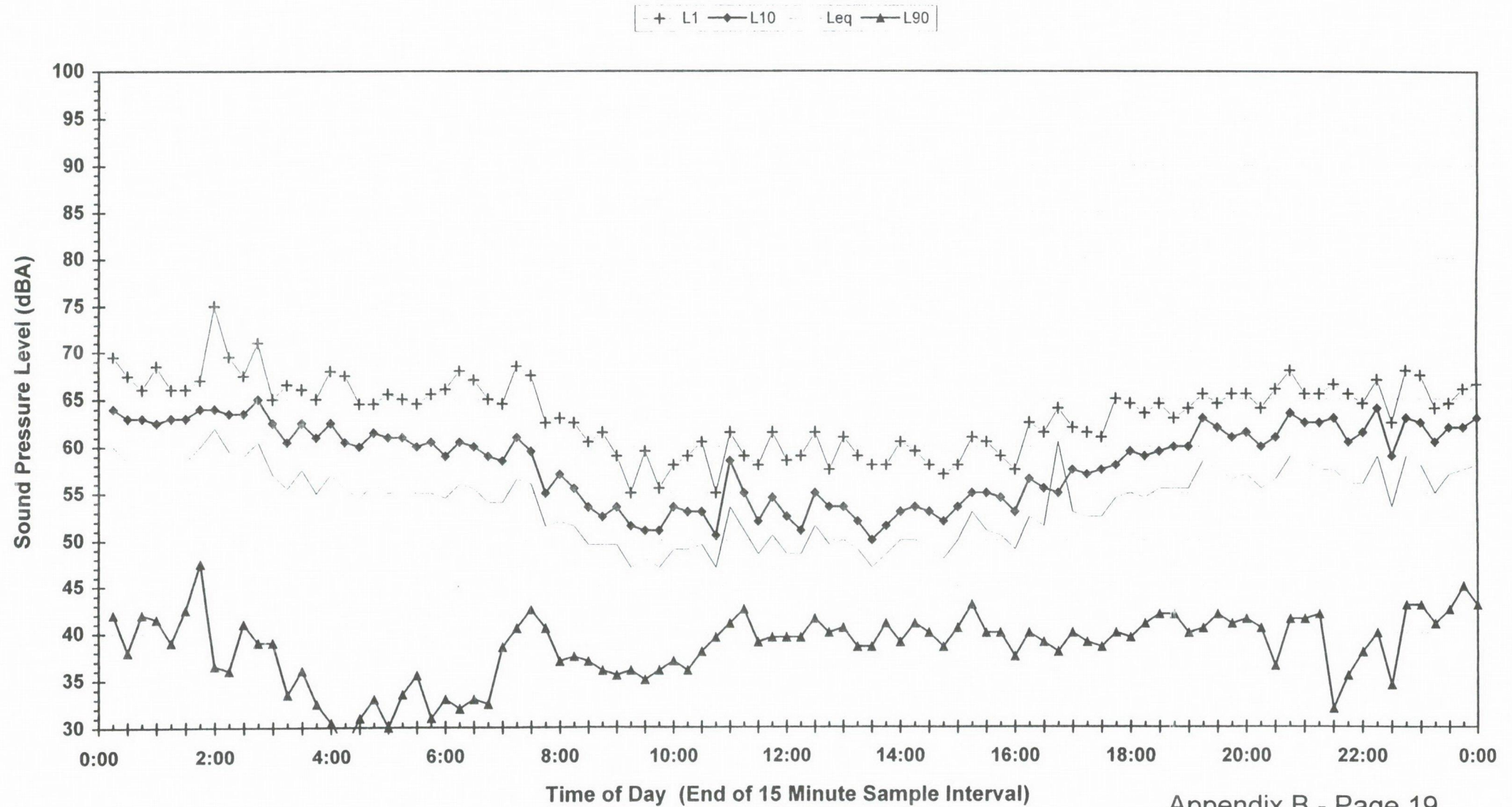
**Statistical Ambient Noise Levels - Tarcutta Truck Stop
Location 1, Near Northern Option - Thursday 7 May 1998**



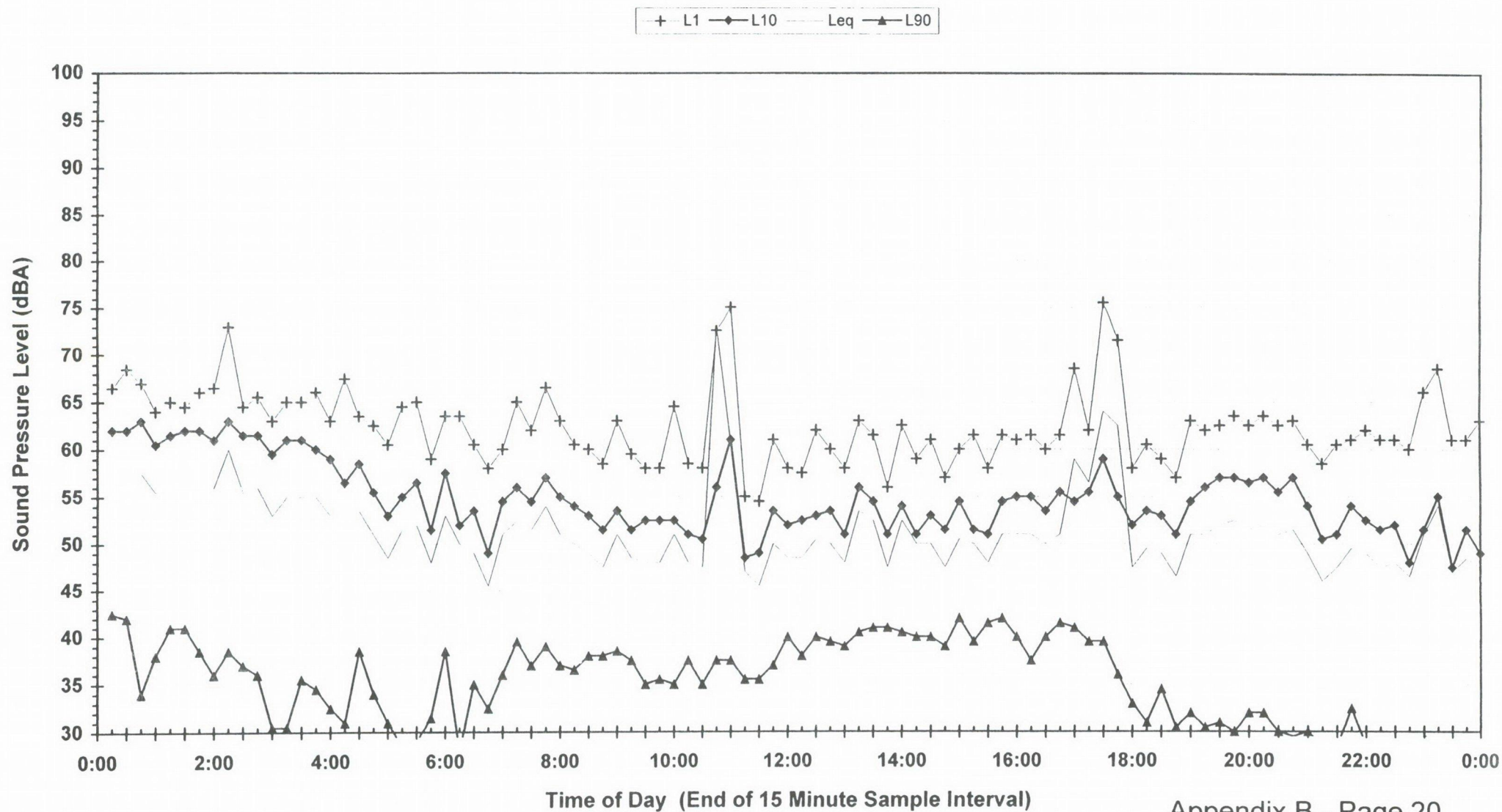
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Statistical Ambient Noise Levels - Tarcutta Truck Stop
Location 1, Near Northern Option - Friday 8 May 1998



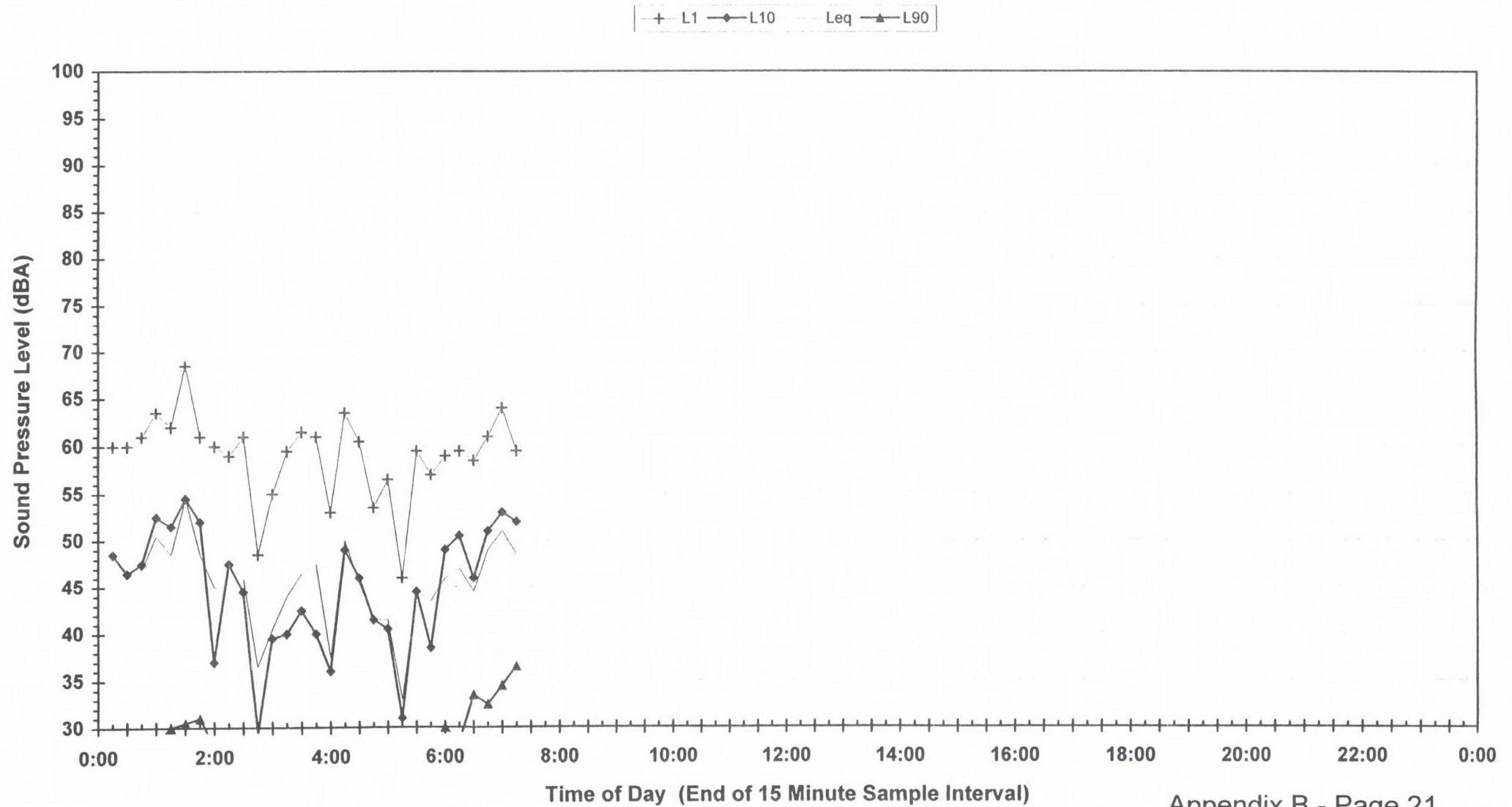
**Statistical Ambient Noise Levels - Tarcutta Truck Stop
Location 1, Near Northern Option - Saturday 9 May 1998**



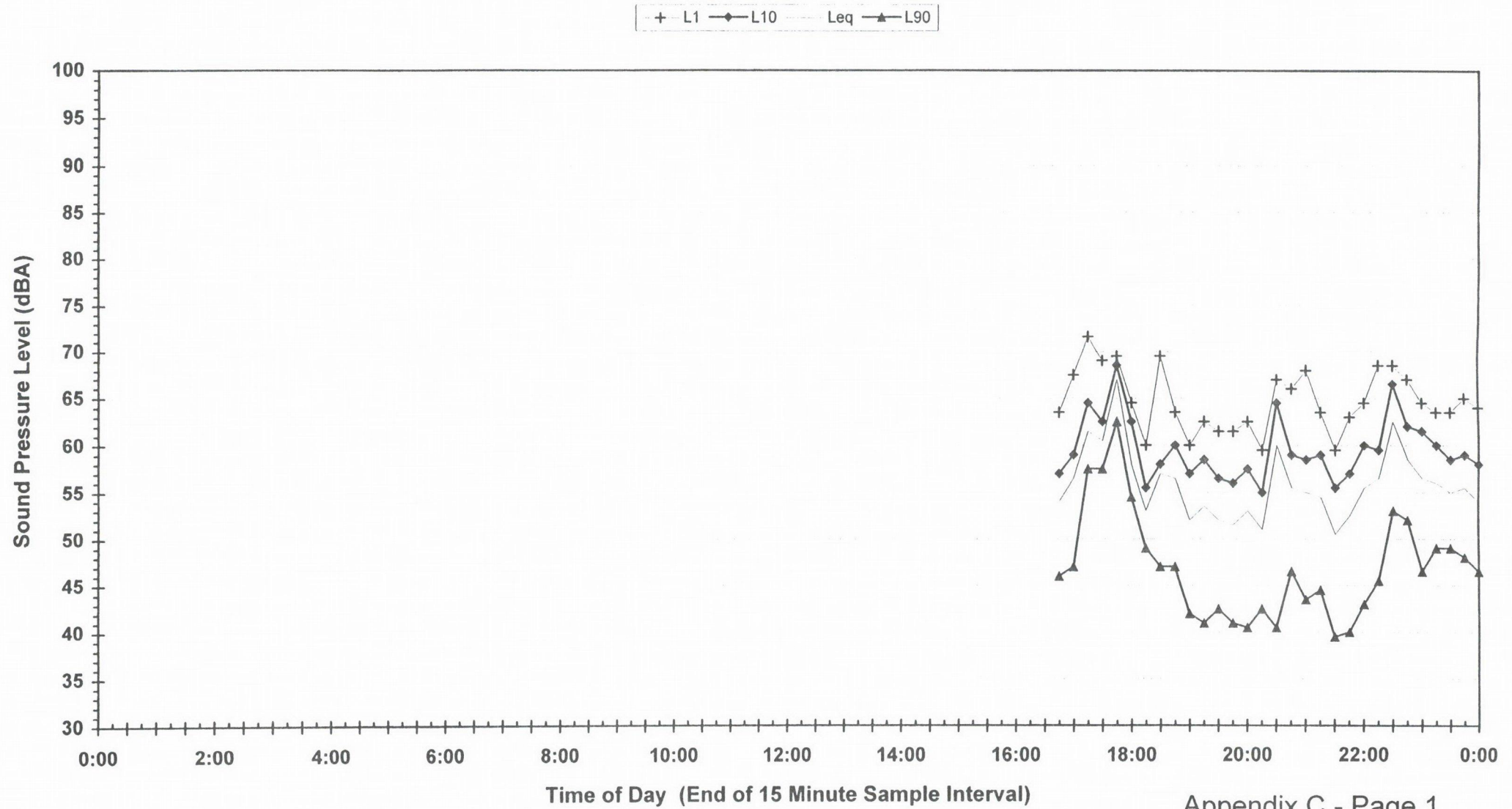
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Statistical Ambient Noise Levels - Tarcutta Truck Stop
Location 1, Near Northern Option - Sunday 10 May 1998



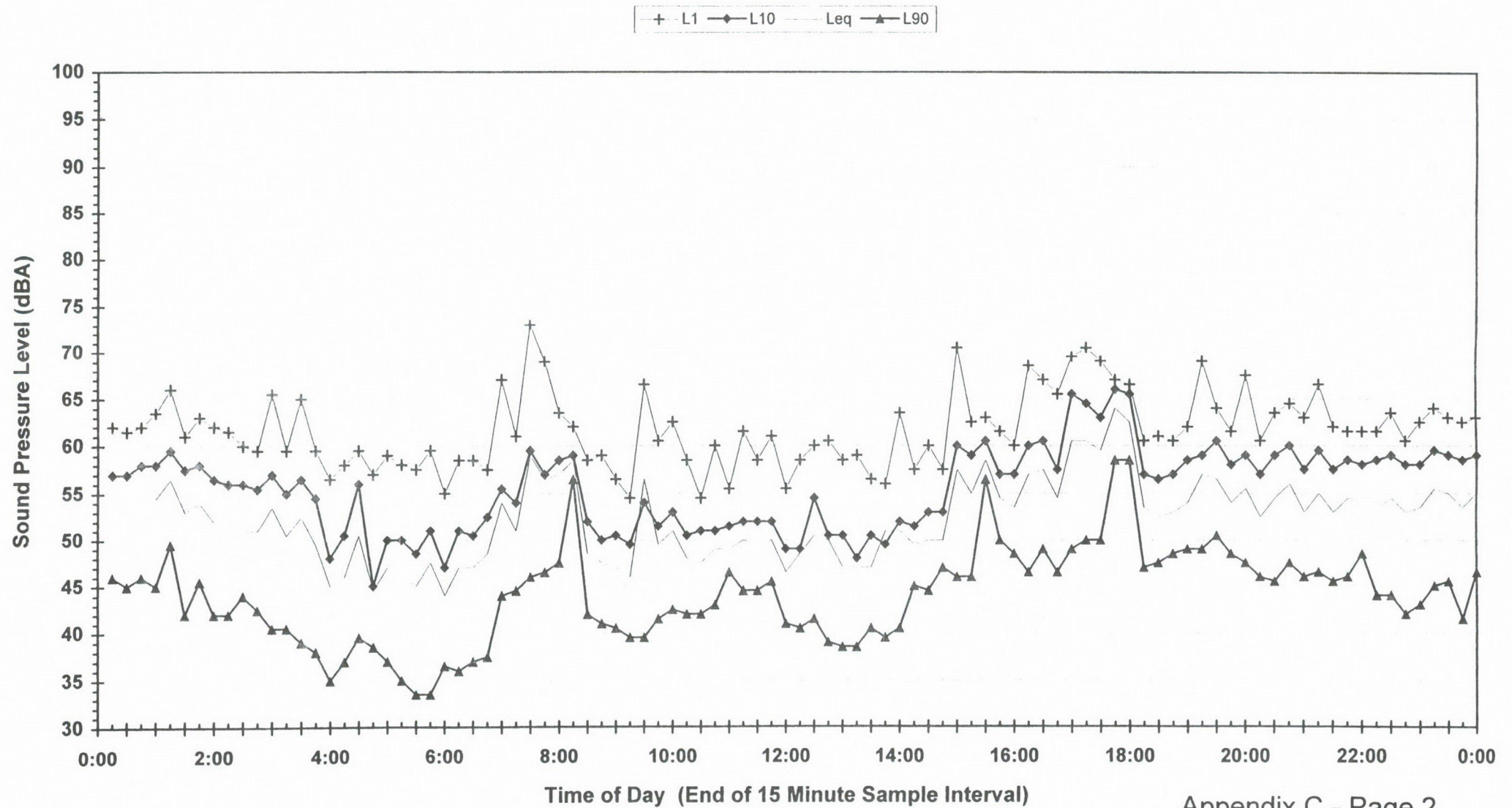
Statistical Ambient Noise Levels -Tarcutta Truck Stop
Location 2, Near Town Centre Option - Monday 20 April 1998



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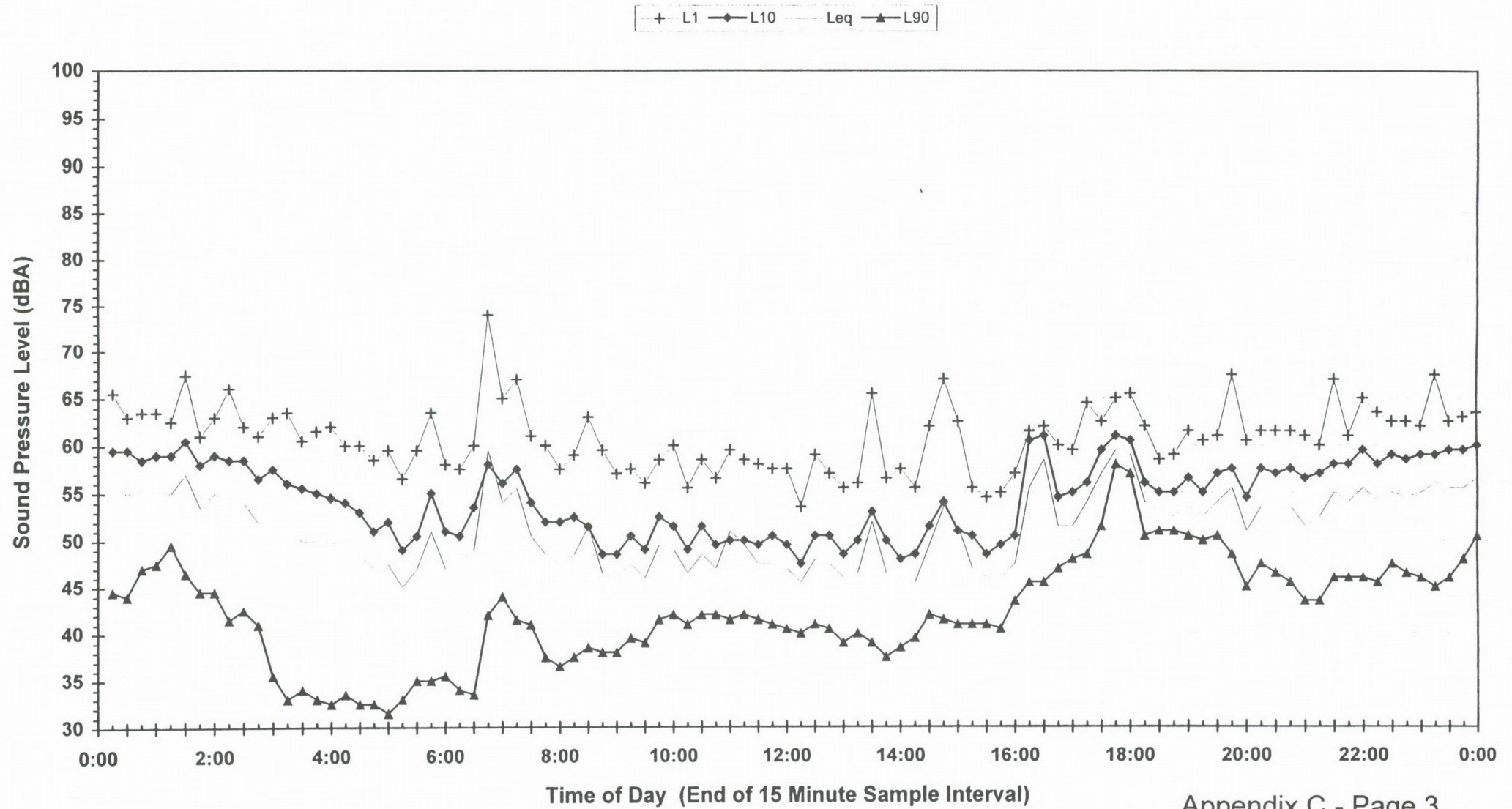
**Statistical Ambient Noise Levels -Tarcutta Truck Stop
Location 2, Near Town Centre Option - Tuesday 21 April 1998**



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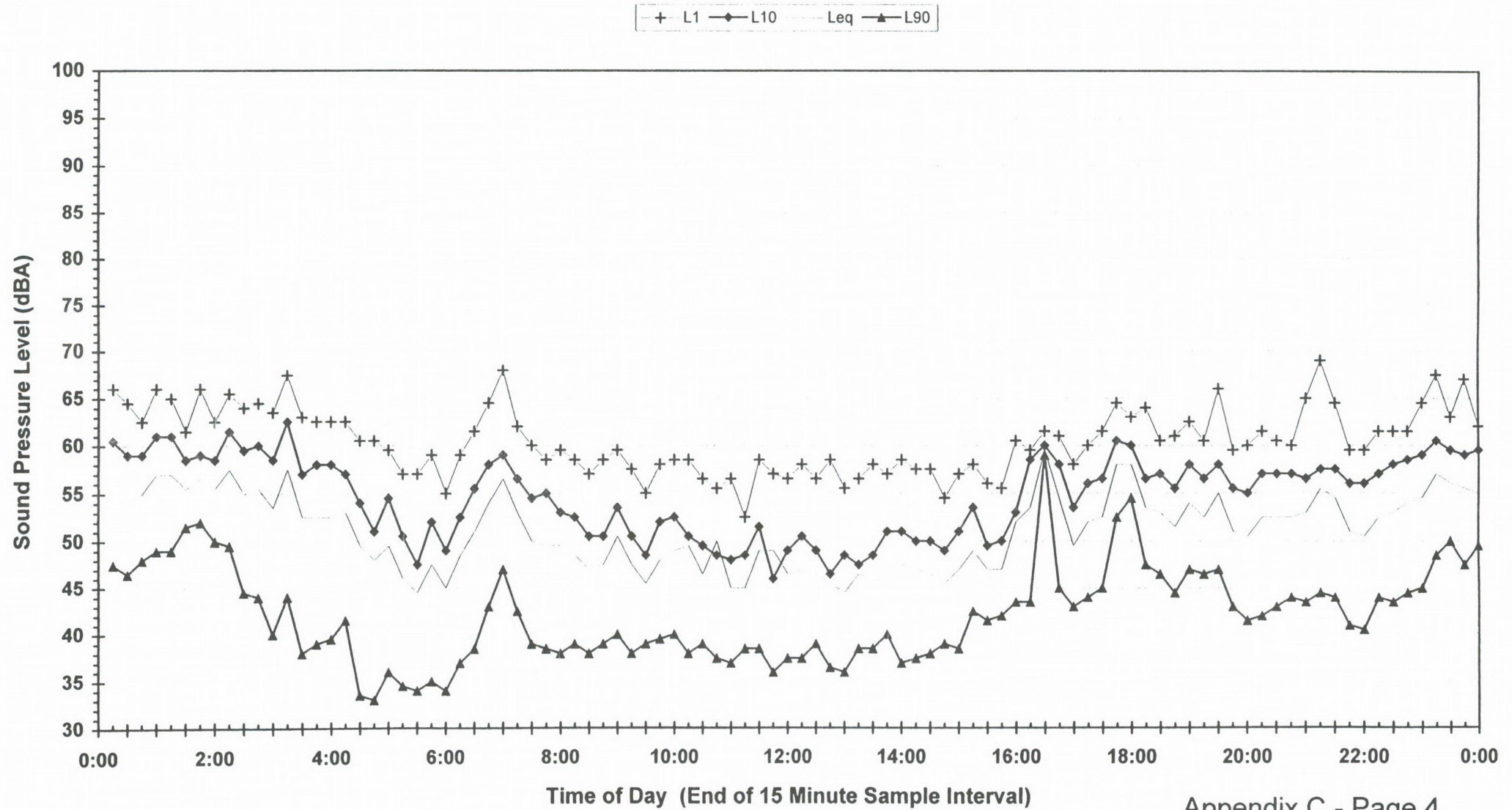
**Statistical Ambient Noise Levels -Tarcutta Truck Stop
Location 2, Near Town Centre Option - Wednesday 22 April 1998**



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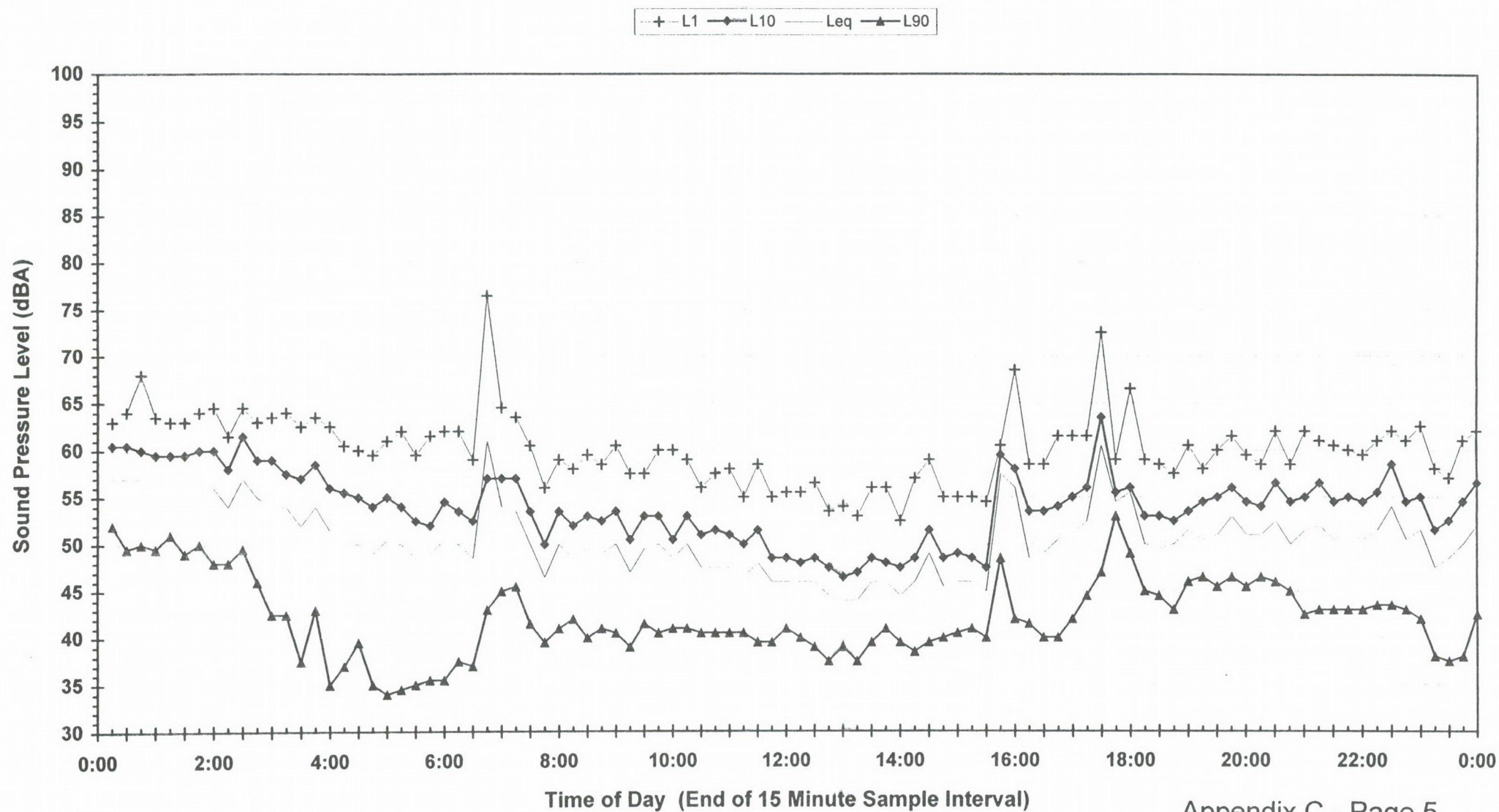
Statistical Ambient Noise Levels -Tarcutta Truck Stop
Location 2, Near Town Centre Option - Thursday 23 April 1998



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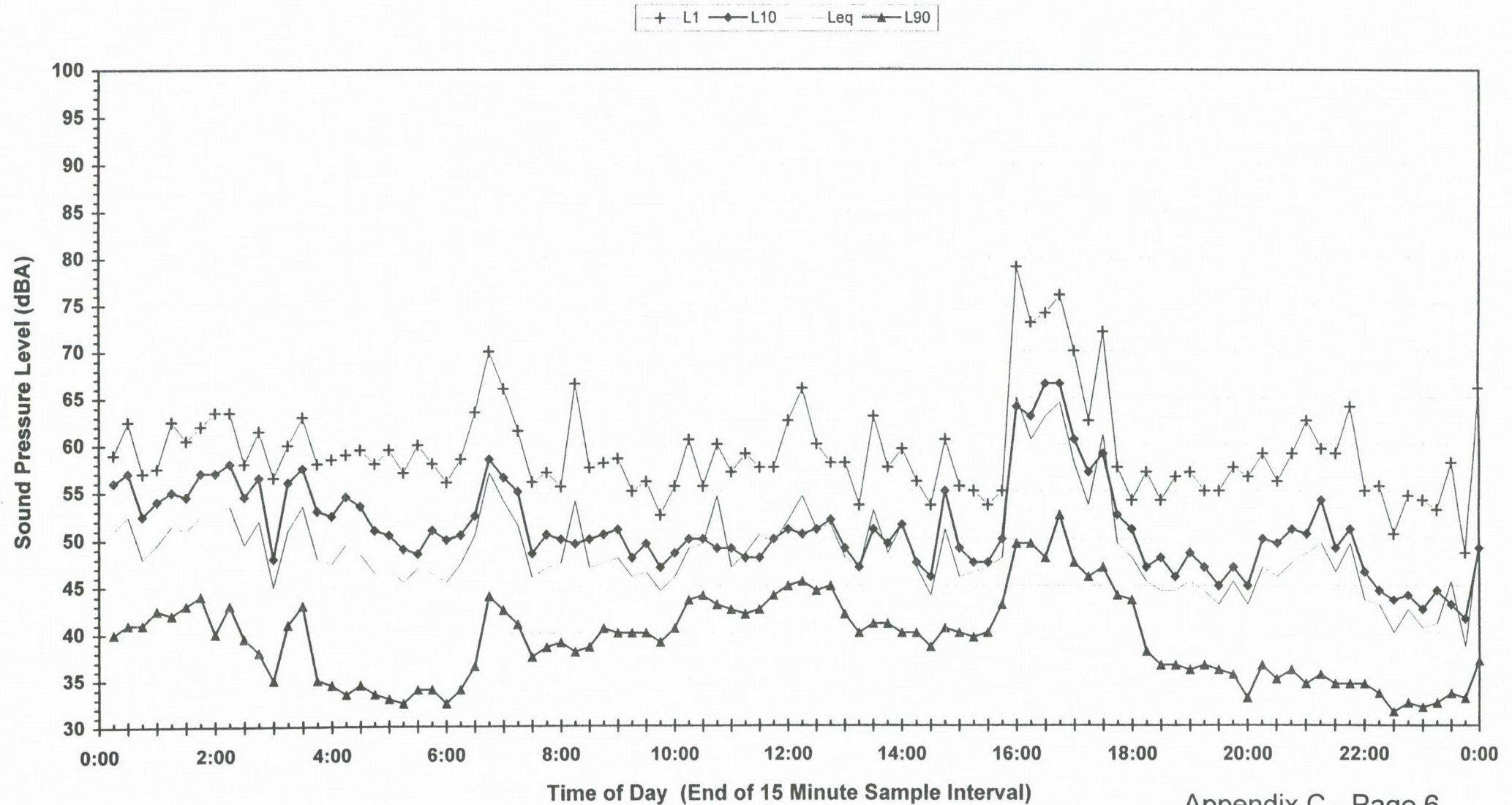
**Statistical Ambient Noise Levels -Tarcutta Truck Stop
Location 2, Near Town Centre Option - Friday 24 April 1998**



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Statistical Noise Levels
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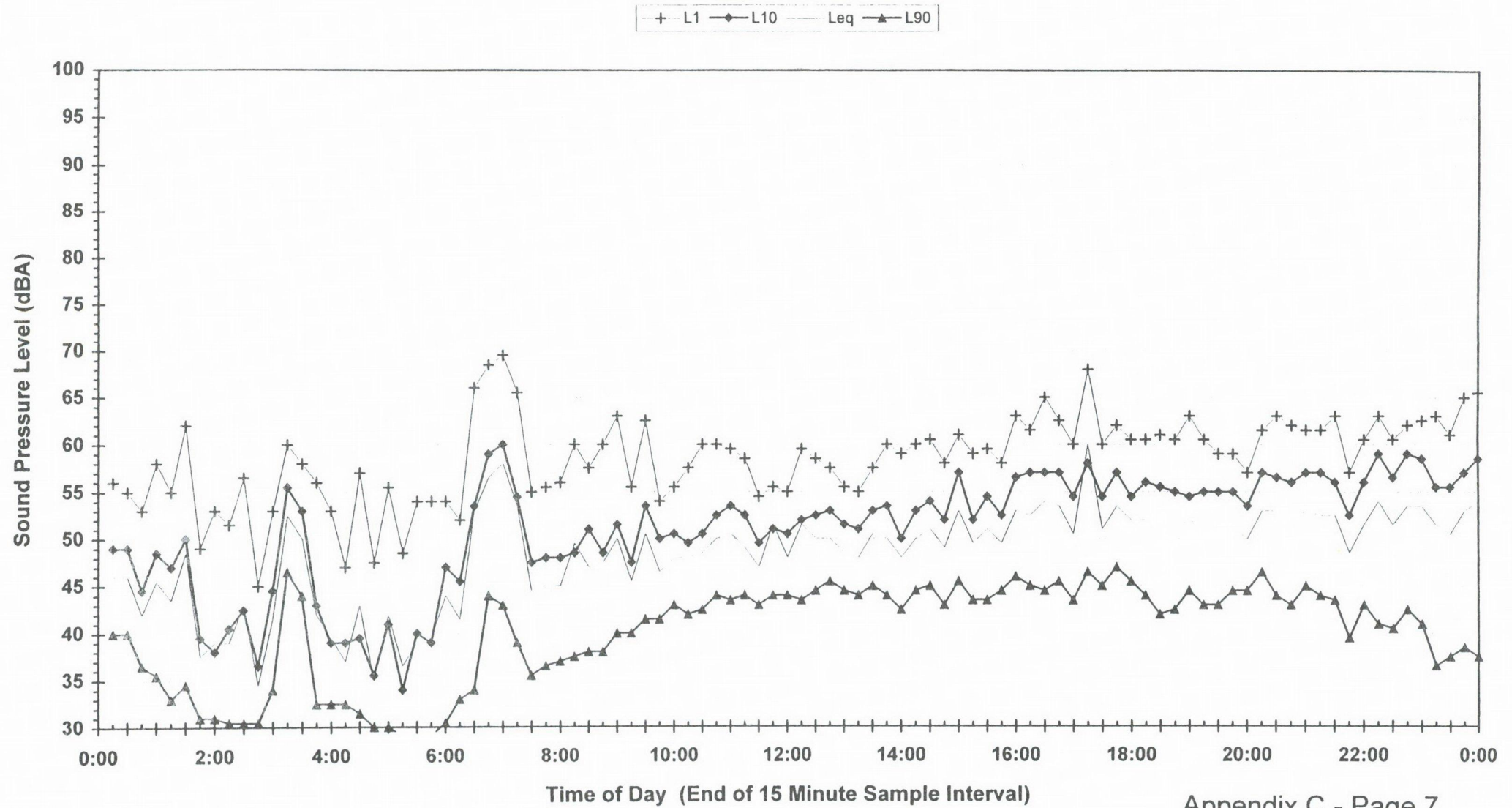
**Statistical Ambient Noise Levels -Tarcutta Truck Stop
Location 2, Near Town Centre Option - Saturday 25 April 1998**



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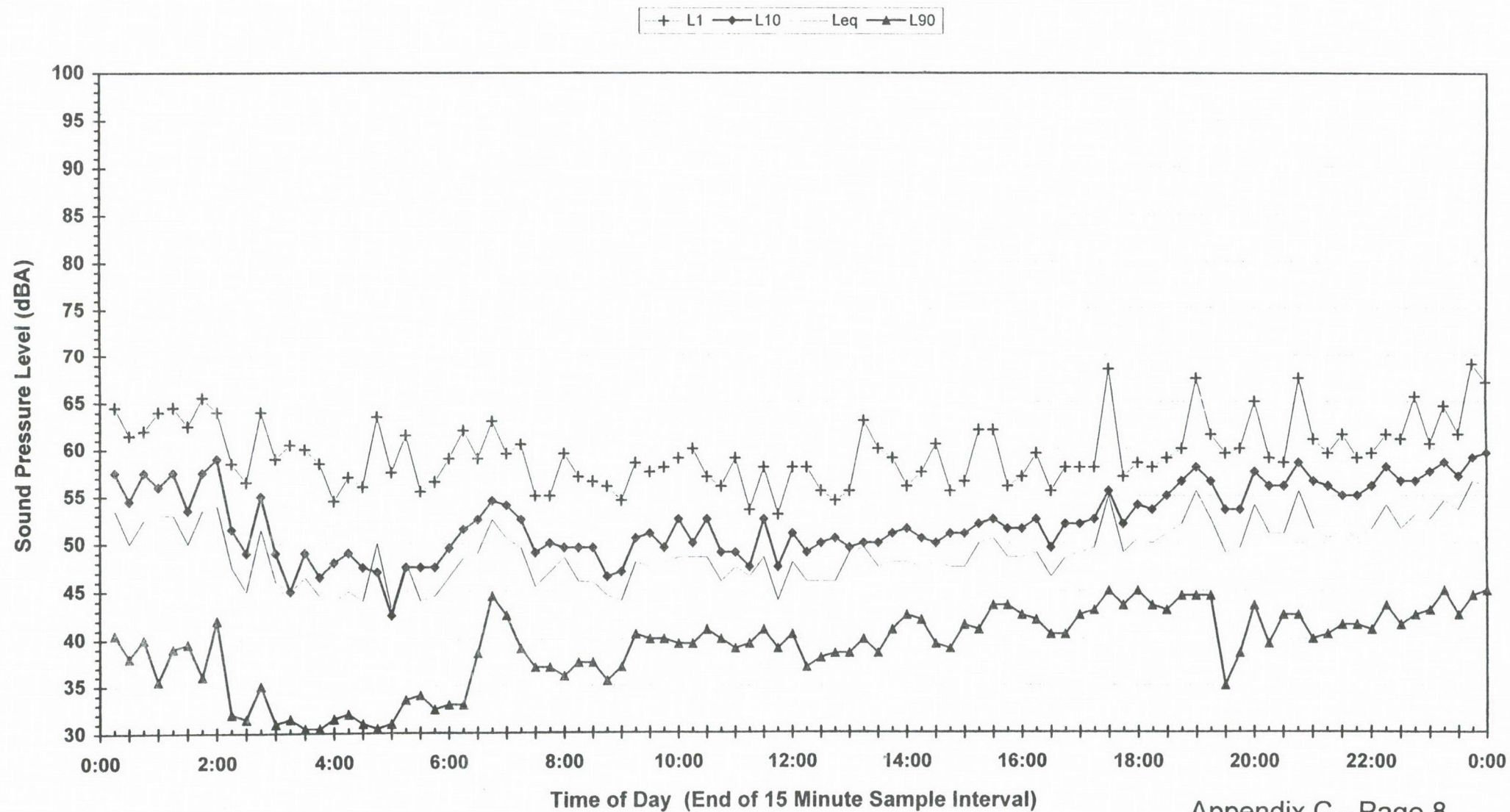
**Statistical Ambient Noise Levels -Tarcutta Truck Stop
Location 2, Near Town Centre Option - Sunday 26 April 1998**



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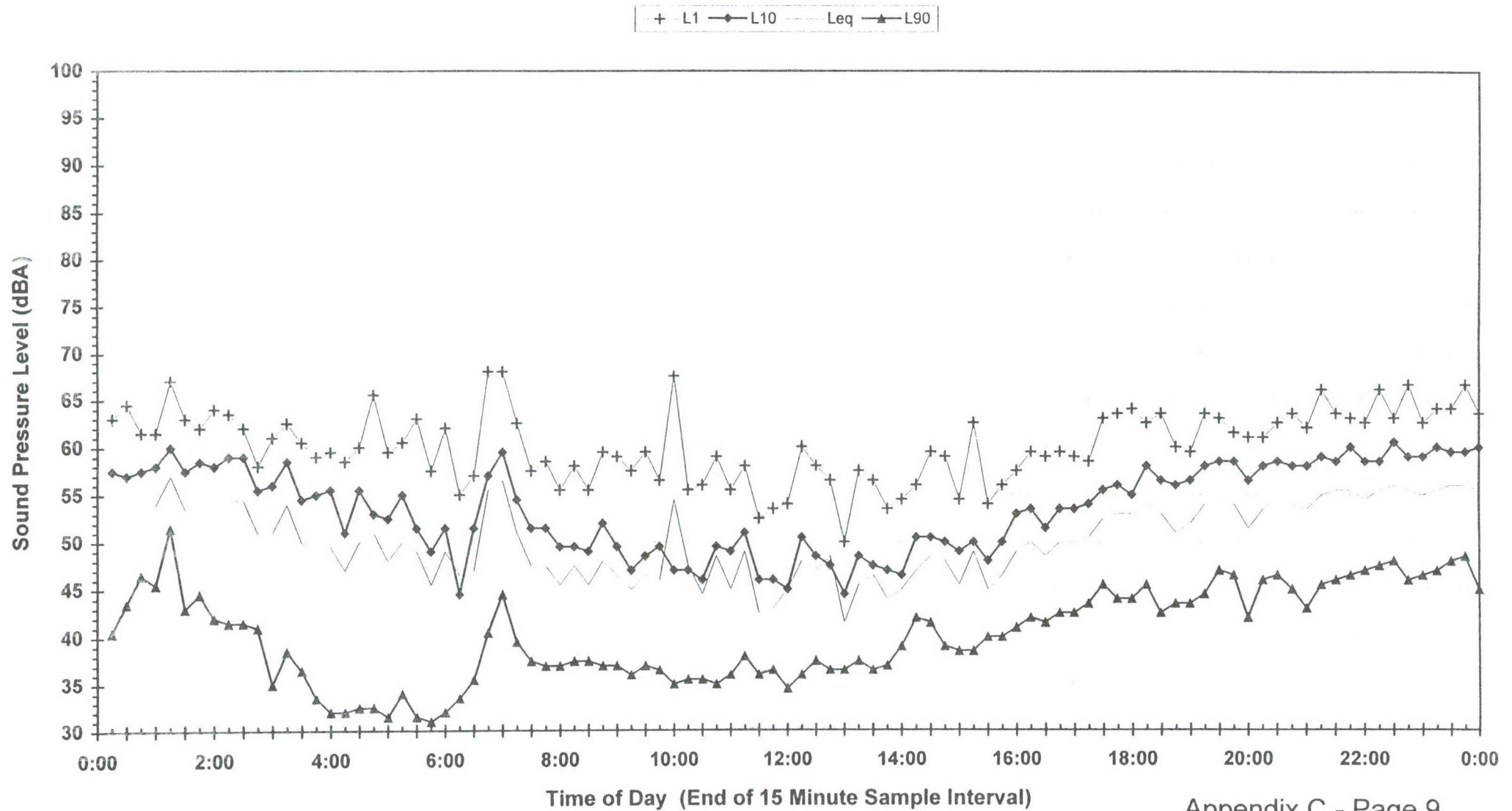
**Statistical Ambient Noise Levels -Tarcutta Truck Stop
Location 2, Near Town Centre Option - Monday 27 April 1998**



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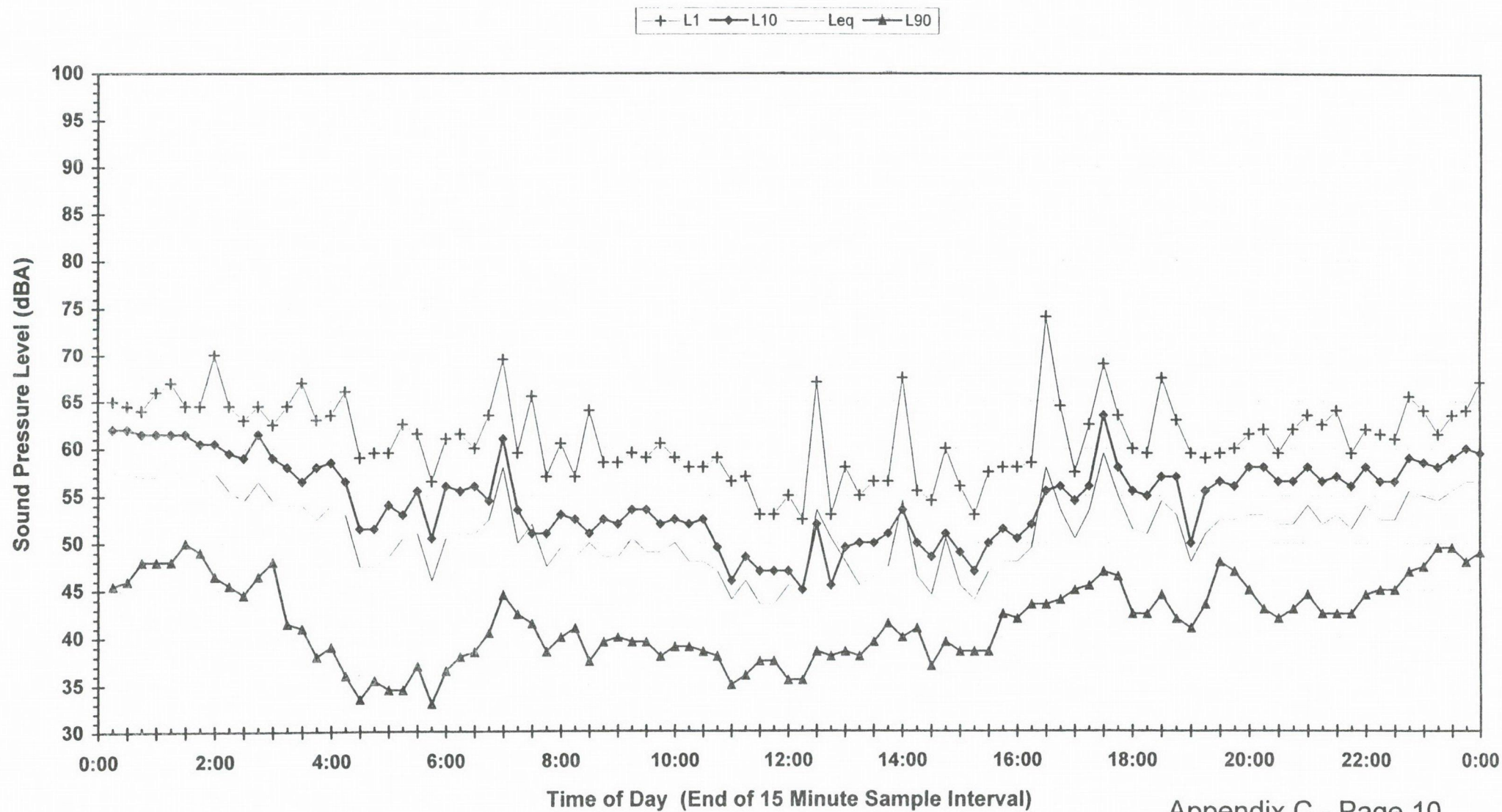
**Statistical Ambient Noise Levels -Tarcutta Truck Stop
Location 2, Near Town Centre Option - Tuesday 28 April 1998**



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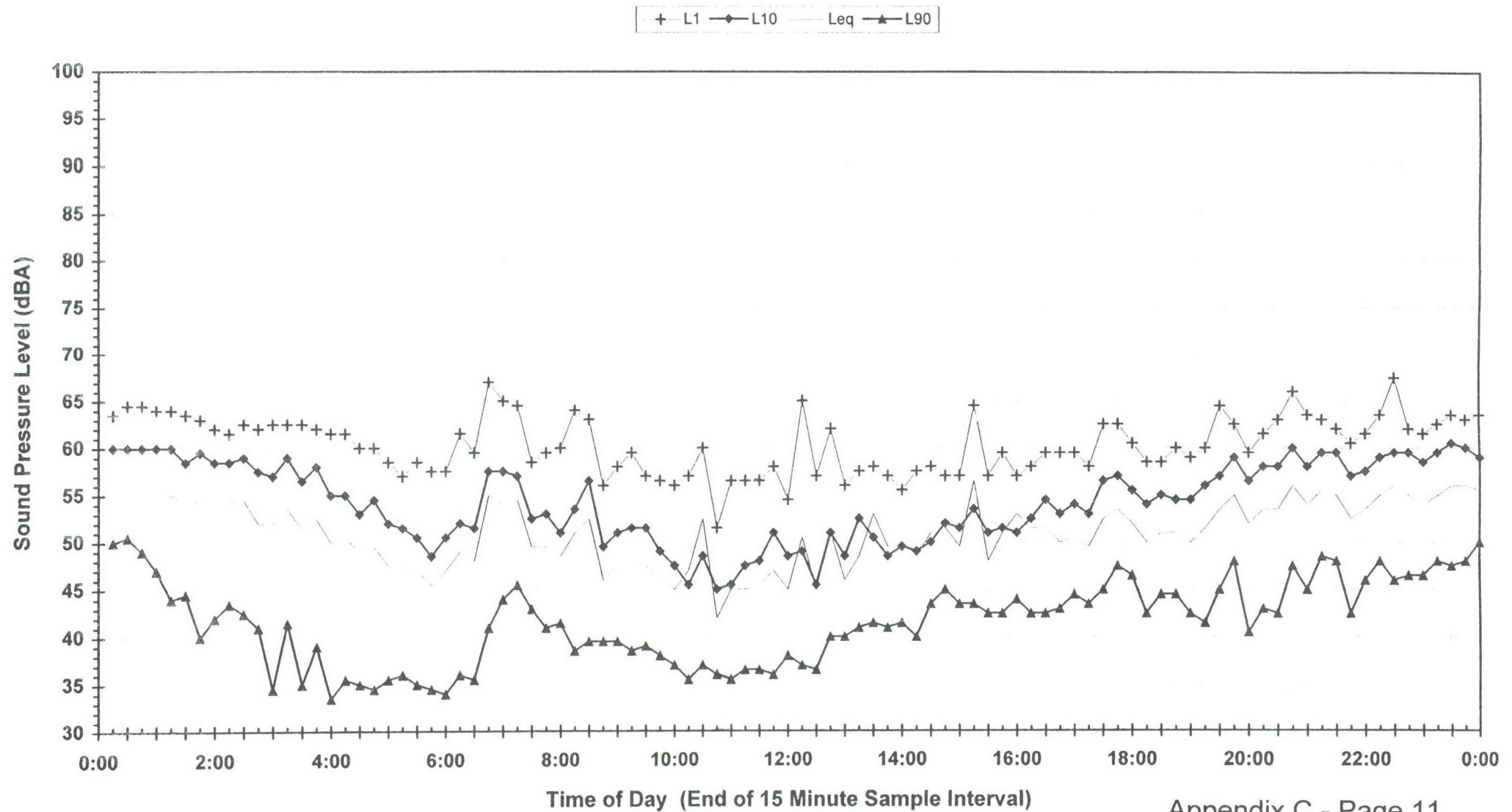
Statistical Ambient Noise Levels -Tarcutta Truck Stop
Location 2, Near Town Centre Option - Wednesday 29 April 1998



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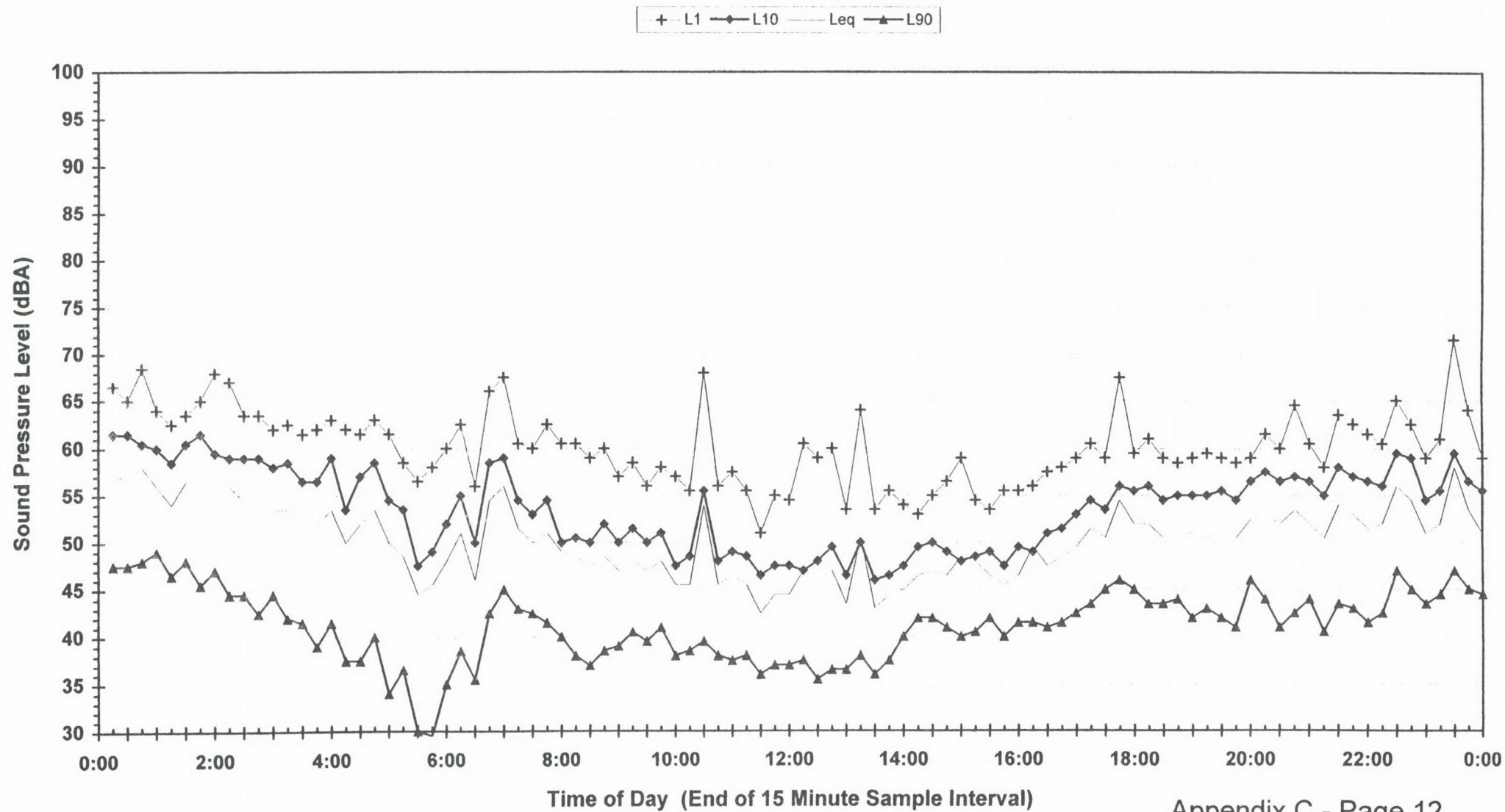
Statistical Ambient Noise Levels -Tarcutta Truck Stop
Location 2, Near Town Centre Option - Thursday 30 April 1998



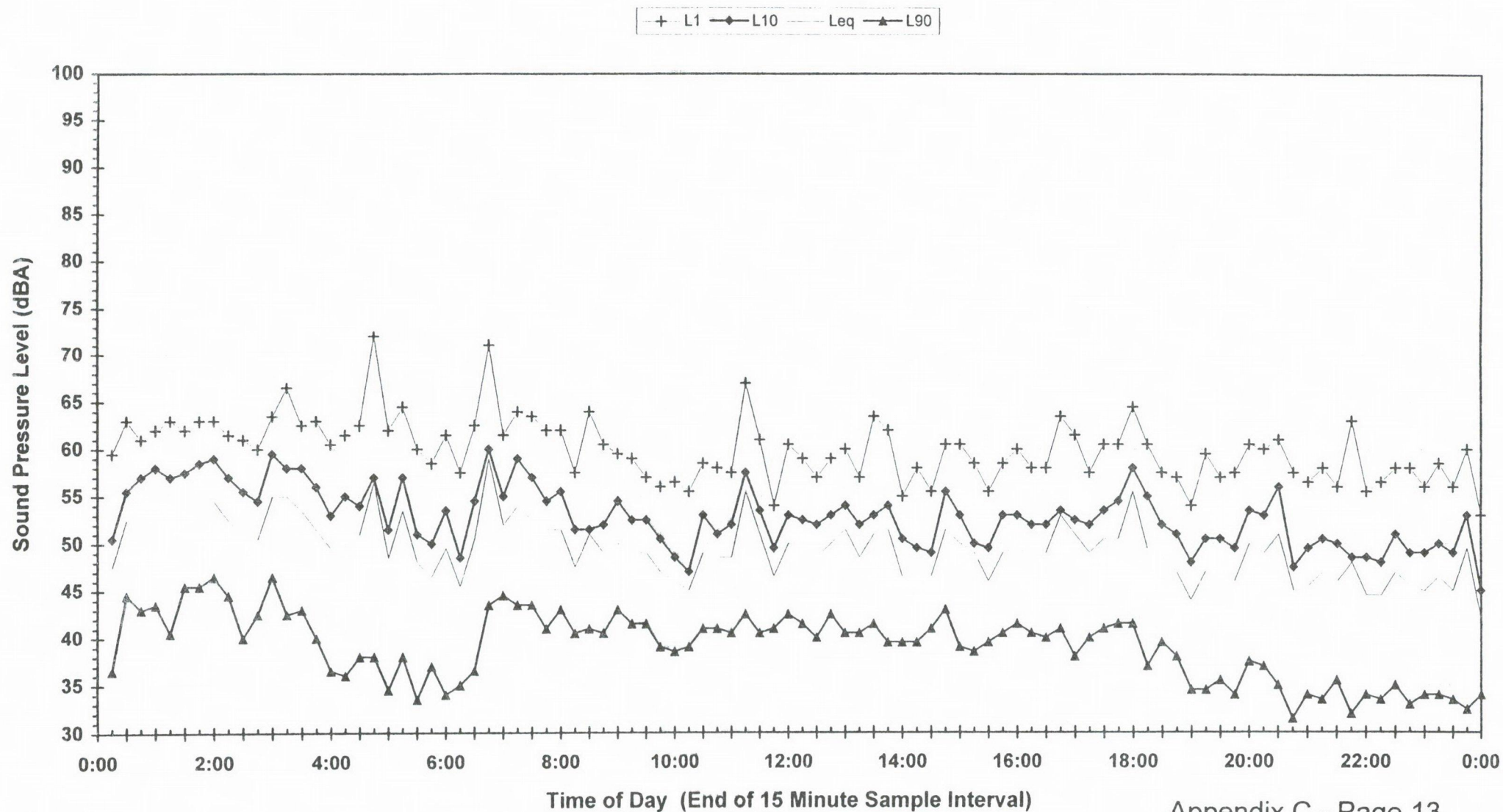
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Statistical Ambient Noise Levels -Tarcutta Truck Stop Location 2, Near Town Centre Option - Friday 1 May 1998



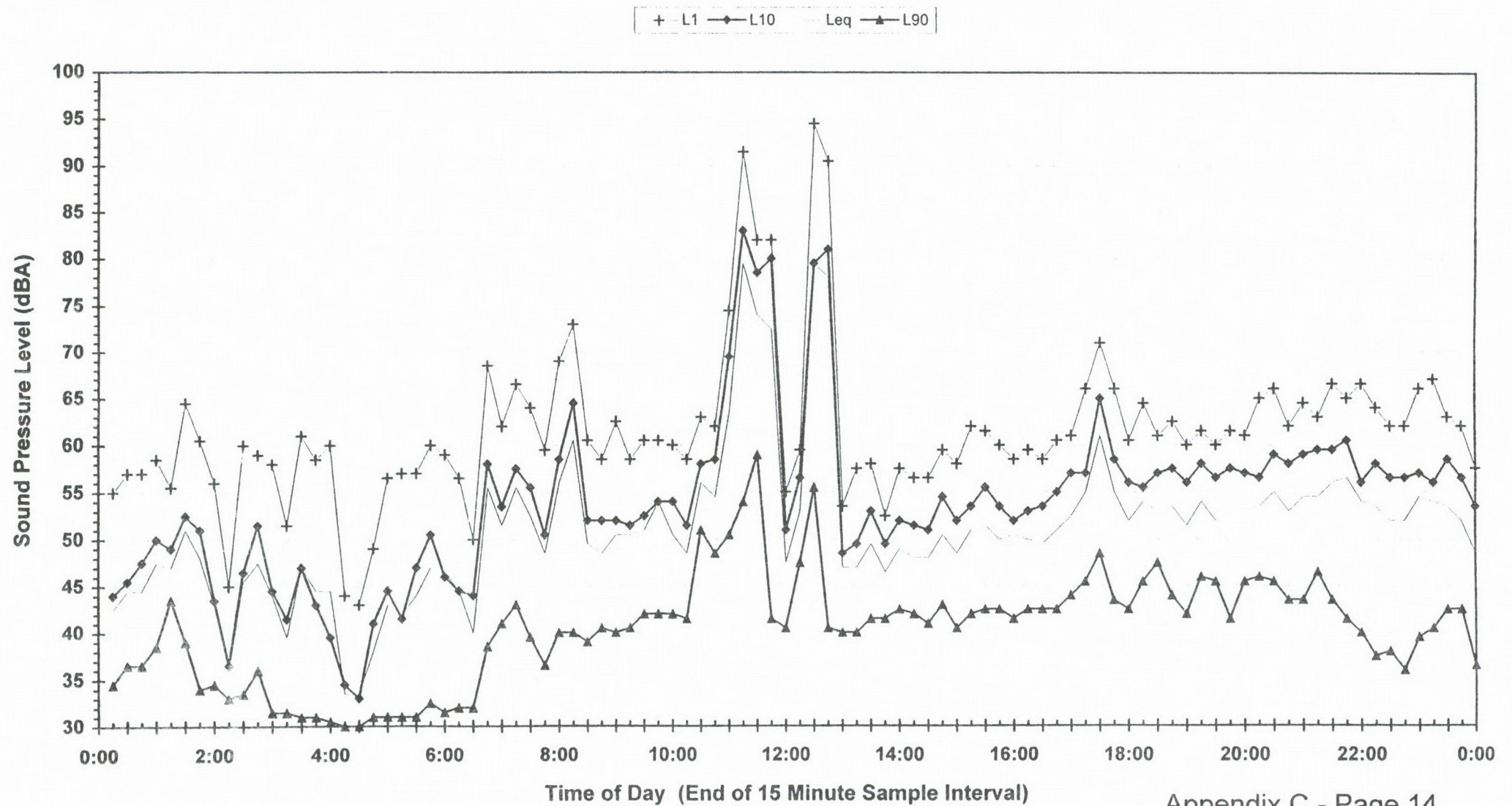
Statistical Ambient Noise Levels -Tarcutta Truck Stop Location 2, Near Town Centre Option - Saturday 2 May 1998



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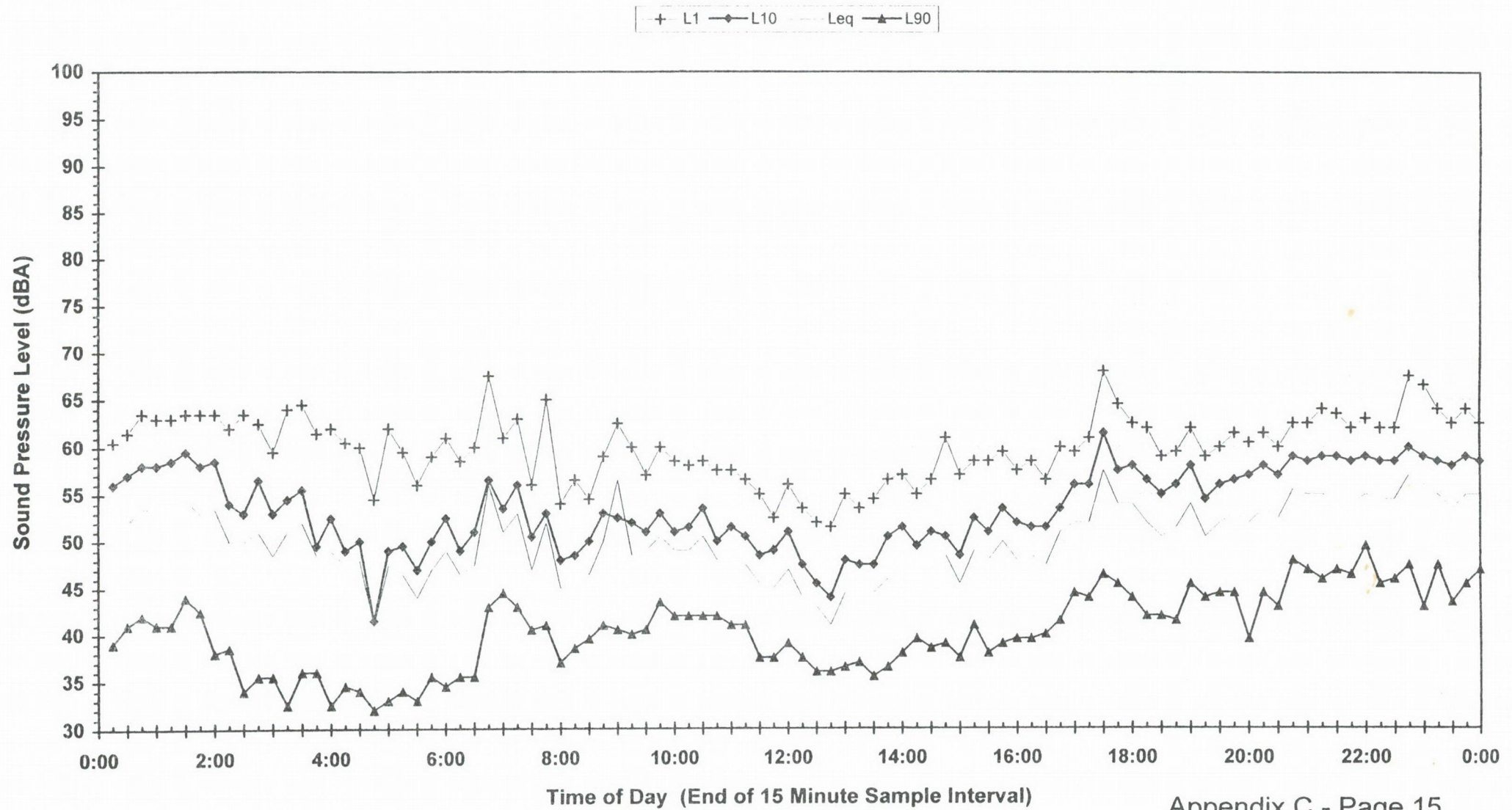
**Statistical Ambient Noise Levels -Tarcutta Truck Stop
Location 2, Near Town Centre Option - Sunday 3 May 1998**



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Statistical Noise Levels
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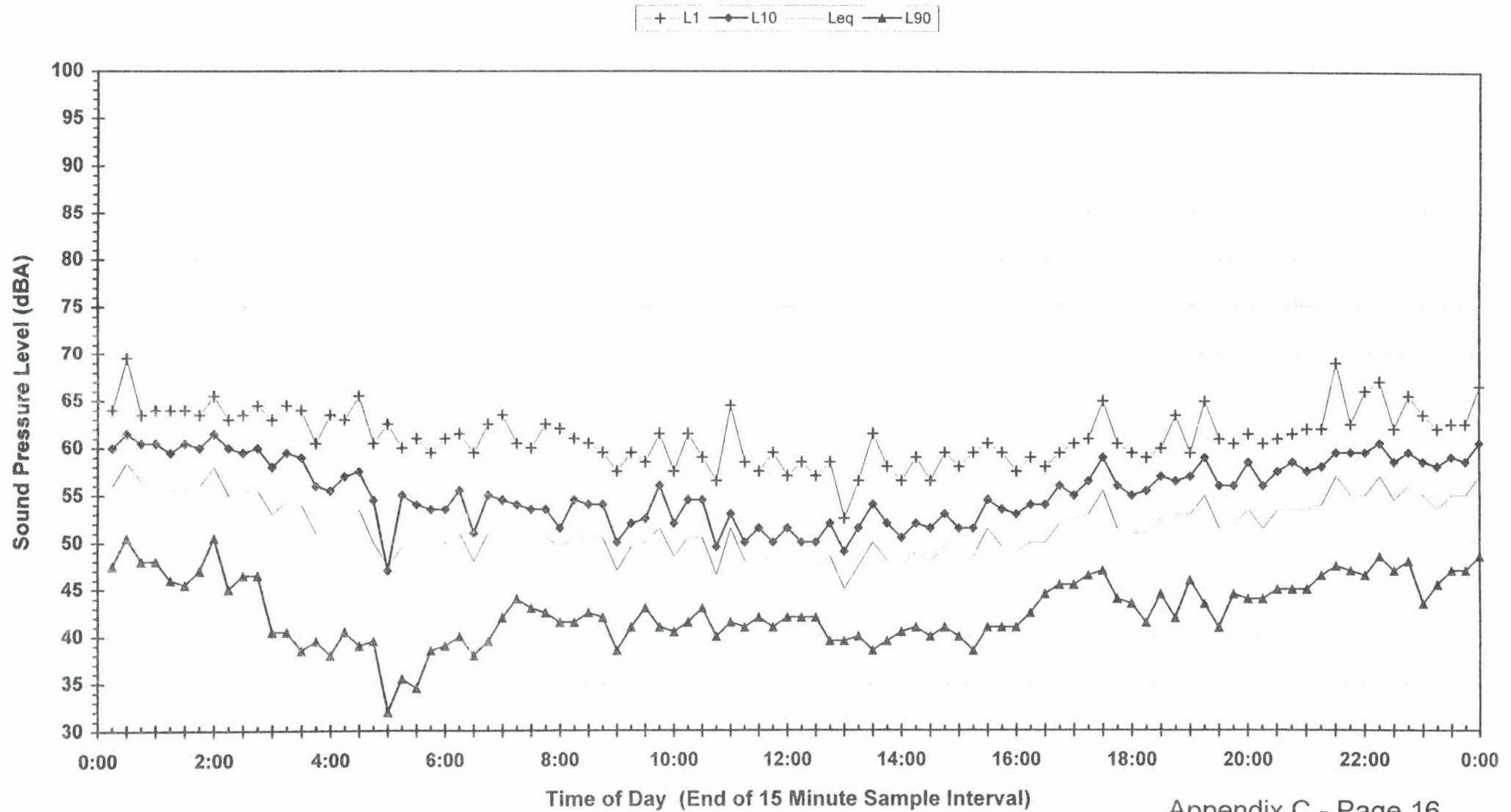
**Statistical Ambient Noise Levels -Tarcutta Truck Stop
Location 2, Near Town Centre Option - Monday 4 May 1998**



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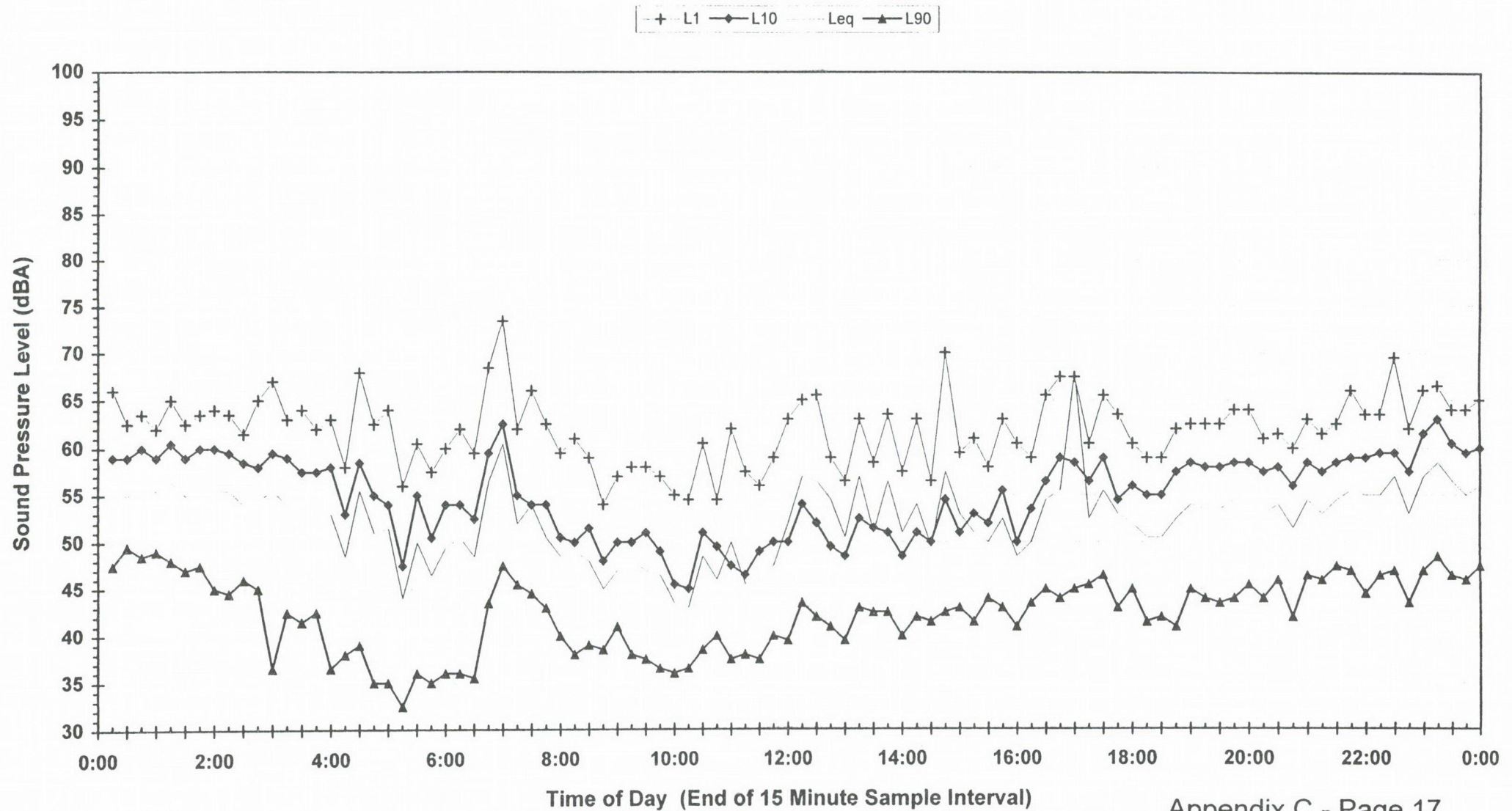
**Statistical Ambient Noise Levels -Tarcutta Truck Stop
Location 2, Near Town Centre Option - Tuesday 5 May 1998**



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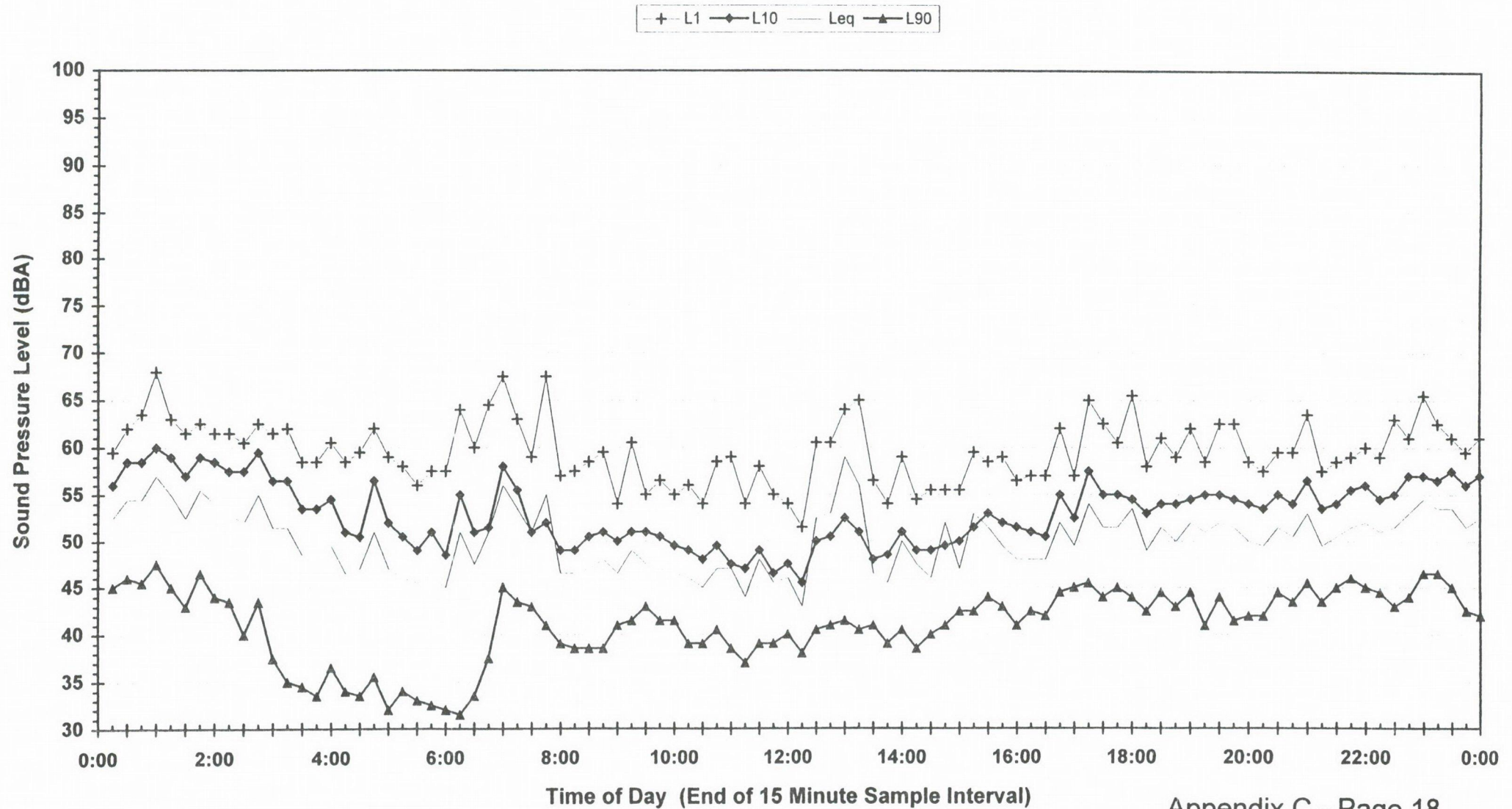
**Statistical Ambient Noise Levels -Tarcutta Truck Stop
Location 2, Near Town Centre Option - Wednesday 6 May 1998**



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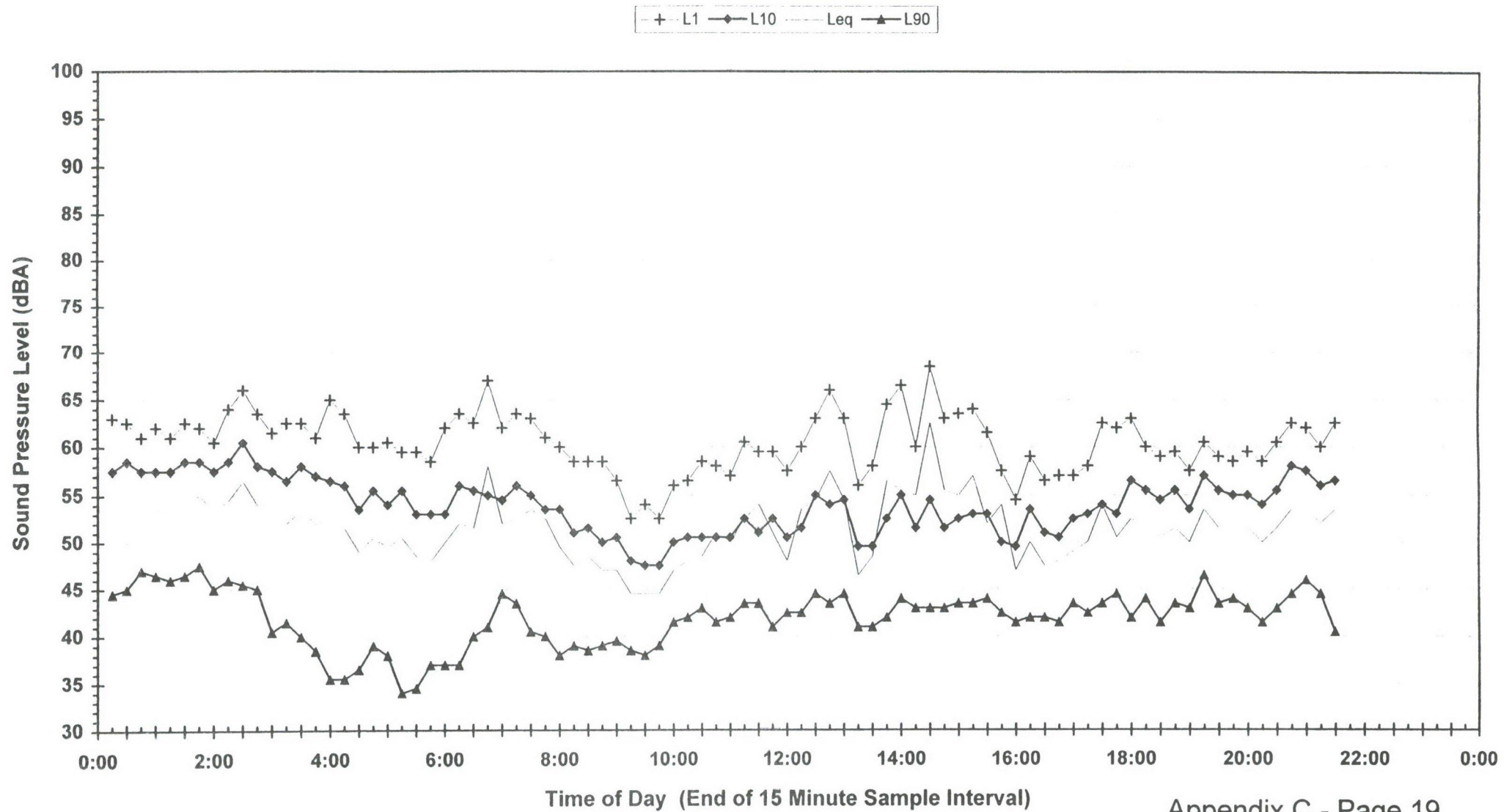
**Statistical Ambient Noise Levels -Tarcutta Truck Stop
Location 2, Near Town Centre Option - Thursday 7 May 1998**



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**Statistical Ambient Noise Levels -Tarcutta Truck Stop
Location 2, Near Town Centre Option - Friday 8 May 1998**



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Statistical Noise Levels
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Legend

- Emission Level Road
- Roadway
- Parking lot
- Receiver
- Building
- Ground elevation

Scale factor 1:6000

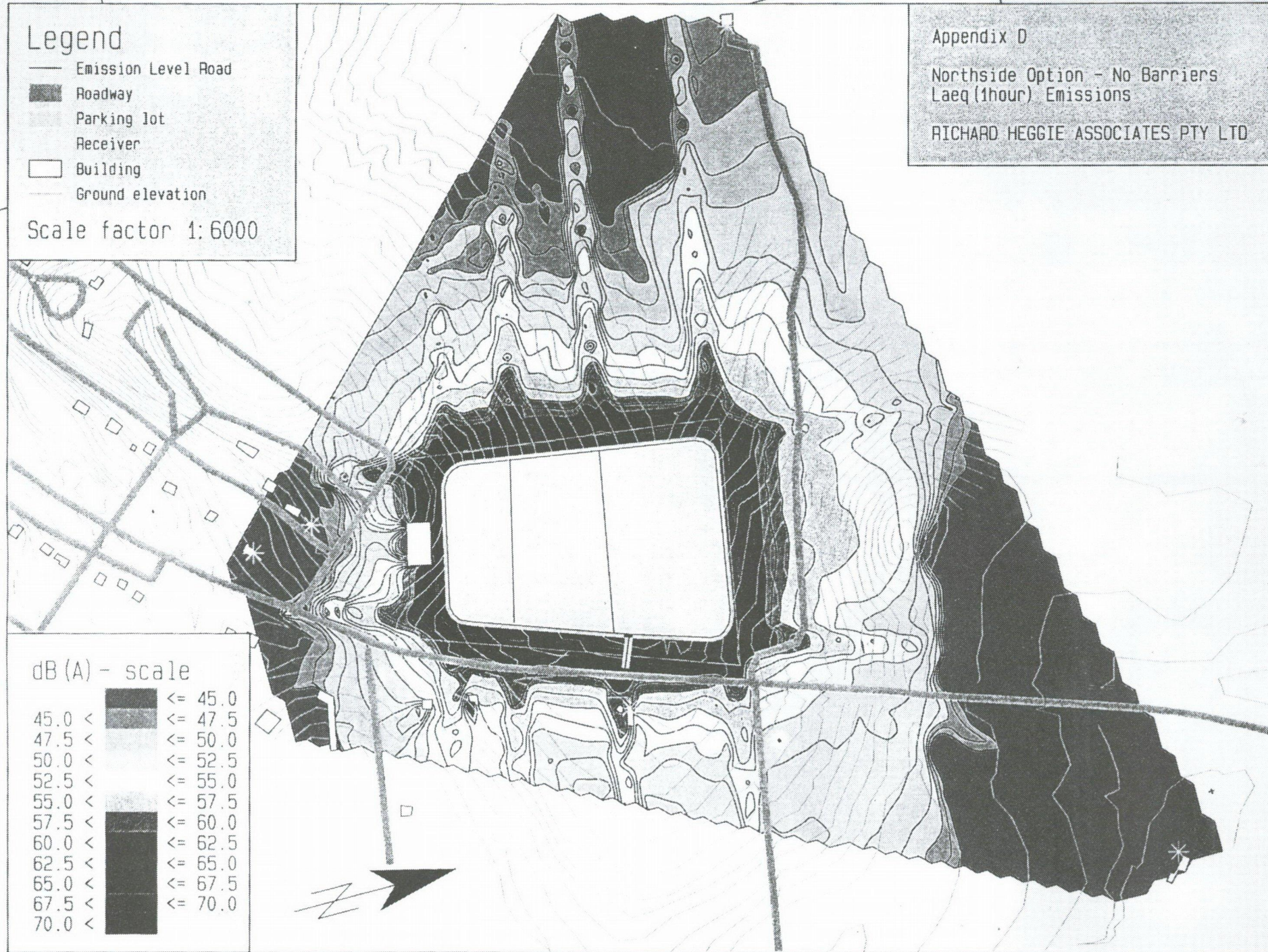
Appendix D

Northside Option - No Barriers
Laeq(1hour) Emissions

RICHARD HEGGIE ASSOCIATES PTY LTD

dB(A) - scale

45.0 <	≤ 45.0
47.5 <	≤ 47.5
50.0 <	≤ 50.0
52.5 <	≤ 52.5
55.0 <	≤ 55.0
57.5 <	≤ 57.5
60.0 <	≤ 60.0
62.5 <	≤ 62.5
65.0 <	≤ 65.0
67.5 <	≤ 67.5
70.0 <	≤ 70.0



Legend

- Emission Level Road
- ▨ Roadway
- ▨ Parking lot
- Receiver
- Building
- Ground elevation

Scale factor 1:4000

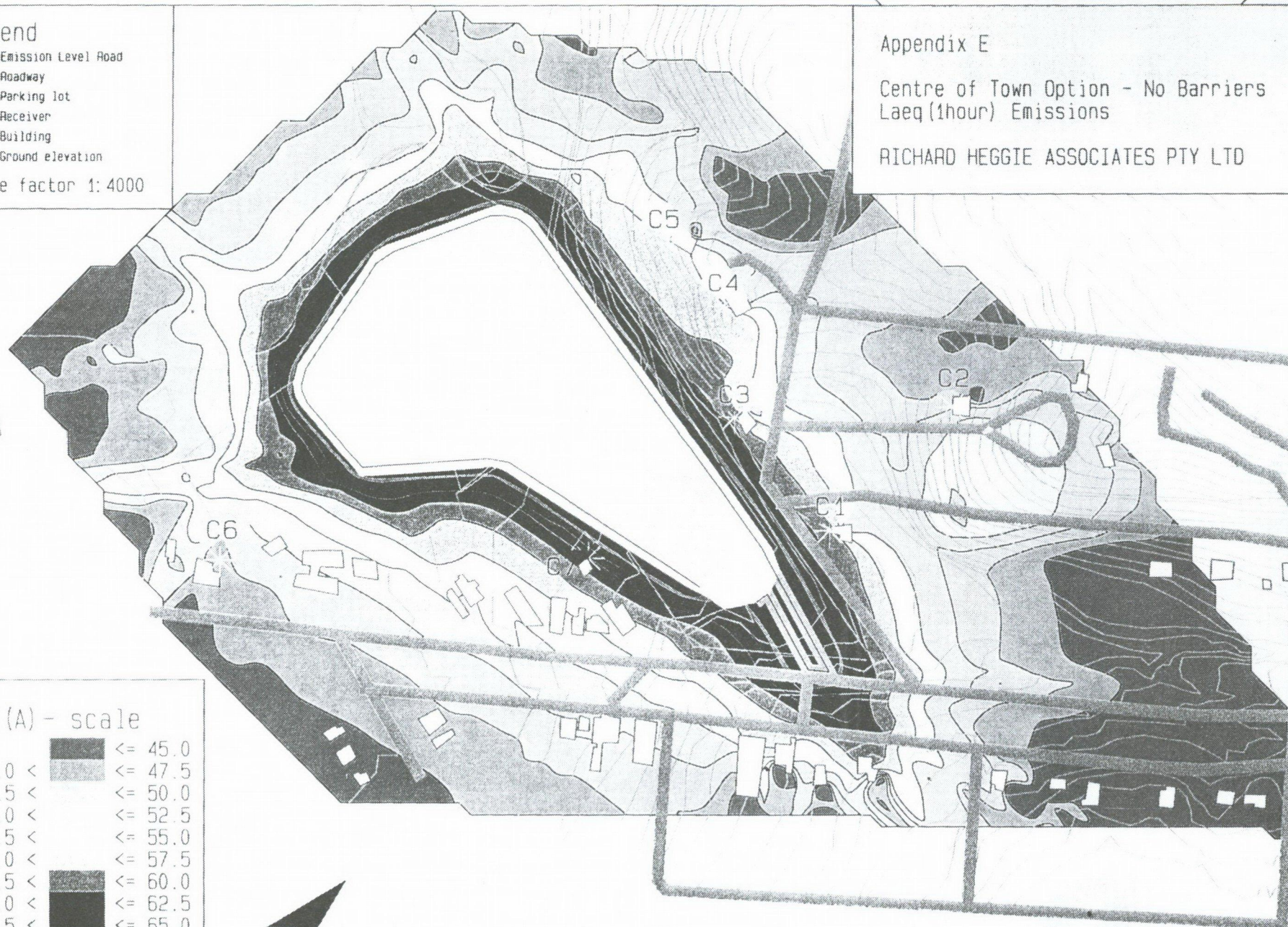
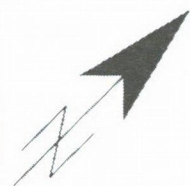
Appendix E

Centre of Town Option - No Barriers
Laeq(1hour) Emissions

RICHARD HEGGIE ASSOCIATES PTY LTD

dB(A) - scale

45.0 <	▨	<= 45.0
47.5 <	▨	<= 47.5
50.0 <	▨	<= 50.0
52.5 <	▨	<= 52.5
55.0 <	▨	<= 55.0
57.5 <	▨	<= 57.5
60.0 <	▨	<= 60.0
62.5 <	▨	<= 62.5
65.0 <	▨	<= 65.0
67.5 <	▨	<= 67.5
70.0 <	▨	<= 70.0







6000

700

800

6000

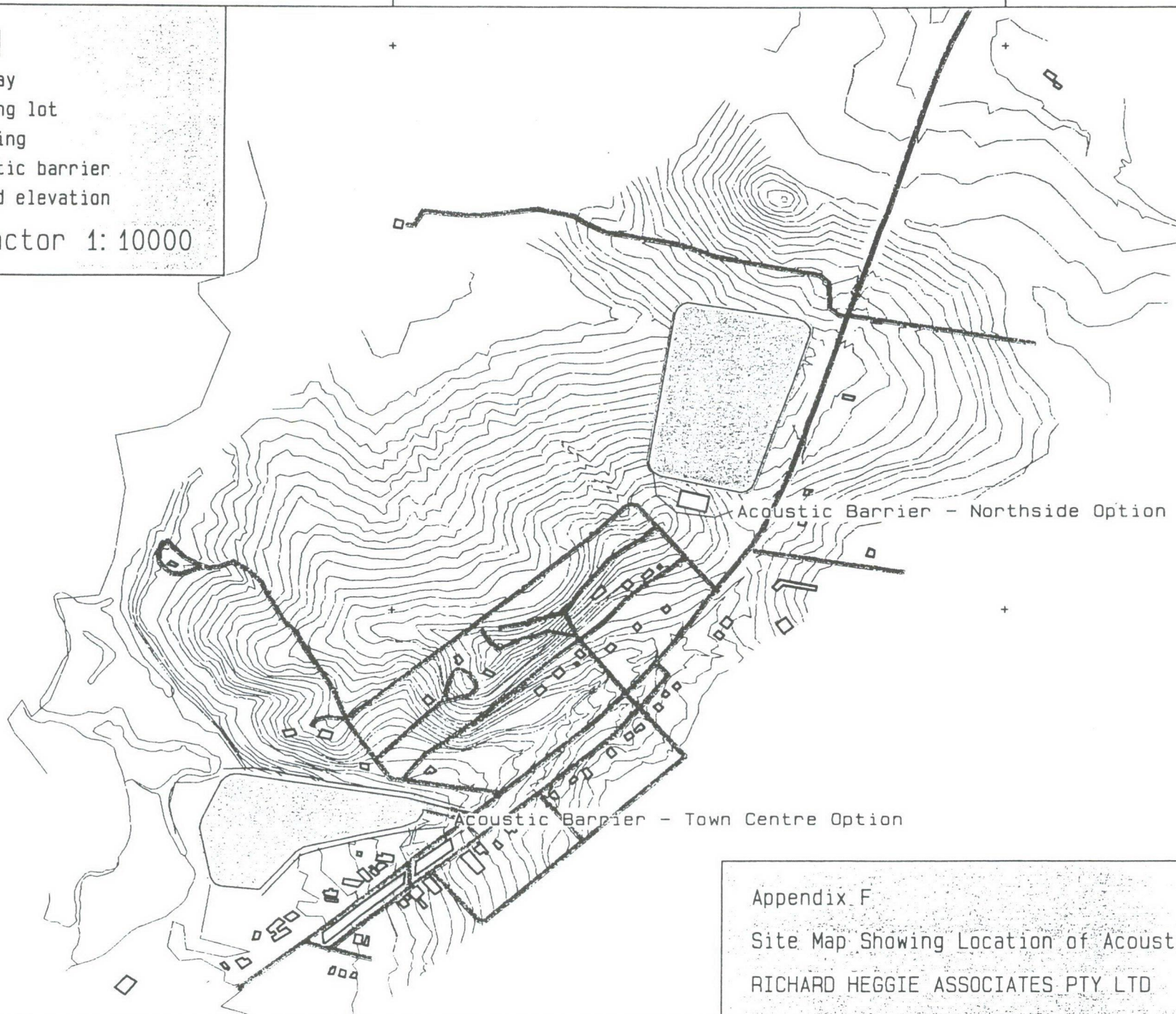
Legend

-  Roadway
-  Parking lot
-  Building
-  Acoustic barrier
-  Ground elevation

Scale factor 1: 10000

5000

5000



Appendix F

Site Map Showing Location of Acoustic Barriers

RICHARD HEGGIE ASSOCIATES PTY LTD

7000

8000